

Usability Assessment and Statistical Analysis of Library Resources in Energy Research Centre Library, University of Nigeria Nsukka

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Abstract This paper reports the findings of a statistical assessment of the use of library and information resources in NCERD Library, University of Nigeria Nsukka. The periods studied are from 2005 to 2012. Library resources available were identified to include books, theses, dissertations & projects (TDPs), journals, conference proceedings and newspapers. Quantitative research design was used because the study involved statistical analysis of records of the library resources in order to ascertain their use by NCERD staff and students. Data was collected by observational technique and recorded documents. Five Research Questions and one Hypothesis were formulated to guide the study. Researchers aim to find whether the use of library resources is independent of the type of library resources available or not. The paper also tends to discover whether the resources are adequately utilized or not.

Keywords Library resources, NCERD library, Library statistics, Resources usability, Statistical analysis

1. Introduction

Research is the basis of innovation and development. It is a precursor for advancement in this era of globalization as it gives competitive advantage. Research will be ineffective if there is inadequate collection, storage and retrieval of library materials. The stock of information resources in libraries constitutes the bedrock of research in any establishment. Harande [1] noted that, “for effective interaction between the information seekers and information resources, the information resource management should be accorded paramount important place in the scheme of information transfer. It is pertinent that the information managers should combine the function of gathering information with analysis, synthesis and delivery of information in usable form. This action increases the value of library and information centre’s output”.

Information required by users appears in various formats such as books, serials, maps, compact discs, etc. These formats are collectively called information carriers. This is because these various objects bear information that is useful to the users of a library. Books and journals are the best known of all the information carriers. Books have been in

existence since the advent of printing technology during the Middle Ages. Nevertheless, other information carriers supplement the print-media collection, especially for learning and recreational purposes. As much as possible, users want relevant information regardless of the format in which it appears. It therefore becomes imperative for libraries to acquire, store and preserve a variety of materials for their users. Aina [2] identified the range of information carriers normally acquired by libraries to include books, serials, manuscripts, cartographic materials, graphic materials, sound recordings, motion pictures and video recordings, microform and digital materials. All these make up library resources available in most libraries. However, the scope of this study is limited to only books and serials (journals, conference proceedings and newspapers).

1.1. Background Information on the NCERD Library

The National Centre for Energy Research and Development (NCERD) of Nigeria is a research institution established in 1982 with the mandate of carrying out research in the field of renewable and alternative energy technologies including manpower training, research output demonstration, dissemination and commercialization. The research center operates with energy policy targeted for increased renewable energy output and usage. Engineers and research scientists in the energy sector generally as well as students with related disciplines are expected to maximally utilize major sources of information for higher result. It is

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this background that motivated the study whose principal objective is to identify the availability and font the usage of library resources by NCERD staff and library clientele (who are made up of students from the University of Nigeria and from other universities and higher institutions).

2. Literature Review

2.1. Information Resources and Research Libraries

Myren and Garcia [3] categorized information into four main parts as: information from people, document resources, reference resources, and other physical evidence. The Role of information resources for research and development and the role of libraries as research centres cannot be overemphasized. It has been noted that knowledge and information have become the most important currency for productivity, competitiveness, and increased wealth and prosperity. Libraries are veritable repositories of knowledge. To this extent, academic and special libraries seek to identify their roles in contributing to their mother institutions' objectives and outcomes in the areas of research, teaching and learning.

More so, it is obvious that the academic set objectives of institutions can only be achieved if the library is adequately stocked and provides the required services to its user community. As Aina [2] rightly puts it "libraries are adjudged to have achieved their mandates when their patrons are satisfied with their range of services". This implies therefore, in order to meet information needs of library users relevant, timely and adequate information resources must not only be provided but also be effectively utilized.

2.2. Importance of Library Statistics

Usage statistics are one of the vitally important tools to good library management. Writing about statistical record keeping or documentation by reference librarians, Aina [2] asserts that "The reference librarian must keep all records of queries. These records when statistically analyzed, help the library in maintaining an efficient library service. The statistics to be collected from the records of queries include types of queries usually asked by users, the most popular information sources for providing answers, categories of users that ask reference queries, etc. The statistics could also help in determining the gaps in the library's collection and, where necessary, new acquisitions could be made".

