

Impact of Information Centres on Scientific Research: A Case Study of the Cocoa Research Institute of Ghana

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Abstract

Information centres are of prime concern as far as managing information is concerned. They have become significant in the provision of scientific and technical resources for scientists. Hence there is the need for information centres to process and repackage information in a suitable format that will satisfy and meet users' information needs. This study looked at the impact of information centres on scientific research with reference to the Cocoa Research Institute of Ghana. The impact of any information centre's services on research or on a parent organization depends on the satisfaction users derive through the services. The study adopted the expectation disconfirmation theory, a customer satisfaction model, and used the survey method, employing the semi-structured questionnaire to collect data from 60 library users and 20 information centre staff. Descriptive statistics such as frequencies and percentages were used to present the analysis. Findings from the study show that the Library is used frequently and patronage is very high. The information resources were found to be reliable, current and produced in a timely manner. Users derive a lot of benefits in using the Information Centre and this has increased research output. However, there are areas of dissatisfaction like the poor nature of Internet connectivity, inadequate information resources and limited funding.

Introduction

In this era of information overload and globalization, information centres have become the link through which professionals and students have access to relevant information available. The development of information technology has brought about the creation of information at a high rate. According to Alemna (2000), the dramatic acceleration in the development and use of information and communication technology (ICT) during the last few de-

ades have set in motion a worldwide process of transition from the 'industrial to the information society'. Lancaster (1977) asserts that information centres exist as an interface between the universe of bibliographic resources and a particular user publication. Hence, there is the need for information centres to process and repackage information in a suitable format that will satisfy and meet users' information needs. The ultimate objective of information centres should be the dissemination of the right information to the right user at the right time to make an impact in all sectors where information centres are established. The user should be the focal point of service to achieve the needed impact (Kumar & Kumar, 2008).

According to the Institute of Statistical, Social and Economic Research (ISSER, 2001), in Ghana the scientific industry has played an increasingly important role in Ghana's annual income for decades. A developing country like Ghana can boost her economy through research by providing information readily in areas that have already been researched into and new areas that can be researched. In this regard, the production, management and dissemination of scientific data and information become increasingly a critical function within scientific research. For researchers to conduct effective research into new products, diseases and other related fields, information centres must have relevant information resources and also employ professional standards in order to meet the information needs of researchers.

Though information centres play an important role in the scientific data and information production, publication and dissemination, little attention is normally given to these centres. It is often forgotten that a good information centre serves as the basis for quality research. It is therefore important to stress the role of information centres, and the need for providing adequate funding support for such centres cannot be underestimated. It is impossible to meet and satisfy the information needs of any particular group of users unless the required information exists and is easily available. Easy access to information may be constrained by factors that hinder the services of these centres and indirectly affect research. Paramount among the problems are poor Internet connectivity, limited funding and lack of information and communication technology facilities. According to Addom (2010), little is known in Ghana of how access to ICT by agricultural researchers, extension officers and other intermediary organizations like information centres

is being used to unearth the existing knowledge and innovative activities in research.

Despite the problems that information centres in scientific institutions face, they have the challenge to efficiently and effectively manage information to facilitate research and technology transfer. This paper seeks to examine the effectiveness of information centres in performing these tasks by looking at the case of the Cocoa Research Institute of Ghana.

The Information Centre of Cocoa Research Institute (CRIG)

The Information Centre of the Cocoa Research Institute of Ghana was established in June 1996, and it is one of the divisions that provide supporting services to the main scientific divisions. The Centre is responsible for the dissemination, storage and management of information at CRIG. It is made up of the following units: Network Management Unit (Computer Centre), Library, Public Affairs, Book Bindery and Photography. The centre is staffed by nine senior officers and thirteen junior officers, Out of the nine senior officers, six are from the Library and the Computer Centre and their specializations are in computer science, software packages, graphic designing and librarianship. The centre's total holdings are 17,834, which is made up of 7,501 textbooks; 8,236 pamphlets; 2,444 bound journals and subscription to 68 journals.

Literature Review

Many studies examine the benefits and/or the value and cost benefits of information centres and information use. In a report of the Library and Information Research Group (LIRG) seminar held in Leeds, 30th October, 2001 on 'the impact of libraries on learning, teaching and research', Professor Gaynor Taylor, Deputy Vice-Chancellor of Leeds Metropolitan University, threw light on how libraries and information centres have impacted on cultural and education and life across the country and the key role in enabling and expanding participation in education and life-long learning. Professor Taylor praised the role of libraries, arguing that they were central to academic communities and the benefits of integrating libraries fully into the learning experience (Everest & Payne, 2001).

