



Full Length Research

## Advances of Search Engine: A Case Study of Federal University of Technology, Minna, Nigeria.

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**Abstract:** This research work was geared towards studying the Advancements of Search Engine Technology and its impacts on Academic Library: A Case Study of Federal University of Technology, Minna Library. Search Engine Technology is an important Information Technology tool that affects both the library users and the staff of the library in every aspect. This research will be beneficial to the library because library users make use of the library to search for materials to get relevant information to satisfy their various search queries. Also, this study will assist with teaching the students the most proficient method to adequately utilize the Internet for their interest and the significance of the Internet to scholarly works. Search engine technology has granted users the opportunity to search for relevant information even probably without the help of the librarian or library staff. The study's research questions guided the framework of the analysis. Response rate, demographic data of respondents, data analysis, and discussion of conclusions.

**Keywords:** Challenges: Epilepsy Patients: Librarian: Health Information: Nigeria.

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### 1.0 Introduction

Libraries have existed for a long time and are generally conceived of as information and service collections. Libraries were originally intended to keep books and records, but they have evolved with time and are now the backbone of every university, institution, or organization. Adewusi (2013) posited library is described as a space within a school that is dedicated to collecting, organizing, storing, retrieving, preserving, and disseminating knowledge to both instructors and students. Libraries play an important role in preserving a nation's history and heritage, and they are passed down from generation to generation. The term 'library' signifies various things to various individuals depending on where they remain in the illumination range (Sivasubramanian & Gomathi, 2019; Egri & Bayrak, 2014). To a few, it is a book shop; a building where books are protected for authority overseen by a librarian, basically guaranteeing that the books are most certainly not messed with unduly. To many, a library is a place of reading and learning; where examination-writing candidates make their temporary homes to peruse their course readings in preparation. The library is one of the educational system's inputs. It may also be defined as a location where books and other educational resources are stored for use by students, instructors, and other library patrons. Libraries are viewed as social institutions dedicated to increasing knowledge, preserving cultural heritage, and providing information to a variety of people (Benard et al., 2014; Vinitha et al., 2011;

Khiste et al., 2011). It might be a physical location, a virtual environment, or both, and provides automatic access to the material. Books, journals, papers, unique duplicates, films, maps, prints, records, microform, CDs, cassettes, tapes, DVDs, Bluebeam Disks, digital books, book recordings, databases, and other formats can all be found in a typical library's collection. Libraries, whether at universities or research institutions, see themselves as important sources of knowledge for their users (Saini et al., 2014; Kurniasih et al., 2018). The archives of the earliest type of composition, Clay tablets in cuneiform material were unearthed in Sumer, some dating as far back as 2600 BC, make up the early libraries.

Presently, Library serves a different purpose in society which is to meet the information needs of its users, allows retrieval of information to be done efficiently and effectively with the use of classification, catalogues, and search engines. Sharma & Patel (2013), considered information retrieval as a subfield of computer science that deals with the storage, access to information, and representation of information. Information retrieval is very important for and library to function effectively as it grants access to users to the library collections, allows users to know what kind of materials are available in the library and most importantly allows users to find relevant information or a document that satisfy the user information needs. Saini & Kumar (2014), see information retrieval as retrieving relevant information from a large source of database. Patel & Govind (2016) argued that the topic 'Advances in search engine technology' covers a wide variety of tasks such as analyzing user demands, evaluating current data gathering, filtering out and storing portions of the data, and resource sharing planning. Search engine technology advancement is a planning and decision-making process, not a single action or set of operations. Information technologies have evolved to the point that they now have a substantial influence on libraries (Yamane, 1967; Sharma & Patel, 2013). Digital libraries, the Internet, electronic publications, CD-ROMs, and other technological advancements have prompted librarians to modify the way they work. This study attempts to explore the influence of current IT advancements on search engine results. In every market condition, it is critical to pay close attention to potential consumers and their usage patterns. This may seem self-evident to librarians since it is their true belief that they take into account implicitly the wants of users—or rather, what they perceive to be the desires of their users. However, the new competitive environment compels libraries to look at things from the user's point of view. First and foremost, this acknowledges that libraries, particularly at universities, deal with a diverse spectrum of customers who have a variety of usage habits. An undergraduate has different information needs than a qualified researcher, and their usage patterns might differ significantly (Jayanthi, 2015; Sunny, 2020). Established researchers have better adapted the use of specialized search tools, but young students will attempt much harder to convert their general information-seeking behavior (using internet search engines) to the specific, academic context. Prior to the development of the World Wide Web, this distinction was solely important to the amount of training that various user groups required to use the library's resource finding tools from the librarian's perspective (printed catalogue, online catalogue, digital library portal). Users now have the option of using additional catalogues (public or academic) and portals besides those found at the library, thanks to a wide choice of general search engines (Bruce & Trevor, 2015; Kurt & Emiroglu, 2018). Google like search engines have "empowered" library users to choose their search tool and access the universe of knowledge without any prior training. While librarians are concerned about the quality of information resources covered by popular search indexes, their users are enthusiastic about these new tools and want to utilize them for any sort of information search.