Going by the above assertion, it is instructive that librarians should take library users' data collection serious as it is an important factor in information gathering about library users. Such data not only makes room for both institutions' management decision about funding resources acquisition and user incentives for maximum patronage by researchers within and outside the organization; but also create needed data for statistical analysis and comparison which would guide the librarians to improve their information packaging, services and attitude towards users.

2.3. Library and Information Resources Utilization

Neelameghan [4] has identified accessibility as one of the prerequisites of information utilization. Since there is growing concern in the need for equal access to information, he argues that information generation, collection, organization, recording and distribution, accessing and utilization operate imperfectly. Thus, the purpose, user characteristics, environment or situation involved, medium of communication, quality, infrastructural facility, cost and time of availability, all condition the use of information. On the other hand, Alegbeleye [5] posits that utilization of information by any clientele is influenced by the kind of job done, profession or function one performs.

Explaining library use, Reitz [6], states that it is "the extent to which the facilities and resources of a library are actually used by its clientele. Common measures include overall or per capita circulation, turnover of collection(s), gate count, program attendance, Internet use with the building, interlibrary loan and reference transactions, etc. Statistics on library use are important in documenting effectiveness and justifying funding". Utilization of library materials is concerned with the number of information materials that are effectively used by its patrons.

3. Statement of the Problem

Effective utilization of libraries has been a matter of concern to librarians, information scientists and educationists in general. Therefore underutilization of library and information resources has no doubt assume a worrisome dimension, given that libraries and librarians have a responsibility of ensuring that their resources and services are effectively utilized especial when huge amount of money is voted for resources procurement. Though there is statistical data on available resources at NCERD library, but this data has neither been analyzed nor updated and compared with data on previous years' users. Apparently, there is little or no statistical data on resources usability by NCERD library users – especially in comparison with years of usage and quantity of resources used. Beyond this, research libraries are meant to provide, promote and facilitate access to specialized information resources. This study intends to investigate whether the use of NCERD library resources depends on the type of resources available or not.

3.1. Objectives of the Study

The general objective of the study is to identify library resources available at NCERD Library and assess the quantum of usability by patrons. Other specific objectives include: to find out the type of library resources available and recorded as used by library users; to make a comparative analysis of the years and varying usages of NCERD library resources; to determine frequency of use of library resources; to find out the observed causes for variations of library

resources usage between 2005-2008 and 2009-2012; to ascertain whether the use of the library resources is independent of the type of resources available or not and to recommend strategies to enhance usage of library resources.

3.2. Research Questions and Hypothesis

The following research questions and hypothesis were formulated to guide the research.

Research Questions

- What types of library resources are available and recorded as consulted and used by NCERD library users?
- Are there any variations in the usage of library resources between the periods: 2005-2012?
- What is the frequency of use of library resources in NCERD library?
- What are the observable causes for variations in the usage of library resources between the periods: 2005-2008 and 2009-2012?
- What strategies could be recommended to enhance library resources usage?
- Is the use of library resources dependent on the type of resources available?

Hypothesis

H₀: The use of library resources in NCERD is independent

of the type of resources available.

3.3. Methodology

Analytical survey design was employed in this study. Documentary sources such Accessioning Register, lending book etc, are used because they contain the information the researchers want. Primary data from 'library users' statistics records and loaning books' of the library was collected. The hypothesis was tested and data was analyzed using Chi Square test statistic (χ^2) at 0.05 level of significance and percentages. This is verified in 'Statistic Tables' book in which 0.05 is the standard level for testing Chi Square test statistic.

4. Results and Data Analysis

Research Question 1: What types of library resources are available and recorded as consulted and used by NCERD library users?

Figure 1 shows that the volumes of books available at NCERD library are 250. Theses (PhD), Dissertations (M Sc.) and Projects (B.Sc/B.Eng.) are all together 32 volumes. Journals are 65, Conference Proceedings 43, Volumes of Newspapers 143. This is represented in a pie chart in figure 2.

