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FACTORS AFFECTING THE USE OF GOOGLE SEARCH ENGINE ACROSS DIFFERENT EMERGING TECHNOLOGICAL DEVICES: IMPLICATIONS FOR DESIGN OF SEARCH SOLUTIONS.

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Abstract

This study focused on the factors affecting the use of Google search engine across different emerging technological devices and its implications for the design of search solutions. The design of the study was survey research design. Three research questions and three null hypotheses were formulated to guide the study.The population for this study was3712 respondents which comprised of 3010 students and 702 Lecturers from University of Nigeria, Nsukka. The lecturers and students were chosen because they make use of Google search engine for research purposes. To constitute the sample, 140 lecturers and 301 students were selected using simple random sampling technique. A structured questionnaire of 21 items was developed for the purpose of data collection. Three experts validated the instrument and Cronbach alpha method was used to determine the reliability co-efficient which yielded 0.81. Data collected were analyzed using mean and standard to answer research questions and independent sample t-test statistic to test the null hypothesis. From the analysis of the research questions, it was found that different factors affect the use of Google search engine across different emerging technological devices such as quality of the system/interface, quality of the information stored in the system and level of satisfaction derived by the user in the daily use of the system. The findings of the study also revealed that there was no significant difference (p>0.05) among the respondents on the factors affecting the use of Google search engine across different emerging technology devices. Based on these findings, it was recommended among others that search engine companies are to censure the inclusion of relevant keyword for easy search, uploading contents that solve user"s problems, making search engine responsive across different devices and gaining back-links to the search engine, so as to improve the convenience and efficiency of using search engines across different emerging technological devices.

Introduction

In recent times, search engines like Google, altavista, yahoo, dogpile and ask have become the main source of information for students, lecturers, researchers, learners and teachers across the globe and numerous technological devices that users use to search for information online have emerged.

It is evident that Google appears to be ahead of all other search engines, and often time people think that Google is the only search engine that can be widely used for all kinds of information search online, be it video, audio text or pictures. According to James K. (2017) a search engine is a website that collects and organizes content from all over the internet and those wishing to locate something would enter a query about what they had like to find and search engine provides links to content that matches what they want. Vangie Beal (2017) defined Search engines as programs that search documents for specified keywords and returns a list of the documents where the keywords were found. The author further defined Google search engine as a search engine that enable users to search for documents on the World Wide Web. Therefore, Google can be described as that search engine that is most widely used in searching for information across different emerging technological devices.

Emerging technological device is a term used to qualify the evolving devices that have transformed our individual lives in different perspectives. According to Conway (2013) Emerging technology is a relative term, because someone may see a technology as emerging, while others may not see it the same way and that According to BusinessDictionary.com, emerging technology is a new technology that is currently being developed, or will be developed within the next five to ten years. Black (2014) also defined emerging technological devices as new devices that will substantially alter our business and social environment. The emerging devices include smart phones, ipads, laptop computers, palmtops, advanced robotics and many others. All of these are currently improving or

Keywords: *Search Engines*, *Google*, *emerging technology*, *search solution*

developing, or will be developed within the next five to ten years. In the same vein, Georges (2010) defined emerging technologies as tools, concepts, innovations, and advancements utilized in diverse educational settings (including distance, face-to-face, and hybrid forms of education) to serve varied purposes. Therefore, we can infer from the authors definitions that, emerging technological devices can be defined as a term used to qualify all the evolving, new and upcoming technological tools like conventional mobile phone, ipads, tablets and laptops PC's amongst others. Thus, technological devices are those electronic gadgets, tools or devices that users use to access search engines

Sequel to the unavoidable importance of the use of emerging technology devices in searching for information online, the use of search engines became as integral to our daily lives as the food we eat and without which we feel completely lost and disconnected to our world. Nowadays, people are found browsing anywhere at any time, be it on the road, market, workplaces and many others, using their phones, tablet Pc's Laptops and many other hand held devices. Nevertheless, there have been numerous problems facing internet search. According to Vlastislav (2011)scale of the problems are emphasized by the recent growth of technological devices, digital libraries, data warehouses and other Internet resources that have arisen as a direct consequence of latest advances in computing, communication, storage and other emerging technological devices. Consequent upon this, urgent efforts are needed to finding the factors affecting the use of Google search engine across different emerging technological devices and its implications for design of search solutions.