Academic Libraries are libraries available in academic institutions. The Library is the chief instrument in achieving the primary objectives of the institution. Thus, they range from the largest university library to the smallest school library (Aljuboori, 2016; Paul, 2019). The school library serving the needs of primary school children, in essence, has the same basic aims as one provided by large numbers of postgraduates in a university setting. Although the services, functions and level of work are vastly different among the different kinds of academic libraries they are primarily established to meet the needs of taught and teachers (Nwalo, 2012; Kimmon, 2012). However, general objectives of academic libraries may be summarized as follows; to serve the curricular, cultural and general education requirement of the academic community; to provide reference material at appropriate levels; to provide study area of users, to provide a lending service appropriate levels; to provide study areas of users; to provide a lending service appropriate to different types of users; to provide an active information service like CAS, SDI etc (Seymour et al., 2011; Akhtar, 2015). Academic libraries, by providing information to their consumers, play an important part in the educational system. Higher education is more of a learning experience than a teaching experience. Libraries are more important in higher education since they are sources of information for acquiring additional knowledge outside of classrooms, as libraries store papers that support the organization's major goals (Salehi et al., 2018; Abbas, 2016; Haubitz, 2012). The Use of search engines in industrialized nations, and access to those practical tales again via search engine Technology has prompted librarians to try with the same in their locations. Because there are no suitable norms in the computerization of university libraries, a thorough investigation of libraries use of search engines by research scholars is thought required. Academic libraries, which are at the core of any educational institution, play a critical role in modern society, and as a result, today's academic libraries are well-equipped to keep up with changing times and technological advancements. Since the use of

Search engine technology in academic libraries is a requirement, the academic library is devoted to delivering better library services to its customers, regardless of caste, sex, age, or other factors.

Over the years, retrieving information in the library has always been carried out manually i.e. using Catalogues and classifications schemes to search for information has always been a problem retrieving information because of the time it consumes to search and extract relevant information from the collection (Adewusi, 2013; Benard & Dulle, 2014). However, in the world of today with the impact of Information Communication Technology (ICT) and its ICT tools we use information retrieval systems in almost all endeavors of our daily lives: searching for a document or book in an online library catalogue or a digital library has become easy and faster through the use of Search engine technology. Search engine technology has become an important part of our information environment. As of today, search engines are increasingly replacing the role of libraries in facilitating information discovery, access and retrieval. Nuning et al. (2018) defined search engine technology as a set of programs that are used to search for information on the World Wide Web (WWW) and File Transfer Protocol (FTP) servers by using keywords. Search engine technology has developed along with the development of website technology and also the number of search engine users has increased over the years. Search engine technology has formed into generally utilized administrations and fundamental instruments for discovering Web-put together data concerning the web.

Suleiman et al. (2018) stressed that search engine helps retrieve relevant information from the database and bring them to the searching user, which springs up reasons why the integration of Search engine technology into the library is very important as it helps users and staffs of the library search for books in the collection easier and faster. With this integration, library patrons or users can get updated on materials they are searching for that is not in the library through the use of e-mails or other notification enabled system applications (Paul, 2014; Ross, 2012). This is the background to the study to find out the advancement in search engine technology and how libraries have been impacted by the integration of search engine technology into libraries (Eke et al., 2014; Brahma, 2012; Seethalakshmi, 2018). The World Wide Web (WWW) is a valuable resource for libraries. The Hypertext Transfer Protocol (HTTP), Hypertext Markup Languages (HTML), and Uniform Resource Locators (URLs) are used in its Client-Server Architecture to organize and enable quicker access to a wide range of information. WWW provides library patrons and other Internet users with a broad array of information resources in a simple, efficient, and effective manner. People regularly utilize the Internet to conduct information searches, mostly on the World Wide Web and through various search engines. Akhtar (2015) stressed that search engine is a program that searches the Internet for specific information. It can also refer to a search engine for a locally stored database. As a result, a search engine acts as a reference librarian, assisting users in locating information sources. Google, Lycos, Yahoo, Web crawler, AltaVista, Infoseek, and other search engines and software include Netscape, Internet Explorer, etc which can be used to browse items or bits of data or news on the internet. This is the background to the study to find out the Advancements of Search Engine Technology and its Impacts on Academic Libraries: A Case Study of Federal University of Technology Minna will be used to conduct this study.

### **Objectives of the Study**

1. Discover the availability of search engine technology in Federal University of Technology Minna.
2. Find out the level of usage of search engine technology in libraries of today by undergraduate students in Federal University of Technology Minna.
3. Find out the negative or positive impact of search engine technology in Federal University of Technology Minna.
4. What search engine do students use in Federal University of Technology Minna
5. Find out how frequently undergraduate students use web search engines in Federal University of Technology Minna.
6. Pinpoint the challenges affecting the use of search engine technology in Federal University of Technology Minna.

### **1.4. Research Questions**

1. What is the availability of search engine technology in Federal University of Technology Minna?
2. What is the level of usage of search engine technology in Federal University of Technology Minna?
3. What is the impact of search engine technology on Federal University of Technology Minna?
4. What search engine do students use in Federal University of Technology Minna?
5. How frequently do undergraduate students use web search engines?
6. What are the challenges affecting the use of search engine technology in Federal University of Technology Minna?