However, the impact of information centres and information use cannot be isolated from satisfying the needs of the user. Thus, users are a central entity in every type of library. Therefore, there is the need to pay attention to the element of user-centeredness and an appreciation for their individual information needs.

Findings of two important studies undertaken in the energy sector in the United States of America provided evidence that substantial savings are made by users at the Energy Database Centres as a result of reading (Griffiths' and King's study, as cited in Agyeman, 2003). The first study titled 'Value of the Energy Database' was conducted for the U.S. Department of Energy (DOE). The purpose of the study was to investigate the value of information generated from the DOE research and development funding, and the contribution that the Energy Database and its products and services made to the value of research. The study concluded that energy scientists through reading of journal articles and technical articles saved a total of \$13 billion in 1981.

In the second study, the methods employed in the first study were modified to examine what contribution libraries and information centres made to the value of information. It determined, among others, the purposes of reading and the effect of information use on research. Data was obtained from a general survey of scientists found in nine fields of sciences. The study attempted to estimate the dollar value of information centres quantitatively in terms of cost savings by asking scientists, for example, to estimate the dollar value to them of time saved as a result of reading journal articles and technical reports. The study revealed that information found at the library was relevant to research as scientists were willing to pay additional cost of resources at the library.

In 1990, the hospital librarians in Rochester, New York, developed a research project that explored the impact of library services on clinical decision making (Marshall, 1992). The 208 physicians from participating hospitals in the Rochester area were asked to request information related to a current clinical case and to evaluate its impact on the care of their patients. As a result of the library information, 80% of physicians reported that they handled some aspect of patient care differently. They said that the information provided by the library helped them avoid hospital admission (12%), patient mortality

(19%), surgery (21%), and additional tests or procedures (49%). The physicians rated the information provided by the library more highly than other information sources such as diagnostic imaging, lab tests, and discussions with colleagues.

A study by Agyeman (2003) on the impact of nuclear information on research scientists and engineers in the nuclear field in Ghana, used the survey method, in which 100 scientists were interviewed to examine the extent to which researchers use library and information services and the beneficial consequences of the use of information in relation to some productivity and achievement indicators. The study findings showed that frequent users of library and information services are more productive in terms of their research output than infrequent users. Also frequent users of library and information services achieved more towards personal development, and they also contribute more to the work of their research institutions than infrequent users.

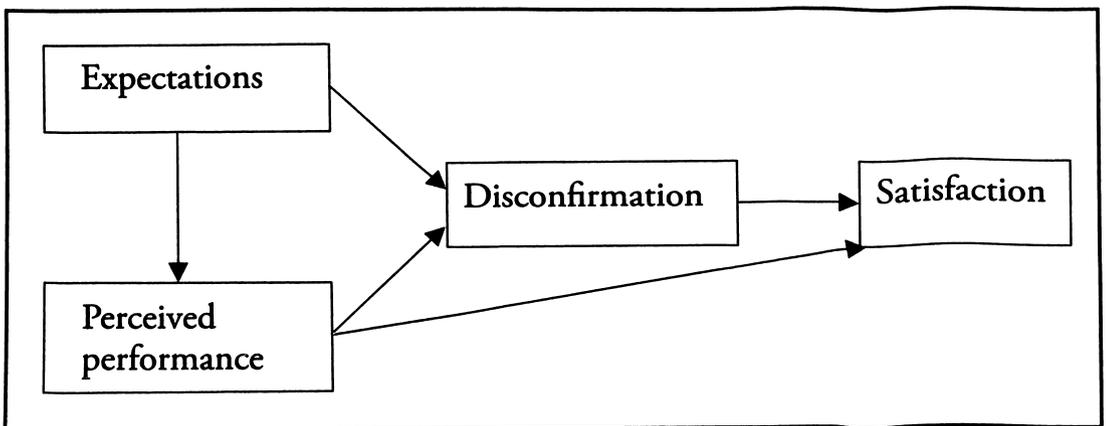
In a research undertaken by Jiagge (1999) on information needs of staff of the Water Research Institute, 120 scientists and their technical staff were interviewed to elicit their opinions on the use of the institute's library when conducting research, the information services provided by the library, and how best to improve the library to meet the needs of users. The study revealed that some sections in the institute are not well catered for in terms of the researchers' information needs. However, when asked the frequency of the use of the library, 78% responded that they use the library everyday and anytime the need arises. This finding shows that the users have a strong perception of information as the basis of their work and are aware of the significant role libraries play in research activities.