Primarily, it can be argued that the main factor affecting the use of any search engine is the quality of information that is available in the search engine's database. According to Brodkin (2008) alongside Personal Computer, the mobile devices are currently the most commonly used and spread Information Communication Technology (ICT) device world-wide, which offers search engine users the directness and level of personalization in getting the required or needed information from the right search engine that no other device can match. Feijo, Maghiros, Abadie and Gómez-Barroso (2009) is of the view that the recent evolution of technological devices will lead to an explosion of search engine content or information quality and applications that will shape the internet of the future and increase the quality of life. Therefore, the authors are of the view that information quality or content of the search engine is an important factor that search engine companies should consider, so as to offer users the high level of integration needed in using search engines across different devices and settings.

However, the pattern of use of search engines across emerging technology devices differ significantly from each other, thus, the need to consider the usability of each search engine, so as to ensure user satisfaction across different devices and settings. Rubin et al(2006) opined that emerging technologies may spring from a new technology or application of an existing technology and are defined as science-based innovations that have the potential to create a new industry or transform existing ones, insofar as there is a high level of user satisfaction. In the same vein, Larry and Chunka (2000) identified three new forces that require a new strategic framework and business design tools

which influence user satisfaction in using emerging technology devices in teaching and learning today, as: digitalization, globalization, and deregulation. However, Rubin (2006) viewed technology innovation as what breeds emerging technologies and without the existence of technology innovations, technology cannot be transformed for new ones to emerge and for our industries and economies to grow there must be high level of user satisfaction of the emerging technologies. On the other hand, the unavoidable importance of some legacy/old systems and resistance to change portrayed by users, hinder the efficient user satisfaction of some technologies. Therefore, user satisfaction is an important factor to be considered while designing search engines that will be used in different devices and settings, thus, the need for smooth progression from legacy/old to emerging systems.

The information quality of Google search engine when compared to other search engines cannot be over emphasized. This is one of the reasons why users are always kin in using Google for their online information search, rather than other numerous existing search engines. In the same vein, Stephen (2007) argued that search engine content publishers are exploring more that they compete on the usefulness of the content or quality of information been browsed online. In clear terms, Google search content providers are transforming their search offerings into applications tailored to specific audiences, delivering information products based on type of device in use, users' roles, activities, and work processes. The authors view is therefore applicable in our contemporary and modern society, because the use of search on emerging devices like Palm tops, Ipads and conventional mobile phones, differs significantly, owing to the differences in screen size and output format. Consequently, search engine developers are to put this into consideration while developing pages and sub-pages in the web, so as to improve the efficiency of use of different emerging devices for online information search.

More so, the level of satisfaction enjoyed by Google search engine users can be evident in the level of their ranking online. In the existence of other search engine providers, Bala and Davenport (2008) states that Google stands out as both particularly successful and particularly innovative company that operates ebusiness, and that Google has unique marketing strategies and leading Internet search engine in the world because of its acquisition of features that satisfy every users. Christensen (2007) also opined that successful companies like Google now find it easy to develop sustaining technologies in businesses as a result of users' high level of satisfaction. The author further stressed that the inability of other successful search engine companies to develop disruptive technologies has undermined their innovative capabilities and business successes. On the other hand, studying the level of users satisfaction affecting the use of Google search engine across different devices would act as a guide to institutions and firms operating in contemporary online settings, thus, helping them to discover what should be done so as to satisfying students and customers.