## **2.0 Literature Review**

### **2.1 Concept of Search Engine**

Vangie (2021) opined that the Search Engine is software that searches documents for given keywords and produces a list of documents that contain those keywords. A search engine typically operates by dispatching a spider to gather as many documents as possible. The papers are then read by an indexer, which produces an index based on the words included in each document. Each search engine's indexes are built using a proprietary algorithm to ensure that only relevant results are returned for each query. Egri & Bayrak (2014) discovered that search engines are the most important source of information on the internet, and their value is growing by the day. As a result, search engines have grown in relevance in recent years by providing the appropriate material at the right time. Nwalo (2012), two major Google upgrades for combating spam sites, have been released in recent years. When we look at these improvements, we can see that there are a lot of new things to consider in terms of SEO. Paul (2019) argued that a search engine, often known as a web search engine or an internet search engine, is a computer software that collects and organizes material from all over the internet (typically web-based). The user types in a query made up of keywords or phrases, and the search engine returns a list of results that best fit the query. Links to web pages, photos, videos, and other internet data can all be found in the results. They can assist in discovering relevant material on a certain subject by employing a variety of search strategies. Furthermore, search engines have become an indispensable tool in internet usage, particularly while surfing the internet. On the World Wide Web, search engines are the most useful navigational tool. Nwalo (2012) claimed that the World Wide Web and the Internet have established a new mode of universal access in which information seekers may access a vast amount of information with a single click of a mouse on a computer or a button on other electronic devices.

Justin (2020) posited that a search engine is a service that enables Internet users to do content searches on the World Wide Web (WWW). When a user types keywords or key phrases into a search engine, they are presented with a list of Web content results in the form of webpages, pictures, videos, or other online data that semantically match the search query. Prince George's Community College (2020) opined that individuals may search the contents of pages and files on the World Wide Web using search engines, also known as Search Services. Search engines are created by computer scientists using software and algorithms. These programs, often known as spiders and robots, scour the content of websites to compile a database of Web pages. According to Paul (2014), Google, Google Scholar, Bing, Yahoo, Blekko, Ask, and Webcrawler are some of the most popular search engines. Each search engine has its own set of characteristics that allow the user to derive unique benefits. Britannica Concise Encyclopedia (2012) defined a search engine as a tool for locating information, notably on the internet or the World Wide Web. Search engines are also referred to as "large databases that span broad regions of the internet." At least one software called a spider, crawler, or bot crawls over the internet gathering information; a database, which stores the obtained information; and a search tool, which allows users to search through the database by typing a keyword defining the information they want, according to Britannica Concise Encyclopedia. Barron's Marketing Dictionary (2012) stressed that a search engine is computer software that can scour vast volumes of text or other data for certain keywords and then return a list of files or documents that include those keywords. It went on to say that search engines help consumers access online material on a variety of topics and are useful secondary data sources. In addition, Gale Encyclopedia of Small Business (2012) opined that search engines, according to the author, are online services that allow users to search the contents of the internet for websites or particular information of interest to them. It explains that when a user types in a search phrase, search engines try to match it to categories or keywords in their catalogues or on the Internet. The search engine creates a list of sites that meet the search parameters, ranking them in order of relevancy. Bruce et al. (2015) posited information retrieval techniques are being applied to the search engines and large-scale text collections in practice. A very good instance is the online search engine, but search engines can be seen in all different applications, also desktop search and enterprise search as previously noted.

Moreover, Kimmon (2012) defined a search engine as a website that links and organizes material from all across the internet, according to the definition. He went on to say that individuals looking for something would type in a query describing what they're looking for, and the engine would then give connections to information that meets their criteria. According to Internet World Usage and Population Statistics (2014), a total of 3,035,749,340 individuals were online worldwide, accounting for 42.3 percent of the global population. Google has 92.2 percent of the entire search engine market, according to Stat Counter Global Stats (SCGS). Bing (3.73 percent), Yahoo! (3.43 percent), Baidu (0.53 percent), Ask (0.42 percent), and other search engines are also utilized (0.13 percent). Based on these definitions, Search engines may be seen as user helpers for finding and retrieving information. The extent, to which they can assist, like any other assistant, is determined by the 15 users' ability to communicate their needs. As a result, interacting with search engines is an important component of the search process.

## **2.2 History of Search Engines**

Seymour (2011) argued that the very first tool used for searching the Internet was the Archie. The word "archive" is spelt without the "v". Alan Emtage, Bill Heelan and J. Peter Deutsch created Archie and they were computer science students at McGill University in Montreal. The software collected directory listings for all files on public anonymous FTP (File Transfer Protocol) sites, generating a searchable database of file names; however, Archie did not index the contents of these sites because the amount of material was so little that it could be easily searched manually. Gopher (developed in 1991 by Mark McCahill at the University of Minnesota) spawned two new search programs: "Veronica" and "Jughead." They searched the file names and titles contained in Gopher index systems in the same way Archie did. Veronica (Very Easy Rodent-Oriented Netwide Index to Computerized Archives) allowed you to search the complete Gopher listings for most Gopher menu names. Jughead (Jonzy's Universal Gopher Hierarchy Excavation and Display) was a tool for acquiring menu information from a specific set of Gopher servers. The first web robot was produced by Matthew Gray in June 1993 then at MIT. The robot was called the Perl-based World Wide Web Wanderer which was used to generate an index called 'Wandex'. The main purpose of the creation of the Wanderer was to calculate the size of the World Wide Web, which it perfectly did until late 1995. In November 1993, the second web's search engine came into existence, Aliweb. Aliweb mainly depended solely on being alerted by the website administrators of the existence at each site of an index file in a designed format and did not use a web robot to operate. In 1994, one of the first "full text" crawler-based search engine was known as the WebCrawler and it came out around that period (Vivekavardhan, 2015; Naik, 2011). WebCrawler lets its users search for any word on any webpage unlike its predecessors and this became the main standard for all major search engine ever since. It was also the first one that the general public was aware of.