Ampem-Darko (1995) conducted a survey with the purpose of assessing the information needs of research scientists at Cocoa Research Institute of Ghana (CRIG) and Cocoa Research Institute of Nigeria (CRIN). He studied needs of scientists from each institute and the library facilities available. Using the cross sectional approach, the study revealed that users found the resources available at the information centre were far below the information needs of researchers and the rate at which their activities are increasing.

Theoretical Framework

The effectiveness of information centres in facilitating scientific research can be examined from the user's perception of how their information needs are being met and satisfied. Various customer satisfaction models have been developed to assist in evaluating customers' or users' perception and satisfaction of a product or a service. The Expectation disconfirmation theory, a customer satisfaction model, was adopted for the study. The Expectation Disconfirmation theory has been described as the most dominant theory of customer/user satisfaction, hence the choice of it. The theory posits that customers form attitudes of satisfaction or dissatisfaction based on a comparison of their pre-consumption expectations and post-consumption experience of a product or service. Customer expectations are based on the perceived performance of a product or service. (Oliver, 1980; Spreng et al., 1996). Expectation disconfirmation occurs in three forms:

- I. Positive disconfirmation, which occurs when perceived performance exceeds expectations,
- II. Confirmation, which occurs when perceived performance meets expectations, and,
- III. Negative disconfirmation, occurring when perceived performance does not meet, and is less than the expectations.



Source: Oliver, R. L., 1980.

The above model illustrates that expectations, coupled with perceived performance lead to satisfaction. If a service outperforms expectations (positive disconfirmation) satisfaction is achieved. If a service falls short of expectations (negative disconfirmation), the consumer/user is likely to be dissatisfied.

The impact of any information centre's services on research or on a parent organization depends on the satisfaction users derive through the services. In information service provision, the service providers must endeavour to provide services that are above users' expectation (Positive disconfirmation) or at least meet their expectation (Confirmation). In contrast to the above, the user is more likely to be dissatisfied when the service does not perform to his expectation (Negative disconfirmation). Therefore, frequency of visits and purpose of usage, quality of information, efficient electronic and print resources and effectiveness of the Information Centre staff, are some of the critical issues information centres must consider to provide services that meet the needs of users in order to positively impact research activities.

Purpose of the Study

The study aimed at assessing the impact of the Information Centre on scientific research at the Cocoa Research Institute of Ghana, Tafo.

In more specific terms, the objectives of the study were:

1. To find out if researchers use the Information Centre and the purpose for using the Centre
2. To find out the benefits of using the Information Centre.
3. To find out if the Information Centre has the needed resources that benefit the activities of researchers.
4. To find out if researchers rely on resources at the Information Centre or rely on other centres for information when conducting research.
5. To find out the constraints of the Information Centre in performing its duties.

Research Design

The research design for the study is the survey method. This involves obtaining data for describing the characteristics of a population at a certain point in time or at specific points in time based on a sample from the population.

Selection of Subjects

The total staff of the Cocoa Research Institute of Ghana is 1,089. However, for the purpose of this study, the target population for this study is researchers and their technical staff from the scientific divisions and staff of the Information Centre. The scientific divisions comprise 38 researchers, 60 technical officers and 37 technical assistants. The Information Centre consists of a staff of 22, making a total of 157. The scientific divisions were selected based on the fact that they carry out all research activities in the Institute. The Information Centre, which has five, was selected because it provides information relating to all issues in the Institute (Cocoa Research Institute of Ghana, 1998).

Sampling Technique

A sample size of 80 was used for this study. The majority (60) was selected from the scientific divisions' staff and (20) from the Information Centre staff, making 75% and 25% respectively. The researcher visited the institution and randomly selected the respondents at one of their meetings to answer the questionnaires. The ratio was arrived at to ensure that each group was adequately represented.

Instrumentation

The study used a semi-structured questionnaire as a means of gathering primary data. Individual respondents were given the questionnaire to complete on their own and the researcher was around to help answer the questions. Two sets of different questionnaires were designed, one each for the scientific divisions and the Information Centre staff. Each questionnaire was divided into three main sections. Section 'A' comprised of personal data, while section 'B' and 'C' covered services provided by the Centre and its usage, re-

sources available and constraints the Information Centre faces in terms of service delivery.