Google's information system quality is characterized by high level of security, fantastic interface, sustainable backend design and easy interactive features. Bala and Thomas (2008) emphasized that, in addition to technology explicitly designed and built by Google for online information search, Google has a well-considered system qualities and cultural strategy that helps the company to attract the most talented people in the land and keep them working hard. In critical perspective, Porter (2001) argued that notwithstanding the contributions of the internet and search engines in learning and research, it has led many companies to make bad decisions that have undermined their competitive advantages as a result of poor information system quality. Therefore, every search engine has to seriously consider the information system quality so as to sustain their competitive advantage and growth.

In consequent, this research is somewhat novel, advanced and creative, as it aims to investigate the factors affecting the use of Google search engine across different emerging technological devices, so as to draw some implications for the design of search solutions.In order words, it will provide in-depth clarity on this issue, so as to contribute significantly to the development and use of Google search engine, as well as aid in information systems practice.

Statement of the Problem

Sequel to the existence of numerous emerging technological devices like smart phones, tablet PCs, palm tops and laptop computers that is mostly used for online information search today, information quality, system quality and user satisfaction derived from Google while using any of the emerging technological devices, like smart phones, tablet PC's, Laptop computer and so on is meant to be satisfactory.

On the contrary, users encounter difficulties in the use of many of the emerging technology devices like phones and tablets in accessing for information online, as against the old technological devices like desktop computers. This is as a result of some issues like, spread views and incomplete results usually gotten from the small screens of phones and tablet PC's as against desktop computers, thus leading to lack of interest in the use of the emerging devices for online information search by search users.

Consequently, the above problems have led to the unavoidable use of some old technological devices, as against the emerging devices in searching for information online, thus, hindering the effective and efficient use of the emerging devices for online information search, thus, the need to investigate different ways of designing and integrating the functionality of Google search engine, in such a way that it will be more adaptable and convenient for information search when used in any device. Thus, the main purpose of this research is to explore the key factors affecting the use of

Google search engines across different emerging technological devices and its implications for design of search solutions, so as to improve the efficiency of use of Google search engine in emerging devices.

Specifically, the study seeks to:

1. identify the system qualities affecting the use of Google search engine across different emerging technology devices,
2. identify the information qualities affecting the use of Google search engine across different emerging technology devices,
3. identify the user satisfaction affecting the use of Google search engine across different emerging technology devices.

The following research questions will guide the study at 0.05 level of significance:

1. What are the system qualities affecting the use of Google search engine across different emerging technological devices?
2. What are the information qualities affecting the use of Google search engine across different emerging technological devices?
3. What are the user satisfaction affecting hat affect the use of Google search engine across different emerging technological devices?

The following hypotheses guided the study and were tested at 0.05 level of significance:

1. There is no significant difference between lecturers and students response on the system qualities affecting the use of Google search engine across different emerging technological devices
2. There is no significant difference between lecturers and students response on the information qualities affecting the use of Google search engine across different emerging technological devices
3. There is no significant difference between lecturers and students response on the user satisfaction affecting the use of Google search engine across different emerging technological devices

Methodology

The study adopted descriptive survey research design. According to Osuala (2005) survey research helps the researcher to identify present conditions, present needs as well as information on which to base sound decisions. The authors further stated that survey research focuses on people, the vital facts of people, and their beliefs, opinions, attitudes, motivation and behavior. Survey design is therefore considered most appropriate for this study because it seeks the opinion of people on the factors affecting the use of google search engine across different emerging technological devices.

The study was carried out in University of Nigeria, Nsukka which comprises of 17 faculties, namely; faculties of Agricultural Sciences, Arts, Basic Medical

Sciences, Biological Sciences, Business

Administration, Dentistry, Education, Engineering, Environmental Studies, Health Sciences, Law, Medicine, Pharmaceutical Sciences, Social Sciences, Physical Sciences, Veterinary and Vocational & Technical Education, respectively.The population for this study consists of 3712 respondents which comprised of 3010 students and 702 Lecturers. The lecturers and students were chosen because they make use of Google search engine for research purposes. To constitute the sample, 140 students and 301 students were selected using simple random sampling technique. This sample was derived using the specifications made in Nwanna (1981). According to the author, to constitute a sample, 40% of the total population is used in a population of few hundreds, 20% of the population is used in many hundreds, 10% of the total population is used in few thousands, while 5% of the population is used where the total number is in many thousands.