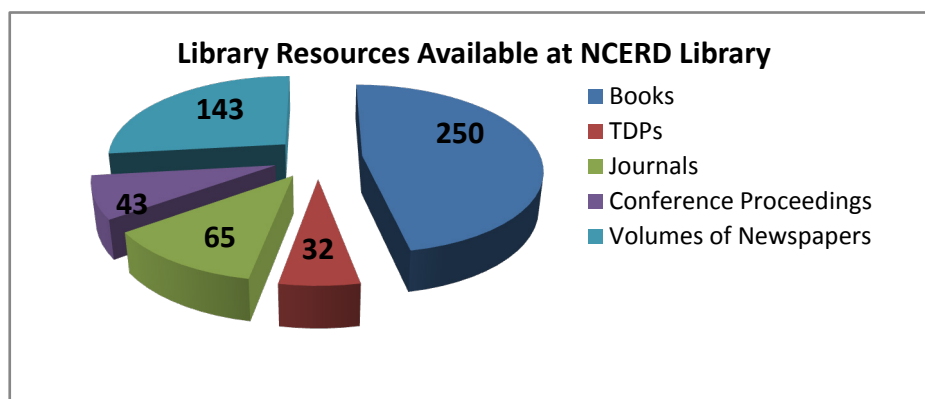


Figure 1. Library Resources available at NCERD Library

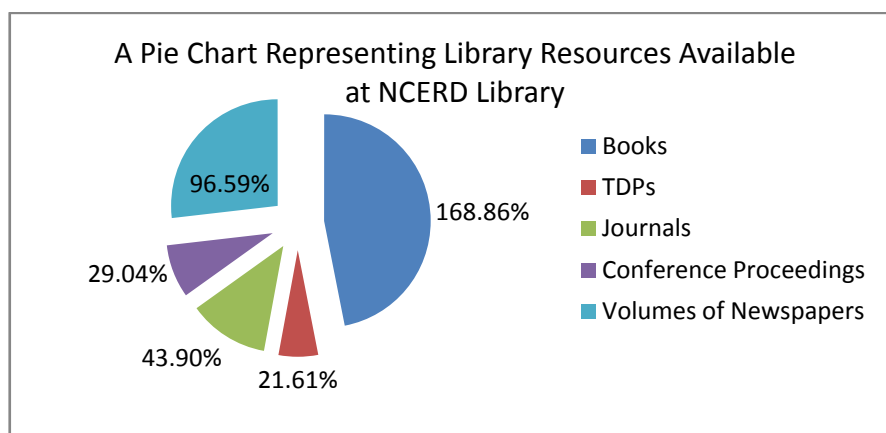


Figure 2. Pie chart of Available Library Resources

Research Question 2: Are there any variations in the usage of library resources between the periods: 2005-2012?**Table 1.** Variations of Number of Materials Consulted between 2005 -2012

Period	Books/TDPs	Percentage	Journals/ Conference Proceedings	Percentage	Newspapers	Percentage
2005	100	24.3%	30	18.3%	35	19.3%
2006	71	17.3%	28	17.1%	30	16.6%
2007	40	9.7%	35	21.3%	28	15.5%
2008	112	27.3%	25	15.2%	40	22.2%
2009	13	3.2%	10	6.1%	10	5.5%
2010	30	7.3%	6	3.7%	12	6.6%
2011	25	6.1%	20	12.2%	14	7.7%
2012	20	4.8%	10	6.1%	12	6.6%
<i>f_j</i>	411	100	164	100	181	100

Data in Table 1 shows that in 2005, 100 (24.3%) books/TDPs were consulted for use. In 2006 usage of books, Projects, Theses & Dissertations (TDPs) dropped to 71 (17.3%). In 2007, usage further dropped to 40 (3.7%). However in 2008 usage increased rapidly to 112 (27.3%) but later dropped drastically to 13 (3.2%) in 2009; other decrease in usage were recorded as follows: 2010, 30 (7.3%), 2011, 25 (6.1%) and 2012, 20 (4.8%).

Journals and conference proceedings consulted within the period under review were as follows: 2005, 30 (18.3%), 2006, 28 (17.1%), 2007, 35 (21.3%), 2008, 25 (15.2%), 2009, 10 (6.1%), 2010, 6 (3.7%), 2011, 20 (12.2%), and 2012, 10 (6.1%). Consulted newspapers were 35 (19.3%) in 2005, 30 (16.6%) in 2006, 28 (15.5%) in 2007, 40 (22.2%) in 2008, 10 (5.5%) in 2009, 12 (6.6%) in 2010, 14 (7.7%) in 2011 and 12 (6.6%) in 2012.