Soon after, a slew of other search engines sprung up, all competing for attention. These included Magellan (search engine), Excite, Infoseek, Inktomi, Northern Light, and AltaVista. Yahoo! was one of the most popular methods for users to locate interesting online sites, however, its search feature only searched its web directory, not full-text web pages. Instead of doing a keyword-based search, information searchers may browse the directory (Seymour et al., 2011; Jato, 2013). Google's search engine became popular in the year 2000. With an innovation called Page Rank, the firm was able to improve the results for numerous queries. This iterative method evaluates online pages based on the quantity and Page Rank of other websites and pages that connect to them, with the assumption that excellent or desirable pages are linked to more than less desired ones. Google's search engine has a simple UI (User Interface) as well. Many of its competitors, on the other hand, integrated a search engine inside a website. In the fall of 1998, Microsoft introduced MSN Search, which used Inktomi's search results. Except for a brief period in 1999 when results from AltaVista were utilized instead, the site began to display listings from Looksmart mixed with Inktomi results in early 1999. Microsoft started transitioning to its search technology, which is driven by its web crawler, in 2004 (called msnbot). On June 1, 2009, Microsoft unveiled their renamed search engine, Bing. Yahoo! and Microsoft announced a partnership on July 29, 2009, in which Yahoo! Search would be powered by Microsoft Bing technology.

## **2.3 Phases of Search Engines**

When it comes to search engines, *David Harry (2013)* identified three phases. They include:

- (i) Crawling
- (ii) Indexing
- (iii) Ranking

**Crawling:** A Crawler is a software or script that systematically scans through the World Wide Web in order to get the most up-to-date results. Web spiders, automated indexers, and other names for search engine crawlers exist, but the main work of the search engine crawler remains constant. Seeds are collections of pages on the web that are crawled or viewed on the internet. Then, based on the specifics of each seed's out-link URL, each seed gets crawled further. Finally, all of the pertinent web pages are located. URLs on this list are periodically re-visited according to the search engine's regulations. The regulations of a search engine might vary from one to the next, so it's a good idea to double-check that any pages previously included in the index haven't turned into spam. Search engine crawlers can have trouble crawling the web due to the characteristics of the Internet It's tough to keep an index up to date with new information. The complicated crawling process is caused by the enormous number of online pages, their rapid pace and rate of change, and the added context. Due to the enormous amount of URLs to crawl, the search engine crawler is forced to prioritize particular websites and connections. Prioritization criteria have been created and implemented in several search engines. There are four different policies from which to pick. The "selection policy" determines which pages should be downloaded for crawling. The "re-visit 18 policy" specifies how often you should check for updates on the web page and when you should do it. Crawlers are informed of website overload via "politeness policies." The distributed web crawlers will be coordinated by the "parallelization

policy." To get relevant results, search engine crawlers depend mostly on the aforementioned policies. The enhanced architecture may be utilized to create high-performance search engine systems capable of downloading millions of pages over many weeks. The web page is grabbed from the World Wide Web and supplied as input to the multithreaded downloader in a well-formed search engine crawler. The URLs downloaded by this multi-threaded downloader are queued. The scheduler will take input from the queue and prioritize the URLs depending on the search engine's policies. The resulting pages will be produced and saved by the multi-threaded downloader in the last phase. The Google Crawler is the most popular of the numerous professional search engine crawlers accessible today. If there are no search engine crawlers, there will be no results for search engine results pages, and new pages will never be displayed.

**Indexing:** The real search engine index is the storing location for all of the gathered information. It is in charge of obtaining pages from the search engine index to provide results for search queries. Each time a search query is launched, the search engine would require a significant amount of time and effort. The search engine would be responsible for not only searching every web page but also for searching the relevant pages for each keyword that appears in the search query. It should not be deprived of anything. The indexing procedure solves the problems mentioned previously. It should also consider security features like spam-free websites. Design considerations and data structures are the two most essential aspects of a search engine index. The design considerations contribute 19 to the index's architecture and the index's functional scheme. Different sorts of data structures are used to create search engine indexes. Choosing the best data structure for the index depends on several variables.

**Ranking:** A lower number (#1) correlates to a higher number (#10) in the search results, whereas a higher number (#10) corresponds to a lower number (#1). A large number of website owners participate in SEO tasks to enhance their search engine rating and bring their website closer to the top of the results because better-ranked websites receive a higher percentage of click-through and attract more visitors than lower-ranked websites. The age of the site, the quality of the site's link range, the relevancy of the page, social connectedness, and competency are just a few of the variables that impact search engine ranking. Users' search histories are also taken into consideration by search engines to provide a more customized search experience. For one visitor, a website might rank #3 for specific search keywords, but for another, it might only rank #8. Even when the same search term is used, search engine rankings are not consistent from one search to the next. Individual pages of a website, not the entire site, are ranked by search engines. This implies that the homepage may rank first for certain keywords, while a valuable internal page may rank third.

## **2.4 Categories of Search Engine**

The major types of search engines may be summarized as follows:

**2.4.1 Primary or Robot Driven Search Engines:** They use the web to compile and build their searchable database. These robots are software programs that run on a host computer and use common protocols to obtain data from websites. Web robots are used by crawlers or worm programs to build databases. They roam the internet automatically, following links from papers and gathering information on the resources they come across based on the HTML structure of the documents (i.e., URL, document title, keywords, etc.).