The instrument for data collection was a 21 items questionnaire titled: Questionnaire for the use of Google search engine. The questionnaire was arranged in two sections; section A borders on demographic data of the respondents while section B focused on the 21 items that are carefully organized in three clusters which addresses the research questions as follows: cluster A identifies the system quality, Cluster B identifies the information quality, while Cluster C identifies the user satisfaction that are affecting the use of Google search engine across different emerging technology devices, respectively. The items were placed on a four point rating scale with options of very large extent; large extent; low extent and very low extent for all clusters. Options are weighted on 4, 3, 2, and 1 point(s) respectively. Three experts validated the instrument and were requested to check the language, relevance and accuracy of the items in addressing the research questions as well as the purpose of the study. The experts were also requested to study the instruments and scrutinize it in line with the research questions and make corrections and suggestions were necessary. Their corrections, suggestions and comments were used to modify the instruments.

Cronbach Alpha was used in determining the internal consistency of the instrument which yielded an overall reliability index of 0.93.Copies of the questionnaire were administered on the respondents with the help of sixteen trained research assistants. The data collected from the respondents were analyzed using mean, standard deviation and t-test statistics. The mean and standard deviation were used to answer the research questions. Any item with a mean rating of 2.50 and above was regarded as agreed while any item with a mean rating less than 2.50 was regarded as disagreed. The correlated t-test statistic was used to test the null hypothesis at 0.05

level of significance. Any hypothesis whose **Results** significance levels was less than or equal to 0.05 **Research Ques** significance, was rejected, while a hypothesis What are the system qualities affecting the use of with significance level g 0.05 level was not Google search engine across different emerging rejected. technology devices?

Table 1: The mean ratings, standard deviation and p-value of respondents on the system qualities affe Google search engine across different emerging technology devices.

S/N	Items	$\bar{X}_S$	$\bar{X}_L$	$\bar{X}_G$	Std dev.	t-cal tailed		p-value	
1	Existence of fallback systems.	3.22	2.98	3.53	0.68	1.13	LE	0.13	NS
2	Fastness of Google's systems anywhere in the world.	3.40	3.45	2.94	0.78	-0.58	LE	0.57	NS
3	Hardware and power systems do not get heat-up.	3.15	3.54	3.20	0.67	-0.87	LE	0.39	NS
4	Less breakdown of systems or at least it has not gone offline since 2000.	2.94	3.83	3.20	0.75	1.08	LE	0.10	NS
5	Google has cooling and power. conservation innovations in its data centers.	2.90	3.00	3.13	0.73	1.20	LE	0.23	NS
6	Google's Google-plex delivers desktop-server applications efficiently.	2.95	3.11	3.27	0.70	-0.28	LE	0.78	NS
7	Simplicity of interfaces.	3.00	3.40	3.17	0.73	1.49	LE	0.14	NS
Overall Cluster mean		**2.72**	**2.82**	**3.20**					

Key: X_S = Mean of Students, X_L = Mean of Lecturers, X_G = Grand Mean, LE = Low Extent, RQ = Research Questio Significant, Cluster Mean = 3.20, tabulated value of 1.98

The data presented in table 1 revealed the analysis on the system qualities affecting the use of Google search engine across different emerging technology devices. The data showed that all the items have the grand mean rating between 2.94 and 3.53 which were above the cutoff point 2.50, and were accepted. The respondents accepted that the basic system qualities represented by all the items are affecting the use of Google search engine across different emerging technology devices.