Data Analysis

The questionnaires were formatted in such a way that the responses were easily coded by assigning numbers to all responses. The data was then analyzed using Statistical Package for Social Sciences (SPSS). Descriptive statistics such as frequencies and percentages were used to present the analysis. Chi-square was used to examine the number of years a researcher has served in the Institute with the use of the Library and the Computer Centre, highest academic qualification and searching for information at the Library. The analysis was tested at 1 percent and 5 percent level of significance.

Results

Usage of the Information Centre

- **Number of Years Served in the Institute by Use of Library.**
out of the 60 respondents who were interviewed, 47 (78.3%) have used the Library once or more a week and the least being twice a year, 2 (3.3%). Of the 47 respondents who have used the Library once or more a week, 18 (38.3%) have served above 10 years at CRIG. Also 21.3% have used it less than a year as well as 1 to 5 years respectively. It was also observed that about 82% of researchers who use the Library once a month have served one to five years, while the rest (18.2%) have served more than ten years. Respondents who have served from one to five years use the Library more than all the other respondents.

The cross-tabulation between number of years served and the use of the Library by researchers show a chi-square value of 14.91 which is statistically significant at 5 percent ($p < 0.05$). It implies there is a significant relationship between number of years served in the Institute and the Use of the Library.

- **Number of Years Served in the Institute by Use of Computer Centre**

On the use of the Computer Centre by number of years served by researchers, the results show that most of the respondents sampled 28 (46.7%) have used the Computer Centre once or more a week. Five of the respondents (8.3%) used the Computer Centre once a month followed by 3 respondents (5%) who used it once a year. Also 24 (40.0%) do not use it at all.

The reported chi-square value of 9.18 did not show a significant level ($p > 0.05$). It implies there is no significant relationship between the number of years served in the department and the use of the Computer Centre by respondents.

Patronage of Library Services

The rate at which users patronize a service can serve as measure to determine how satisfied or dissatisfied they are. When the Information Centre staff was asked about the level of patronage of services provided, 68% said patronage is very high while 16% said high, and 16% also indicated quite high. This confirms the responses given by the researchers that the Library is used more frequently than the Computer Centre.

Accessibility of Information at the Library

Availability and easy accessibility of information is crucial when searching for information. When the respondents were asked whether they find it difficult searching for information at the Library, 59.3% indicated that they sometimes find it difficult searching for information at the library, 39% have no difficulty, while 1 (1.7%) find it difficult searching for information.

Difficulty in Searching for Information by Academic Qualification

Most respondents in all the categories of qualification sometimes have problems searching for information. Out of 60 respondents, 37 (61.7%) sometimes have problems searching for information. The analysis reveals that majority of researchers who sometimes find it difficult searching for information at the Library are those with master's degree (24.3%) followed by

PhD (21.6%). The survey results again show that out of the 22 researchers who responded that they do not have difficulty in searching for information, most of them (50.0%) fall within the diploma category. The calculated Pearson chi-square value of 20.66 with a probability of 0.024 is statistically significant at 5 percent level ($p > 0.01$). This implies that there is a significant relationship between highest academic qualification and searching for information at the Library. From the study, respondents with higher academic degrees mostly find it difficult in searching for information at the Library.

Purpose of usage of the Information Centre

One indicator of the worth of an information centre is the purpose for which it is used. Therefore in impact studies, it is advisable to ascertain the factors which influence users to use an information centre. Responses from researchers in the scientific divisions show that 53.3% of researchers use the Information Centre for professional development followed by research work (48.3%). In addition, about 42% use it for publication while 5% use it for teaching. Only 3.3% use the Information Centre for consulting and advising. On the other hand, responses from the Information Centre staff show that they believe researchers mostly use the Information Centre for research purposes (95%), followed by publication (85.0%) and the least is for professional development (25.0 %).

Benefits in Using the Information Centre

The respondents were asked about the benefits researchers derive in using the Scientific Information centre. Result shows that most respondents (26.7%) are of the view that the Information Centre has made research work easy. Also, 23.3% said it has helped in upgrading their knowledge while 20% indicated it has made easy access to library materials. Other responses given are the following, for easy reference work (11.7%), lending services 5 (8.3%) and for report preparation and presentation 4 (6.7%). From the responses given it is clear that majority of respondents have benefited in using the Information Centre especially in research work (26.7%) followed by upgrading in knowledge (23.3%) and easy access to library materials (20.%).