**2.4.2 Directory-Based Search Engines:** The internet's yellow pages are called directories. They hold data that has been provided to them by indexers or users who have contributed entries. Manually maintained subject directories with searchable web-based interfaces are common. A subject directory that is known to everyone is Yahoo. Yahoo offers several different subject titles. A subject directory is a collection of material divided into categories and subcategories, as well as subjects and subtopics. A topic directory may be searched for all items that include a keyword, but it is frequently just as convenient to click on a category and then browse through particular subdirectories until the required subject is found. These directories provide access to material that has been organized into categories. They classify websites like Internet tutorials, universities, museums, and so on.

**2.4.3 Meta-Search Engines:** Mega indexes, often known as meta-search engines, do not contain a searchable database. They make use of databases that are maintained by other search engines. A meta-search engine takes a user's single query and sends it to many search engines at the same time. Multi-threaded search engines are another name for such search engines. Some of the more well-known meta-search engines include Ask Jeeves, MetaCrawler, Savvy Search, @Once!, All-in-One Search Page, Internet Sleuth, Magellan, Net Search, Dogpile, Metacrawler, Metafind, Metasearch, and ixquick.com.

**2.4.4 Subject-Specific Search Engines:** Subject-specific search engines look for information in a database that has been developed specifically for that topic. A subject-specific search engine, also known as a Topical or Vertical search engine, searches a database dedicated to a single topic. Subject-specific search engines concentrate on one particular topic and often provide better access to information than powerful keyword indexes. Besides, subject-specific search engines as an organized and structured guide to Internet-based e-information resources that are carefully selected after a predefined process of evaluation and filtration in a subject area or specialty. For instance, Health A to Z, Math, Agri, Surf, Law Crawler, etc. Furthermore, subject portals are LibrarySpot, Librarian's Index to the Internet, Argus Clearing House, BIOME, BUBL, etc.

**2.4.5 Blogs Search Engines:** Blog Search is a type of search engine that focuses on blogs. It is a firm believer in the self-publishing phenomena represented by blogging, and we hope that Blog Search will assist our users in more efficiently exploring the blogging universe, as well as motivate many to join the 23 revolution. You may use Blog Search to see what others are saying about any topic you choose. A list of blog search engines to aid in the discovery of blogs. Google Blog Search, Technorati, Sphere, Ice Rocket and Bloglines.

**2.4.6. Semantic Web Search Engines:** Semantic Web search engines index RDF (Resource Description Framework) data stored on the Web and give an interface to search via the crawled data, unlike standard search engines that crawl the Web Accumulating Web Pages. A list of Semantic Web search engines in development may be seen below. The following are examples of semantic search engines: Semantic Web Search Engine (SWSE), Sindice, Watson, Yahoo! Micro search, Falcons

**2.4.7 Hybrid Search Engines:** Crawler-based or human-powered listings are displayed in hybrid search engines. It now employs a hybrid of the two outcomes. Crawler-based search engines, such as Google, rely on crawlers as a primary mechanism and human-powered directories as a backup. For example, Google may use human-powered directories to pull a webpage's description and display it in search results (Justin, 2020; Prince George's Community College, 2020). As human-powered directories go away, hybrid search engines are becoming increasingly crawler based. However, there is still manual screening of search results to remove copied and spam sites. When a website is flagged for spam, the owner of the site must take corrective action and resubmit the site to search engines. Before re-inclusion in the search results, the experts do a manual evaluation of the submitted site. Although the crawlers handle the operations, the control is manual in this case to monitor and display the search results naturally.

## **2.5 Popular Search Engines**

It will be impossible for a person to access information without the address of search engines. To save time, it is critical to have a precise address and tool to search for the necessary information. Furthermore, librarians should maintain the addresses of these search engines on hand to provide effective services. Some of the most often used search engines are included in the sections below:

- a. Google ([URL:http://www.google.com](http://www.google.com))
- b. yahoo ([URL:http://www.yahoo.com](http://www.yahoo.com))
- c. Altavista ([URL:http://www.altavista.com](http://www.altavista.com))
- d. Hotbot ([URL:http://www.hotbot.com](http://www.hotbot.com))
- e. Excite ([URL:http://www.excite.com](http://www.excite.com))
- f. Infoseek ([URL:http://www.infoseek.com](http://www.infoseek.com))
- g. Web crawler ([URL:http://webscrawler.com](http://webscrawler.com))

## **2.6 Roles of Search Engines Technology**

in Academic Libraries benefit from search engines in the following ways. They are as follows:

- a. They are readily available sources of up-to-date information.
- b. Get the information you need in the shortest amount of time possible.
- c. Direct users to the location of resources other than looking for.
- d. Provide users with the most up-to-date information about a topic or issue throughout the world.

## **3.0 Research Methodology**

### **3.1 Research Design**

The Survey Technique is the research method that will be used in this study "Advances of Search Engine Technology on Academic Libraries: A Case Study of Federal University of Technology Minna,". This approach was deemed the best method for generating relevant data. This survey method was chosen since it allowed the researcher to contact study participants in their various locations and gather data for the study. The findings of the study will then be applied to the whole population. As data was collected from respondents via copies of the questionnaire, the survey approach was necessary for this investigation. The decision to choose a case study research method was based on the fact that it allowed the researcher to perform an in-depth analysis of the topic area and obtain first-hand data and information directly from the source, resulting in a more effective research process.