This was further confirmed by the test of hypothesis, presented on the same table. The t-test analysis revealed that there is no significant difference between the opinion of the students and Lecturers on the system qualities affecting the use of Google search engine across different emerging technology devices, which are; existence of fallback systems, fastness of Google's systems, hardware and power systems heat-up, breakdown of systems, cooling and power conservation innovations in its data centers, Google-plex desktop-server applications and simplicity of interfaces. The items recorded

tcalculated values less than tabulated value of 1.98 at 0.05 levels of significance and 84 degree of freedom on the respective items. It implied that there was no significant difference between the mean scores of Students and Lecturers on the system qualities affecting the use of Google search engine across different emerging technology devices. The null hypothesis (H_{01}) for each independent sample in each items were therefore, accepted. More so, the overall cluster mean of 3.20 indicative that the respondents strongly agreed to the items.

Research Question 2: What are the information qualities affecting the use of Google search engine across different emerging technology devices?

Table 2: The mean ratings, standard deviation and p-value of respondents on the information qualities affecting the use of Google search engine across different emerging technology.

S/N	Items	$\overline{X_S}$	$\overline{X_L}$	$\overline{X_G}$	Std Dev.	t-cal	RQ	Sig 2-tailed	Ho_2
1	Extension of Google apps for android and other mobile apps	3.15 3.05	3.23	3.19	0.73	-1.72	LE	0.09	NS
2	Confidentiality of information and copyright laws are strictly adhered to.		3.19	3.16	0.79	-0.56	LE	0.58	NS
3	Information is edited day by day and old ones replaced with new and valid ones.	3.23	3.40	3..32	0.71	0.15	LE	0.88	NS
4	Sources of information are usual access granted by Google, befor	3.06	3.52	3.29	0.78	-1.50	LE	0.14	NS
5	Free access to some genuine scho Books and articles	3.18 3.37	3.22	3.20	0.79	-2.15	LE	0.33	NS
6	24 hours uninterrupted access.		3.10	3.34	0.67	-1.99	LE	0.48	NS
7	Information is uploaded and updated daily by accredited authors and researchers.	2.95	3.41	3.18	0.68	-0.19	LE	0.85	NS
	Overall Cluster Mean	**2.682.81**	**3.24**						

Key: X_S = Mean of Students, X_L = Mean of Lecturers, X_G = Grand Mean, LE = Low Extent, RQ = Research Question, NS = Not Significant, Cluster Mean = 3.24, tabulated value of 1.98

The data presented in Table 2 revealed the analysis on the Information qualities affecting the use of Google search engine across different emerging technology devices. The data showed that all the items have the grand mean rating between 3.16 and 3.34 which were above the cutoff point of 2.50, and

were accepted. The respondents accepted that the basic information qualities represented by all the items are affecting the use of Google search engine across different emerging technology devices.

This was further confirmed by the test of hypothesis, presented on the same table. The t-test analysis revealed that there is no significant difference between the opinion of the students and lecturers on the information qualities affecting the use of Google search engine across different emerging technology devices, which are; extension of Google apps for android and other mobile apps, strict adherence to confidentiality of information and copyright laws, information is edited day by day and old ones replaced with new and valid ones, sources of information are usually evaluated and access granted by Google before upload, free access to some genuine scholarly Journals, books and articles, 24hours uninterrupted access and information is uploaded and updated daily by accredited authors and researchers. The items recorded t-calculated values less than tabulated value of 1.98 at 0.05 levels of significance and 84 degree of freedom on the respective items. It implied that there was no significant difference between the mean scores of Students and Lecturers on the Information qualities affecting the use of Google search engine across different emerging technology devices. The null hypothesis (H_{01}) for each independent sample in each items were therefore, accepted. More so, the overall cluster mean of 3.24 indicative that the respondents strongly agreed to the items.

Research Question 3: What are the user satisfaction affecting the use of Google search engine across different emerging technology devices?

Table 3: The mean ratings, standard deviation and p-value of respondents on the user satisfaction affecting the use of Google search engine across different emerging technology devices.