Research Question 3: What is the frequency of use of library resources in NCERD?**Table 2.** Difference in consulted materials in the two periods under review

Period	Frequency of use (Books/TDPs)	Percentage used
2005-2008	323	78.6%
2009-2012	88	21.4%
Total	411	100%
Period	Frequency of use (Journals/Conference Proceedings)	Percentage used
2005-2008	118	72%
2009-2012	46	28%
Total	164	100%
Period	Frequency of use (Newspapers)	Percentage used
2005-2008	133	73.5%
2009-2012	48	26.5%
Total	181	100%

Data in table 2 shows that books and TDPs consulted and used between 2005 and 2008 were greater – 323(78.6%) than the same materials – 88(21.4%) consulted between 2009 and 2012. In all, frequency of use of books/projects, theses and dissertations was 411 between 2005 and 2012. Journals/conference proceedings used between 2005 and

2008 were 118 (72%), whereas the same materials consulted between 2009 and 2012 were 46 (28%). This result indicated a drastic drop. Newspapers consulted during the period 2005-2008 were 133 (73.5%), whereas the same materials consulted between 2009-2012 were only 48 (26.5%). This also indicated much drop in newspaper usage.

Research Question 4: What are the observed causes of variations in the usage of library resources between the periods 2005-2008 and 2009-2012?

Table 3. Observed causes of variations in library resources usage

S/N	Observed cause of variations in library resources usage
1	ASUU Strike in 2009 that lasted over 4 months
2	V-SAT Internet facility outside NCERD Library
3	Obsolete Resources in the Library
4	Preference of Online-Resources to Print-media
5	Non-record of Newspapers consulted outside the Library

Data in Table 3 indicates that there are four reasons or remote causes of the variations in the use of NCERD library by its clientele. These causes include the strike of Academic Staff Union of Universities (ASUU), which lasted for over four months. Subsequently, academic activities were suspended during the period the strike lasted and as a result, students who rely on consulting the library resources were on compulsory holidays and could not patronize the library. Other factors militating against resources use by the NCERD's research staff were identified to include: V-SAT Internet facility installation, obsolete books and journals and preference of use of Internet resources to print-media. Newspapers were consulted in the general office before they were brought to library and as a result, usage of newspapers is not comprehensively recorded.

Research Question 5: What strategies could be recommended to enhance usage of library resources?

Table 4. Strategies to enhance usage of library resources

S/N	Strategies to enhance usage of library resources
1	Increase number of acquisitions per Year
2	Current Awareness Services (CAS)
3	Selective Dissemination of Information (SDI)
4	User Education for patrons on library resources and use
5	Involvement of research staff in selection and order of resources

Table 4 data shows that four strategies are recommended by researchers in order to enhance usage of library resources in NCERD library. They include increase in number of acquisitions per year i.e. increase library budget. Render current awareness services and selective dissemination of information (sorting out and sharing information to NCERD various units as well as according to the various research interest of the library users). Organize, on regular basis, user education for patrons. Research staff of Energy Research Centre should be involved in the selection and order of resources for the library. These recommendations are also applicable to any other library particularly special and research libraries.

4.1. Testing the Hypothesis

H_0 : The use of library resources in NCERD is independent of the type of resources available.

Table 5. The Contingency Table

Period	Books/ TDPs	Journals/ Conference Proceedings	Newspapers	f_i
2005-2008	323	118	133	574
2009-2012	71	28	30	182
F_j	411	164	181	$f_{..} 756$

5. Test Statistic

According to Oladugba, et al. [7] the test for the analysis of independence of two variables is given as:

$$\chi^2 = \sum_i^r \sum_j^k \frac{(f_{ij} - e_{ij})^2}{e_{ij}} \sim \chi^2_{(r-1)(k-1)} \quad (1)$$

where e_{ij} is the expected frequency which is defined as

$$e_{ij} = \frac{(f_i)(f_j)}{f}$$

Expected frequencies, e_{ij} is given by

$$E_{ij} = f_{ij} = \frac{f_i \times f_j}{f} \quad (2)$$

where: e_{ij} is the expected frequency in the ij^{th} cell.

Π_{ij} is the probability of an observation occurring in a specific cell, $i = 1, 2, \dots, r$

$j = 1, 2, \dots, k$

f_{ij} is the observed response/frequency in the ij^{th} cell

$$f_i = \sum_j f_{ij} = i^{th} \text{ row marginal total}$$

$$f_j = \sum_i f_{ij} = j^{th} \text{ column marginal total}$$

$$f = f_{..} = \sum_{ij} f_{ij} = \sum_{ij} E_{ij} = \sum_i f_i = \sum_j f_j$$

such that:

$$E_{11} = \frac{f_{1.} \times f_{.1}}{f_{..}} = \frac{574 \times 411}{756} = 312.06$$

$$E_{12} = \frac{f_{1.} \times f_{.2}}{f_{..}} = \frac{574 \times 164}{756} = 124.52$$

etc.