### **3.2 Population of the Study**

Undergraduate students of Federal University of Technology Minna library were the study's target population. The total number of undergraduate students is 21,617 (Source: Academic Office, Federal University of Technology, Minna June 2021).

**3.3 Sample Size and Sampling Technique**

A simple random sampling technique was used for this study because it is more efficient in getting the required data and avoiding some of the challenges of other sampling techniques. A simple random sample is a subset of the entire population of the study. A total sample size of undergraduate students was selected randomly from both campuses (Gidan-Kwano campus and Bosso campus) from a total population of 21,617 from Federal University of Technology, Minna library. Therefore, Taro Yamane (1967) was used to get the sample size of the population.

$$n = \frac{N}{1+N(e)^2}$$

Where n represents the corrected sample size, N represents the population size, and e represents the margin of error (MoE), with e=0.05 depending on the study circumstance. When the original sample was taken is more than 5% of the population size in a finite population, Yamane's formula is used to calculate the corrected sample size.

$$n = \frac{N}{1+N(e)^2}$$

$$n = \frac{21617}{1+21617(0.05)^2}$$

n = 392.75  
n ≈ 393

**3.4 Research Instrument**

For this investigation, a questionnaire was utilized to gather data. The researcher was able to gather enough and valuable information from the respondent by using a questionnaire as an instrument. The questionnaire was divided into two sections: section A (respondent demographic data) and section B (questionnaire content) (research questions). Undergraduate students at the Federal University of Technology in Minna were given the questionnaire.

**3.5 Validity of Research Instrument**

The project supervisor and a few additional professors in the Department of Library and Information Technology who are experts in this field will validate the questionnaire instrument. As a result, the adjustment was made before the questionnaires are distributed to the respondents.

**3.6 Procedure for Data Collection**

The questionnaires were self-administered to undergraduate students in various departments belonging to different levels to be studied via their departmental social media group platform with the help of an online questionnaire which was accessible via a link that was distributed.

**3.7 Method of Data Analysis**

SPSS version 23 was used to ensure the accuracy of the data analysis performed on this study's data. The responses received from respondents were broken down into tables and straightforward rates, and the information collected using SPSS version 23 was used to complete the further investigation on the information collected using SPSS version 23. (SPSS). Tables, percentages, and the median were used to analyse the data in order to answer the research objectives that drove this investigation. The four-point scale was used in this exercise.

$$fx = \frac{\sum 4*n_1, 3*n_2, 2*n_3, 1*n_4}{\sum}$$

X = Grand memory of all items

N = Number of respondents

fx = Summation of number of responses



### 3.8 Decision Rule

To determine the acceptance level, the middle number will be the determinant. If any  $f_x$  is greater or equal to the median, then it shall be considered Agree. If the  $f_x$  is less than the median, it shall be considered Disagree.

### 4.0 Data Presentation and Analysis

This chapter contained statistical analysis and explanation of the data analysis outcomes. The study's research questions guided the framework of the analysis. Response rate, demographic data of respondents, data analysis, and discussion of conclusions were all addressed in this chapter.

**Table 4.1: Response Rate of Questionnaires**

Federal University of Technology, Minna	No of questionnaire administered	No of Questionnaire retrieved	Percentage (%)
Undergraduate students	393	287	73.03%

Table 4.1 above shows a total number of 393 copies of questionnaires that were designed which entails questions, of which 287 questionnaires were filled and returned.

### 4.2 Section A

**Table 4.2 Faculty of Respondents**

Faculty	Frequency	Percentage (%)
SAAT	29	10.1
SEET	26	9.1
SICT	53	18.5
SIPET	35	12.2
SEMT	26	9.1
SET	35	11.5
SLS	26	9.1
SPS	32	11.1
SSTE	27	9.4
TOTAL	287	100

Table 4.2 above shows the Faculty of Respondents, 10.1%(29) of the respondent that filled the questionnaire were from SAAT, 9.1%(26) of the respondent that filled the questionnaire were from SEET, 18.5% (53) of the respondent that filled the questionnaire were from SICT, 12.2% (35) of the respondent that filled the questionnaire were from SIPET, 9.1% (26) of the respondent that filled the questionnaire were from SEMT, 11.5%(35) of the respondent that filled the questionnaire were from SET, 9.1%(26) of the respondent that filled the questionnaire were from SLS, 11.1%(32) of the respondent that filled the questionnaire were from SPS, and 9.4%(27) of the respondent that filled the questionnaire were from SSTE.

**Table 4.3: Respondent by Gender**

Gender	Frequency	Percent (%)
Male	185	64.5
Female	102	35.5
Total	287	100

Table 4.3 shows us the Gender of respondents, out of 287 questionnaires distributed, 64.5%(185) of the respondent that filled the questionnaire were males and 35.5%(102) of the respondent were females from 287 respondents, showing that the majority of the respondent are males.

**Table 4.4: Level of the respondents**

Level	Frequency	Percent (%)
200	37	12.9
300	52	18.1
400	101	35.2
500	97	33.8
Total	287	100

Table 4.4 shows the Level of respondents, out of the 287 questionnaires distributed, 12.9%(37) of the respondents were 200 level students, 18.1%(52) of the respondents were 300 level students, 35.2%(101) of the respondents were 400 level students and 33.8%(97) of the respondents were 500 level students.