S/N	ITEMS	$\overline{X}_S$	$\overline{X}_L$	$\overline{X}_G$	Std. Dev.	t-cal	RQ	Sig 2-tailed	HO
1.	Felt control of Individuals in handling Google pages through its friendliness.	2.88	3.45	3.17	0.67	0.74	LE	0.46	NS
2.	Shift from mini computer applications to portable/mobile apps, which increased users' ability to use it anywhere, even on the road.	2.99	3.15	3.07	0.70	-0.55	LE	0.59	NS
3.	Increase in the capability of search personalization.	3.06	3.32	3.19	0.71	-0.29	LE	0.77	NS
4.	Simplicity of interfaces and ease of use.	3.52	3.27	3.40	0.74	0.66	LE	0.51	NS
5.	User Interface friendliness	3.18	3.21	3.20	0.67	0.66	LE	0.51	NS
6.	Self training instructions, through Help windows.	3.22	3.18	3.20	0.82	-1.19	LE	0.23	NS
7.	Multi-tasking capabilities (users can browse and search at a time).	3.37	3.07	3.22	0.65	-0.08	LE	0.93	NS
	Overall Cluster Mean	**2.702.82**	**3.20**						

Key: X_S = Mean of Students, X_L = Mean of Lecturers, X_G = Grand Mean, LE = Low Extent, RQ = Research Question, NS = Not Significant, Cluster Mean = 3.20, tabulated value of 1.98

The data presented in Table 3 above revealed the analysis on the user satisfactions affecting the use of Google search engine across different emerging technology devices. The data showed that all the items have the grand mean rating between 3.07 and 3.40 which were above the cutoff point 2.50, were accepted. The respondents accepted that the basic user satisfactions represented by all the items are affecting the use of Google search engine across different emerging technology devices.

This was further confirmed by the test of hypothesis, presented on the same table. The t-test analysis revealed that there is no significant difference between the opinion of the students and lecturers on the user satisfaction affecting the use of Google search engine across different emerging technology devices, which are; felt control of Individuals in handling Google pages, shift from mini computer applications to portable/mobile apps, increase in the capability of search personalization, simplicity of interfaces and ease of use, user Interface friendliness, self training instructions and Multi-tasking capabilities. The items recorded tcalculated values less than tabulated value of 1.98 at 0.05 levels of significance and 84 degree of freedom on the respective items. It implied that there was no significant difference between the mean scores of Students and Lecturers on the user satisfactions affecting the use of Google search engine across different emerging technology devices. The null hypothesis (H_{01}) for each independent sample in each items were therefore,

accepted. More so, the overall cluster mean of 3.20 indicative that the respondents strongly agreed to the items.

Discussion of findings

The analysis of data in table 1 shows that the mean ratings of the responses of the respondents on the identified items relating to the system qualities affecting the use of Google search engine across different emerging technology devices, which are; existence of fallback systems, fastness of Google's systems, hardware and power systems heat-up, breakdown of systems, cooling and power conservation innovations in its data centers, Google-plex desktop-server applications and simplicity of interfaces had mean values ranging from 2.90 to 3.83 which are all greater than the cut-off point of 2.50 on a 4-point rating scale. Therefore, the data in the table indicated that the respondents agreed that all the 7 items could be the system qualities affecting the use of Google search engine across different emerging technology devices. The standard deviation values for the 7 items ranged from 0.67 to 0.78 which showed that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also showed that the p-values of all the items ranged from 0.10 to 0.78 which are greater than 0.05 level of significance. This showed that there was no significant difference (P>0.05) between the mean responses of lecturers and students with regards to the system qualities affecting the use of Google search engine across different emerging technology devices. This finding is in consonant with the view of Clayton (2007) who opined that successful companies like Google now find it easy to develop sustaining technologies in businesses because of the high quality of their system. This finding is also in line with that of Boritz (2002) and Boateng (2012) who buttressed that system qualities positively affect the use of Google search engine across different emerging technology devices.