The decision on whether to accept or reject the hypothesis is based on the value of the above test statistic which is approximately a chi-square distribution with $(r-1)(k-1)$ degrees-of-freedom.

Decision Rule:

The decision rule is to reject the null hypothesis if the value of the test statistic χ^2 exceeds or equals $\chi^2_{(r-1)(k-1)}$

$$\chi^2_2(0.05) = 5.99$$

Since $\chi^2 = 3.6046 < \chi^2_2(0.05) = 5.99$, we do not have enough reason to reject the null hypothesis (H_0) and we therefore uphold that the use of library resources in NCERD is independent of the type of resources available at 0.05 level of significance.

5.1. Discussion of Findings***Library and information resources available and utilized***

The total number of books/DTPs used was 411; total journals/conference proceedings used were 164; whereas the number of newspapers consulted was 181. In all, 756 materials were utilized between 2005 and 2012.

Variations of number of materials consulted in the library

Library resources available at NCERD UNN Library among others include: books, theses, dissertations, projects (TDPs), journals, conference proceedings and newspapers. Data presented in table 2 addressed the research question on variation of number of materials consulted between 2005 and 2012. The result shows that in 2005 all materials consulted totaled 165. In 2006, it totaled 129, in 2007 – 103, in 2008 – 177. But resources usage began to drop from 2009 (33), 2010 (48), 2011 (59) and 2012 (42). This radical decrease in library resources usage was caused by certain factors including ASUU strike, VI-SAT Internet installation in the research center but not within the library.

Causes of Variation in Resources Usage

ASUU strike, V-SAT Internet facility, obsolescence or resources intertwined with the subsequent, preference to online resources were the remote causes of staff and students' variation through the years in their use of library resources.

Result of tested Hypothesis

The result of the null hypothesis tested brought about its rejection and acceptance of the alternate hypothesis that the use of library resources in NCERD is not independent of the type of resources available. This attests the fact that naturally any university or research library is determined by its academic or research activities. This result implies that accessing the library's stock is not determined by the type of materials available especially as these materials are mostly energy-related and are veritable tools for research and development.

Strategies to enhance Usage of Library Resources

Strategies to Enhance adequate use of Library and Information Resources in NCERD

The number of library resources acquired per year is to be increased. In other words, there be a budget increase to accommodate purchase of greater quantity and quality of resources. Other-result oriented strategies which bothered on

the librarians' role include: Current Awareness Services, Selective Dissemination of information and user education for library patrons on resources and use.

5.2. Conclusions and Recommendations

The objective of the study was mainly to identify library and information resources available and utilized in NCERD UNN library and also to ascertain whether the use of the resources by clientele was independent of the type of resources available or not. The findings primarily revealed that the sources are not sufficient in variety, quantity, and quality. Additionally, they do not reflect the latest research standards.

The result of the null hypothesis tested shows that the use of library resources in NCERD is not independent of the type of resources available. The result also shows that library resources were not adequately utilized. This is obviously because the existing resources are obsolete (or not primarily relevant). The role librarians, information scientists, and statisticians play in ensuring adequate provision, maximum use and statistical record keeping and data analysis cannot be over emphasized. This is particularly important in a globalized and competitive economy.

Based on the findings of the study, the researchers recommend the following steps to achieve firm objectives of establishing the NCERD library:

1. Library staff and curricular program coordinators need to collaborate closely on the acquisition of resources in order to ascertain a continuous update of these in accordance with latest research standards.
2. The library staff is challenged to be up and doing in keeping statistical records of users materials consulted on a daily basis.
3. Such statistics should be periodically examined and analyzed by the librarians in order to recommend to and inform decisions of the research institution's management committee for improvement in resources acquisition.
4. Management of NCERD should create an enabling environment for research by equipping the library with modern facilities, including internet connectivity in the library.
5. Staff and other library users should form the habit of visiting the library from time to time and not solely rely on information from the internet, because not all facts are gotten from the net.
6. Current Awareness Services (CAS) and Selective Dissemination of Information (SDI) should be a regular practice of the librarians in the Energy Research Centre. This will help library users to be kept abreast of new arrivals, and ability to promptly access current information in their various disciplines and research interests.
7. NCERD staff in the general office should be asked to keep statistics of newspapers consulted for proper recording of newspaper use.

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