**Table 4.5: Marital Status of respondents**

Status	Frequency	Percentage
Single	250	87.1
Married	37	12.9
Total	100	100

Table 4.5 shows us the Marital status of respondents, out of the 287 questionnaires distributed, 87.1%(250) of the respondents were Single and 12.9%(37) of the respondents were Married.

**Table 4.6: Age Distribution Table of Respondents**

Age	Frequency	Percentage (%)
15-20	40	13.9
21-25	153	53.3
26-30	76	26.5
30 above	18	16.3
Total	287	100

Table 4.6 shows us the age distribution of respondents, out of 287 respondents, 13.9%(40) are within the range of 15-20, 53.3%(153) are within the range of 21-25, 26.5%(76) are within the range of 26-30 and 16.3%(18) are within 30 and above.

### 4.3 Section B

**Table 4.7: Availability of Search Engine Technology**

Options	Frequency	Percentage (%)
No	21	7.3
Yes, and I make use of it	207	72.1
Yes, but I don't make use of it	59	20.6

Total	287	100
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Table 4.7 shows the analysis of the availability of Search Engine Technology. From the data analyzed, 7.3%(21) of the students indicated “No” that the library does not have Search engine technology and 72.1%(207) of the students agreed that Search engine is available in the library and they make use of it, while 20.6%(59) of the students do not make use of the Search engine technology provided by the University library. Therefore, it is evident that the majority of undergraduate students are aware of the availability of Search Engine Technology in Federal University of Technology, Minna Library and they make use of it.

**Table 4.8: Level of usage of Search Engine Technology**

Level of Usage	Frequency	Percentage (%)
The level of usage of Search engine is Very High	19	6.6
The level of usage of Search engine is High	20	6.96
The level of usage Search engine is Moderate	30	10.44
The level of usage of Search engine is Low	109	38
The level of usage of Search engine is Very Low	109	38
Total	287	100

Table 4.8 Shows the level of usage of Search Engine Technology at Federal University of Technology, Minna. From the table above, we can see that 6.6%(19) of the students indicated that the level of Search engines is Very High, 6.96%(20) of the students indicated that the level of search engine is High, 10.44%(30) of the students indicated that the level of search engine is Moderate, 38%(109) of the students indicated that the level if search engine is low and 38%(109) of the students indicated that the level of search engine is very low. Therefore, it is evident that the level of usage of Search Engine Technology is Very low.

**Table 4.9: Impact of Search Engine Technology**

Impacts of Search engine	Strongly agreed 4	Agreed 3	Disagreed 2	Strongly Disagreed 1	Fx	Decision
Increased the amount of materials in the Library	110(38.3%)	113(39.4%)	44(15.3%)	20(7%)	887	Disagree
Increased the Visibility of the library	120(41.8%)	101(35.2%)	45(15.7%)	21(7.3%)	894	Disagree
Increased academic performance of students	120(41.8%)	104(36.2%)	46(16%)	17(5.9%)	901	Agree
Helped students in assignments	123(42.9%)	100(34.8%)	45(15.7%)	19(6.6%)	901	Agree
Made students visit the library more	114(39.7%)	97(33.8%)	52(18.1%)	24(8.4%)	875	Disagree
Increased the number of student	114(39.7%)	95(33.1%)	53(18.5%)	25(8.7%)	872	Disagree

**Median= 901**

Table 4.9 indicated the Impact of Search Engine Technology. The result shows that 39.4%(113) agreed that Search Engine has increased the number of materials, 41.8%(120) strongly agreed that Search Engine has increased the visibility of the library, 41.8%(120) strongly agreed that Search Engine has increased the academic performance of students, 42.9%(123) strongly agreed that 38 Search Engine has helped students in assignments, 39.7%(114) strongly agreed that Search Engine has made students visit the library more, and 39.7%(114) strongly agree that Search Engine has increased the number of students. Hence, it is evident that the major Impact of Search Engine is that it has helped students in assignments.

**Table 4.10: Types of Search engines used by students**

Search Engine	Strongly Agreed 4	Agreed 3	Disagreed 2	Strongly Disagreed 1	Fx	Decision
Google	172(59.9%)	71(24.7%)	23(8%)	21(7.3%)	948	Agreed
Wikipedia	132(46%)	83(28.9%)	48(16.7%)	24(8.4%)	897	Agreed
Yahoo	94(32.8%)	78(27.2%)	66(23%)	49(17.1%)	791	Agreed
Infoseek	47(16.4%)	63(22%)	65(22.6%)	112(39%)	619	Disagree
Bing	46(16%)	53(18.5%)	53(18.5%)	135(47%)	584	Disagreed

**Median= 791**

Table 4.10 Indicated the Types of Search Engines Being Used by Students. The result shows that 59.9%(172) of the respondents use Google the most, 46%(132) of the respondent uses Wikipedia, 32.8%(94) of the respondent uses Yahoo, 39%(112) of the respondent strongly disagreed that students use Infoseek and 47%(135) of the respondent strongly disagreed that students use Bing. Therefore, the data analyzed shows that the majority of students make use of Search engines and Google is the most used search engine.