The analysis of data in table 2 shows that the mean ratings of the responses of the respondents on the identified items relating to the information qualities affecting the use of Google search engine across different emerging technology devices, which are; extension of Google apps for android and other mobile apps, strict adherence to confidentiality of information and copyright laws, information is edited day by day and old ones replaced with new and valid ones, sources of information are usually evaluated and access granted by Google before upload, free access to some genuine scholarly Journals, books and articles, 24hours uninterrupted access and information is uploaded and updated daily by accredited authors and researchers had mean values ranging from 2.95 to 3.52 which are all greater than the cut-off point of 2.50 on a 4-point rating scale. Therefore, the data in the table indicated that the respondents agreed that all the 7 items could be the information qualities affecting the use of Google search engine across different emerging technology devices. The standard deviation values for the 7 items ranged from 0.67 to 0.79 which showed that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also showed that the p-values of all the items ranged from 0.09 to 0.78 which were greater than 0.05 level of significance. This showed that there was no significant difference (P>0.05) between the mean responses of lecturers and students with regards to the information qualities affecting the use of Google search engine across different emerging technology devices. This finding is in line with that of David (2013) and Bala and Davenport (2008) who buttressed that information quality of Google search engine has made it the most used search engine in the whole world. Myers (2006) also pointed out that Google is almost the only known search engine that people use across every device. The author further pointed that one of the reasons why people mostly use search engine is because more information can be gotten from Google when compared to other existing search engines.

The analysis of data in table 3 shows that the mean ratings of the responses of the respondents on the identified items relating to the user satisfaction affecting the use of Google search engine across different

emerging technology devices, which are felt control of Individuals in handling Google pages, shift from mini computer applications to portable/mobile apps, increase in the capability of search personalization, simplicity of interfaces and ease of use, user Interface friendliness, self-training instructions and multi-tasking capabilities had mean values ranging from 2.88 to 3.52 which are all greater than the cut-off point of 2.50 on a 4-point rating scale. Therefore, the data in the table indicated that the respondents agreed that all the 7 items could be the user satisfaction affecting the use of Google search engine across different emerging technology devices. The standard deviation values for the 7 items ranged from 0.65 to 0.82 which showed that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also showed that the p-values of all the items ranged from 0.23 to 0.93 which were greater than 0.05 level of significance. This showed that there was no significant difference (P>0.05) between the mean responses of lecturers and students with regards to the user satisfaction affecting the use of Google search engine across different emerging technology devices. This finding agrees with the submission of Feijo, et al (2009) who is of the view that the steady innovations in Google search engine has led to an explosion in the satisfaction of individual users. This finding is also in line with that of Karen (2007) and Brodkin (2008)who emphasized that the numerous cloud services performed by Google has gained them a high level of user satisfaction across different devices and settings.

Recommendations

In other for search engines to maintain a high level of information and system qualities, as well as overall user satisfaction, it is recommended among others that search engine companies are to:

1. **Ensure the inclusion of relevant keywords for easy search:** If search engines are ranking for terms that potential customers are not searching for, then the search engine traffic will be pretty useless. The main point of ranking on search engines is to rank for keywords that a customer is likely to use.Therefore, for search engines to improve their visibility, it is required that they consider user intent and then carry out keyword research. For instance, someone who searches —buy a generator in Nigeria‖ is probably searching to find out where to buy a generator.

2. **Upload contents that solves user's problems:** One of the main determinants of a quality search engine is the ability to solve search users' problems. Google and other search engines can only remain relevant if they provide results that solve users' problems or provide the information that they are searching for. Therefore, any search engine that provides this type of content will be ranked high online

3. **Make search engine responsive across different devices:** Numerous devices that search users use in searching for information online exist today. Indeed, it can be said that reasonable percentage of Google searches is done on mobile devices today. This makes mobile devices critical to the search engines usage and visibility. This is one of the reasons Google introduced the mobile-first indexing.

4. **Gain back-links to the search engine:** Back-links are links to search engines from external websites. They are one of the most important ranking signals. Google search quality analysts claims that back-links are one of the 3 most important Google ranking factors. Therefore, any search engine needs to back-link their pages so as to put them ahead of their competitors.