Resources of the Information Centre

Both material and human resources at the Information Centre were considered

- Adequacy of Resources

On the adequacy of materials at the Information Centre, 45% of the respondents indicated that the materials are fairly adequate, followed by 35.1% who believe the resources are not adequate. It was also observed that 17.5% alleged that materials are adequate while 2 percent held the view that the materials are very adequate.

- Reliance on Resources at the Information Centre

The question was whether users rely on the resources at the Information Centre when conducting research or rely on other sources elsewhere. Out of the 60 respondents from the scientific divisions, 24.6% use the resources always, 29.8% do not use it always, 40.4% use it once in a while and 5.3% do not use the resources at all. This implies that the resources are used by majority of the respondents, but not always. The following is the response given by the Information Centre staff: out of the 20 who responded to the question whether researchers rely on the resources at the Information Centre when conducting research, 50% of the staff said users always rely on the resources when conducting research, 43.7% said not always, 6.3% indicated once in a while and there was no response for not at all.

- Quality of Information Found

The quality of an item or a product is not easy to assess. For this study, quality of materials at the Information Centre was assessed in terms relevance, currency and timeliness. It is interesting to note that while a few (8.3%) respondents indicated that the information found is not relevant, the percentage of respondents that stated that

information found was not current and not timely registered 3.3% and 5% respectively. It is obvious that the materials found in the Information Centre are relevant, current and produced in a timely manner.

Success in Obtaining Information

In terms of success in obtaining information, majority of the respondents representing 47% sometimes find what they wanted, while 43.0% partially find what they wanted. About 10% responded that they always find what they wanted. Most of the time, success in obtaining information depends on factors such as extensiveness of the collection, organization of the collection and the skills of the user.

Conclusively, whereas 40.4% of respondents from the scientific divisions indicated that they rely on the resources of the Information Centre once a while, only 6.3% of respondents from the Information Centre said so. It can be concluded that researchers rely on the resources at the Information Centre, but not always.

Effectiveness of the Information Centre Staff

The question was meant to find out how best the Information Centre staff could help as far as conducting research is concerned. Out of 60 respondents, 27 (45%) said the Information Centre staff are good. About 2 (3.3%) said excellent. The rest of the rest of the responses from the scientific divisions are, very good 18 (30%), fair 1 (18.3%) and somehow 2 (3.3%).

Constraints

- **Constraints of the Information Centre**

The 20 respondents from the Information Centre indicated the following: lack of current books (30%), financial problems (25%), lack of journals (25%), shortage of materials (25%), lack of good computers (20%), lack of Internet connectivity (20%), lack of good photocopiers (15%), and unreliable tele phone networks (15%) are the constraints affecting the Information Centre. The study showed

that inadequate resources are major constraints facing the Information Centre staff.

- **Causes of Constraints**

When the Information Centre staff were asked about the possible causes of the problems facing the Information Centre, 75% indicated lack of funds as a cause while 35% alleged ignorance of the authorities at CRIG on the impact the Information Centre has on research. Additionally, 15% of respondents indicated lack of interest in the services provided by the Information Centre.

- **Constraints of Researchers**

Among the problems that faced the scientific divisions, the foremost mentioned were the unreliability of the Internet service, which registered a high response rate (60%) and lack of access to online databases and local databases (58%). Other problems mentioned are 'materials are not very current', 'sometimes information needed delays' (these problems are related to the Internet connectivity), and 'the Information Centre staff are not very helpful'.

Findings and Discussions

- **Usage of the Information Centre**

The results from this study showed that the Library is used more than the Computer Centre. About 81% use the Library once or more a week. This confirms the responses given by the Information Centre staff that the Library patronage is very high. The response from the scientific divisions indicated that the Centre is mostly used for professional development and research. About 95% of responses from the Information Centre showed that the Centre is mostly used for research purposes, followed by publication (85%). It can be deduced from the above that, the Information Centre is mostly used for research purposes. It is clearly indicated here that there is a high level of satisfaction as far as usage and purpose of usage is concerned (positive confirmation). However, the number (46.7%) of respondents who use the

Computer Center once or more a week is not satisfying. This reiterates the unreliable nature of the Internet, meanwhile the lack of access to online databases remains a paramount user concern.

In order not to waste so much time in searching for information, users must be given user education. There must also be enough guides to make searching for information less difficult. The study showed that 59.3% of respondents from the scientific divisions sometimes find it difficult in searching for information. Incidentally, more users with higher academic qualification were more likely to find it difficult in searching for information at the Library. The possible reason could be that such users are pre-occupied with many things and do not want to spend much time searching for information. From the deduction, one can conclude that there is a negative disconfirmation (dissatisfied) about easy accessibility of searching for information at the Library by the scientific divisions.