**Table 4.11: Frequency of Use of Web Search Engines**

Frequency of usage	Frequency	Percentage (%)
Daily	112	39
Twice a week	39	13.6
Once in two weeks	34	11.8
Once in a month	29	10.1
Once in three months	27	9.4
Once in six months	41	14.3
Total	287	100

Table 4.11 shows the Frequency of use of Search engines by undergraduate students of Federal University of Technology, Minna. The result collected from the study shows that 39%(112) of the respondents use Search engine daily, 13.6%(39) use Search engines twice a week, 11.8%(34) use the Search engine once in two weeks, 10.1%(29) use Search engine once in a month, 9.4%(27) uses Search engine once in three months, 14.3%(41) uses Search engine once in six months. The findings imply that majority of Federal University of Technology, Minna uses Search engines every day.

**Table 4.12: Challenges Affecting the Use of Search engine**

Challenges	Strongly agreed 4	Agreed 3	Disagreed 2	Strongly disagreed 1	Fx	Decision
Library is not silent enough	125(43.6%)	78(27.2%)	38(13.2%)	46(16%)	856	Agreed
The location of library is difficult	113(39.4%)	91(31.7%)	41(14.3%)	42(14.6%)	769	Disagreed
Internet connection is slow	131(45.6%)	88(30.7%)	51(17.8%)	17(5.9%)	907	Agreed
Library has no internet connection	113(39.4%)	90(31.4%)	45(15.7%)	39(13.6%)	761	Disagreed
Staffs are not accommodating	112(42.5%)	92(32.1%)	53(18.5%)	20(7%)	850	Agreed
Not getting relevant information	124(43.2%)	73(25.4%)	54(18.8%)	36(12.5%)	880	Agreed
Lack skills to use search engine	123(42.9%)	80(27.9%)	43(15%)	41(14.3%)	859	Agreed
No constant power supply	132(46%)	85(29.6%)	38(13.2%)	32(11.2%)	891	Agreed
Computers are not sufficient	152(53%)	74(25.8%)	40(13.9%)	21(7.3%)	931	Agreed

**Median= 850**

Table 4.12 shows the challenges affecting the use of Search Engine Technology. The result indicates that 43.6%(125) of the students strongly agreed that the library is not silent enough, 39.4%(113) strongly agreed that the location of the library is difficult, 45.6%(131) strongly agreed 41 that internet connection is slow, 39.4%(113) strongly agreed that Library has no internet connection, 42.5%(112) strongly agreed that staffs are not accommodating, 43.2%(124) strongly agreed of not getting relevant information,

42.9%(123) strongly agreed of lacking skills to use Search engine, 46%(132) strongly agreed of no constant power supply and 53%(152) strongly agreed that computers are not sufficient.

#### **4.4 Discussion of Findings**

It was observed that undergraduate students of Federal University of Technology, Minna are aware of the Search Engine Technology and they make use of it on a daily basis but the level of usage of Search engines in Federal University of Technology, Minna Library is very low. This is because of the low availability of Computers in the University Library as revealed in the study and this has made most students resort to the use of their personal Computers to access the Search engine. A lot of issues disturbs students from using the search engine technology in the library but the most pressing issue from the study is that Computers are not available for use. Also, from the observation made, it was discovered that the major Impacts of Search engine on the Library is that it has made the Library known to other Universities, it has increased the academic performance of students who uses the Library and has helped students carry out their various assignments. From the data analysis, it was also revealed that the majority of the undergraduate students prefer to use the Google search engine then followed by Wikipedia. These search engines are very resourceful and have large databases where students can get all their search queries solved in an instant with little or no effort. The frequency of Search engine usage by undergraduates is on a daily basis as student needs data and information to carry out researches, assignments and increase their academic performance in school.

#### **5.0 Conclusion and Recommendation**

Search engines are supposed to be about enthusiasm, optimism, hope, and enrichment, yet doing so might lead to despair and disillusionment. While utilizing search engines to find resources, a student may have felt one or both of these emotions. One might argue that user happiness is primarily determined by the user's search tactics. However, the quality of the search engines utilized for information retrieval also has a role. There are several search engines available nowadays for finding resources. They present the results of searches in an easily understandable format, with several customization options such as refining and sorting. It is clear that the concept of Search engines in Libraries is an emerging trend and it is also utilized by students for performing activities such as assignments, final year projects, research works and for the general improvement of their academic performance. It can be noted therefore that the use of search engines plays an important role in a student's academic performance, whether good or bad depending on how it is being utilized by the student. There is a need to increase the number of computers in the library to accommodate more users at the same time who wants to use search engine technology. This would facilitate easy access to search engines with different computers available. The management of the Library should ensure a constant power supply so students through the use of computers can get access to Search engines when they need it. Seminars, Meetings, orientations should be held by the Library to enlighten students on how to make effective use of search engines to get the expected result needed. From the study, we see that the most used search engine is Google. The University library should provide other search engines like Scirus, windows live academy etc to provide a wider range of retrieving information from search engines. It is a known fact that no research work is complete, therefore further studies should be carried out to know how advanced search engine has come and its impacts on academic libraries. The Students of Federal University of Technology, Minna are aware of the availability and make use of Search engine technology on a daily basis. These Search engines assist the students in their research, assignment and gain additional knowledge. The majority of the Student at Federal University of Technology, Minna prefer to make use of the Google search engine. The major constraints to the use of Search engine technology in Federal University of Technology, Minna include Insufficient Computers, erratic power supply and students not getting relevant information they need when using Search engine.

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