Finally, web search engines are to offer users the opportunity to search for information and personalize their search across different devices and settings, so as to improve the convenience and efficiency of using search engines across different devices that are continually emerging.

Conclusion

From the findings of this study, it can be evident that various technological devices have emerged which help in daily use of search engines, as they support different search functionalities and students, lecturers and other search engine users rely on search engines for information seeking of different kinds and with different intentions and patterns of use. This study further revealed that user satisfaction, information quality and system quality of any search engine influence their use across different emerging technology devices, like smart phone, tablet PC's, Laptop computers and so on. This research also integrated the use of different search engines across different devices to meet up with users of different kinds, and further drew its implications for the design of search solutions, which may have critical consequences on both the design and use of search engines. This is very important because the relevant of studying the use of search across different emerging technological devices is a key benchmark for improving the design of search functionalities in different devices and settings.

References

Adam, N., Kozanoglu, A., Paliwal, A.and Youssef, M. (2006). Mutual trust in open environment for cascaded web services. *International journal of engineering(IJE), 5 (5)*, 435-467.

Bala,T. and Davenport, H. (2008). *Reverse Engineering Google"s Innovation Machine*. London: Harvard Business Review.

Bar-Ilan, J., Mazlita, M. and Mark, L. (2006). Methods for comparing rankings of search engine results.ScienceDirect. http://www.elsevier.com.

Brodkin, J. (2008). *Loss of customer data spurs closure of online storage service*. United Kingdom: The Linkup Network World.

Carr, G. (2004). *Business competitive advantage*. London: Harvard business school press.

Christensen, M. (2007).*Innovator"s Dilemma: When new technologies cause great firms to fail.*London: Harvard business school press.

David, C. (2013). *What Is Emerging Technology?* Ukraine*:* Stevens-Henager college press. Retr.from:https://www.stevenshenager.edu.

D'aveni, A. (2004.) *Hypercompetition: Managing the dynamics of strategic maneuvering.* New York: The free press, a division of Macmillan Inc.

Downes, L. and Mui, C. (2000). *Unleashing the killer app: digital strategies for market dominance*. London: Harvard Business Press.

Feijóo, C., Maghiros, I., Abadie, F. and Gómez-Barroso, J. (2009). Exploring a heterogeneous and fragmented digital ecosystem: mobile content. *Journal of Telematics & Informatics.* 26 (3), 282-292.

Garcia, D. (2008). *Web service security management using semantic web techniques*. Campinas: Institute of computing press university of campinas.

Karen, D. (2007*). Google's shine dulled as e-business scores takes a hit in customer satisfaction survey*. Italy: Reed Business Information press. Retrived from http://www.Elsevier.com.

Larry, D. & Mui, C. (2000). *Unleashing the Killer App*. London: Harvard Business School Press.

Myers, P. (2006). Emerging Technology as a good problem solver. *Information systems Journal. 12* (2), 113-129.

Nwanna, O.C. (1981). *Introduction to educational research for student teachers*. Ibadan: Heineman Educational Books, Ltd.

Porter, M. (2001). Strategy and the Internet. *MIT"s Quarterly*. 24, 65 – 71.

Rubin, A. (2006). *Emerging technologies supporting chemical process r&d and their increasing impact on productivity in the pharmaceutical industry*. New Jersey: Brunswick press International.

Sauer,C. (2003). *Why Information Systems Fail: A Case Study Approach.* United Kingdom: Alfred wailer Press.

Spink, A., Bernard, J., Dietmar, W. and Tefko, S. (2002). From E-Sex to E-Commerce: Web Search Changes. *IEEE Computers*. Retrieved from ttp://www.fcezariaonline.net/sciencescp.pdf

Stephen, B. (2007). *Beyond Search: Content Applications*. UK: Mathiy Jones Inc.

Thousand, O. (2005). *Conducting Research Literature Reviews: From Internet to Paper.*USA: Sage Publications.

William, D. and McLean, D. (2003). The Model of information systems success: A Ten-Year Update. *Journal of Management Information Systems.*13 (4), 32-40.