The success of researchers in obtaining information was not encouraging. About 10% responded affirmatively that they always find what they want at the Information Centre. Furthermore, 43% stated that they partially find what they want and the rest (47%) sometimes find what they want. There could be varied reasons for this. It is likely that users are not skillful in searching for information or the organization of the materials in the Centre is complex. Therefore the Centre should consider providing users with bibliographic instructions.

Resources

- **Adequacy of Resources**

Only an insignificant percentage of respondents, 1.8%, indicated that the resources are very adequate, while 35.1% indicated that the resources are not adequate. The response suggests that users are not satisfied with the adequacy of the resources. The perceived performance is lower than respondents' expectation (negative disconfirmation). This confirms findings of a study done by Ampem-Darko (1995), which suggested that respondents were dissatisfied with the resources at the information centres of the Cocoa

Research Institute of Ghana and the Cocoa Research Institute of Nigeria. Alemna (2000) added that special libraries are faced with problems of lack of materials.

- **Reliance on Resources of the Information Centre**

Researchers relying on the resources of the Information Centre can be an impact measure of the worth of the Information Centre. Again there is a contradicting view on whether researchers rely on resources at the Information Centre when conducting research. About 50% of the Information Centre staff stated that the researchers always rely on the resources as against 24.5% of researchers who said they always rely on the resources of the Information Centre and 40.4% who rely on the resources occasionally.

- **Quality of Information Found**

Information centers can make a positive impact only when the information it produces is relevant, current and timely. The analysis revealed that 53.3% of respondents believe the information found at the Information Centre is relevant. In addition, 76.6% indicated that the information found is current, and 70% attest to the fact that it is produced in a timely manner. This finding corroborates a previous study by Agyeman (2003), in which 77.2% of the respondents she studied indicated that the information obtained was relevant. The results conclude that perceived performance meet expectations.

Impact of the Information Centre on Research Output and Benefits of Usage

One of the important indicators of the impact of libraries is the effect of reading on the productivity of professionals, according to Griffiths and King (1993). Overall, 76.4% of the respondents declared that the use of the Information Centre had increased research output. The study showed that generally researchers are satisfied with the impact of the Information Centre on their research activities. Other benefits of using the Information Centre cited by respondents include: easy preparation of research proposals, report preparation and presentation, among others.

Constraints of Information Centre and Researchers

Any constraint on the Information Centre is likely to affect effective and efficient service delivery. The following are the problems facing the Information Centre staff: financial constraints, inadequate resources, lack of good computers and photocopiers and poor Internet connectivity. Lartey and Sam (2004) reported that most information Centres in scientific institutions lack ICT facilities, network and Internet connectivity are not reliable. Based on the constraints stated, there is clear evidence that the researchers are not completely satisfied with facilities of the Information Centre (negative disconfirmation). The unreliable nature of the Internet recorded a response rate of 60%. Other comments made are that lack of access to online and local databases and sometimes information needed is delayed. These problems hinder access to current publications and are experienced in all research institutions and virtually in all institutions of higher learning in Ghana as indicated by (Kissiedu, 2002).

Conclusion

On usage, the Library is perceived to be used more frequently than the other units under the Information Centre. Patronage on the whole is satisfactory except that Internet facilities are less used due to the aforementioned constraints.

Materials found were said to be relevant, current and timely but inadequate. The study shows that the Information Centre staff said 50% of researchers always rely on the resources but only 24.6% of researchers themselves said they always rely on the resources of the Information Centre. Though users appreciated the effectiveness of the Information Centre staff, there is the need for them to be better equipped so that they can provide high quality services in order to satisfy their users (Bayraktaroglu & Ozgen, 2008).

One common problem that runs through the study was lack of networking. Without networking access to the Internet, online databases and sharing of information becomes a problem. It prevents the free flow of information. The study shows that the major constraints affecting the Information Cen-

tre are lack of resources and financial problems. The four major constraints specified by the researchers are the non reliability of the Internet, lack of access to online and local database and materials not being adequate.

It can be concluded that there is a significant level of satisfaction among users. They expressed confirmation and positive confirmation in the use of the Library. The information resources are reliable, current and produced in a timely manner. Users derived a lot of benefits in using the Information Centre and it has also increased research output. However there are areas of dissatisfaction comprising the poor nature of Internet connectivity and constraints both the Information Centre and the researchers faced.

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