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An Analytical Study of Masters Dissertations on the Balme Library, University of Ghana, Legon

V. K. Fosu and A. A. Alemna

Balme Library,
University of Ghana
P.O. Box 24
Legon, Ghana
aalemna@yahoo.com

Abstract

This paper analyses masters dissertations written on the Balme Library, University of Ghana by students of the Department of Information Studies, University of Ghana from 1998-2005, with a view to ascertaining how the management of Balme Library has implemented the recommendations from the dissertations. The analysis takes the form of the type and year of dissertation, subject of dissertation, and whether written by Balme Library staff or not. The findings indicate that most of the recommendations in the dissertations have not been implemented by the library. One of the reasons for this is that the Balme Library did not even know of the findings and recommendations. Some suggestions have been made to overcome this problem, including the need for staff of the Balme Library to supervise some of such dissertations or, failing this, and/or the need for the management of the library to, at least, be made aware of studies and recommendations relating to the Balme Library.

Introduction

The dissertation is an essential aspect of masters degrees in a number of library and information schools throughout the world, including the

Department of Information Studies at the University of Ghana. The goals of a dissertation are to meet the requirements of a degree, proving that one has mastered the skills necessary to succeed in one's chosen scholarly field, while at the same time, making an original contribution to that field (Duke and Beck, 1999).

The number of dissertations written each year in the department has grown steadily in the past five years. Similarly, a lot of interest has been developed by masters' students on the activities of the Balme Library, University of Ghana.

The subject of the dissertation is crucial. It is the main core of the work and therefore has to be chosen with a lot of care and attention. The Balme Library has been a subject of attention by masters' students of the Department of Information Studies in recent years. It is the main library of the University of Ghana, Legon. Balme Library is the largest library in Ghana. It has a stock of about 350,000 volumes and 5,000 periodical titles. It was built to accommodate 250,000 volumes and 350 readers. But at the moment, university expansion has meant that the library is now expected to serve over 17,000 potential readers, made up of students (undergraduate and postgraduate), faculty, the administration and the general university community. There are different departments within the library and each department has its specific role. They are: Administrative Department, Orders and Acquisition Department, Cataloguing Department, Reader Services Department, Technical Services Department and the Computer Unit (Alemna and Cobblah, 2004).

For students of the Department of Information Studies, University of Ghana, the Balme Library thus provides the following advantages: easy access, extensive collections, large facilities, large number of professional staff and increased electronic information provision.

Review of Relevant Literature

In most universities the life cycle of a thesis/dissertation begins with the conception of a researchable topic by a graduate student in consultation with a supervisor or a potential supervisor. Upon agreement, the student is normally requested to develop a research proposal under the supervision of an academic staff member within the relevant department. The proposal is then presented in an oral presentation at a seminar convened by the department where other members and experts in the field often participate. Comments are made, and the candidate is requested to reflect on them before submitting the proposal for approval to the Faculty Higher Degrees Committee as pertains at the Universities of Dar-es-Salaam, Makerere and others (Kiondo, 2004). At the University of Ghana, there are three stages in the approval of theses and dissertations. The first stage involves the approval of the research proposal for the intended topic, by the Department. Then, it has to be approved by the Faculty Committee before it is submitted to the Academic Board for final approval.

Theses and dissertations as requirements for masters' degrees have become controversial in recent times. There is an on-going debate as to whether it is necessary to present a thesis or dissertation in order to obtain a master's degree. The arguments include that: (a) the nature of thesis is incompatible with the nature of so many disciplines presently requiring it as part of the curriculum; (b) at best, the majority of theses are insignificant as contributions to their disciplines especially so in terms of their cost in time, harassment, and money to the candidate and in time and harassment to the faculty involved; (c) many "good" schools are doing away with thesis (presumably for good reasons); (d) students are not prepared educationally or equipped intellectually to "write" a coherent, readable thesis; (e) the time spent by the candidate on thesis could be spent more profitably in additional coursework better preparing the candidate professionally; and (f) once theses are approved, bound, and shelved, nobody ever reads them.

These arguments, and there are no doubt others, have validity. Too often, however, the negative thrust of these arguments is allowed to go unchallenged. There are persuasive points to be made on the other side of the question (Schwarz, 1973). The dissertation

is the first expression of maturity in and mastery of a field. It is therefore of a special importance to the candidate and the institution. For most institutions, it is the best instrumentality by which to measure the candidate's preparedness, ambition and accomplishment. It is also the last important exercise that students will do in their graduate careers. For the candidate, the dissertation also provides an opportunity to produce something of original value or conception, to an extent, independently of coursework. It also enhances the research and writing skills of the candidate. The idea of literature review also enables the candidate to have a broad view of the whole gamut of literature in the chosen subject, from which to select relevant ideas.

Another advantage of the dissertation is the analytical and critical thinking that it provides in the analysis of findings and recommendations. This allows the candidate to exercise his/her analytical skills as well as marshal coherent arguments in making conclusions and recommendations. It may be pertinent also to mention here that the process of seminar presentations before a topic is finally accepted allows for some level of peer review and lessons in academic presentations which might be carried over to the candidate's future jobs after leaving the library school. Although one might argue that dissertations are not necessary or required for certain masters' programmes, it is the view of the present researchers that for the library and information profession, writing of dissertations should be encouraged. In the view of Schwarz (1973), "to focus on the product of dissertations and to judge it entirely in terms of its usefulness, originality, or its contribution to the field, is to misunderstand its primary function – that of the culminating event in a particular educational process." It is important that the dissertation becomes an integral part of the masters' student's education and professional training. It should be informed by a comprehensive knowledge of the field gained in formal training, and it should demonstrate the student's capacity for significant professional performance beyond graduation. The dissertation should be publishable or a source of publishable material (Lang, 2002).

The argument that students are not yet prepared to produce scholarship of sufficient quality to be published is a curious one, since their work will be subject to the same rigours of peer review as everyone else's (Olson and Drew, 1998). What is

expected is a better supervision of graduate students through effective mentorship so that they learn how to produce rigorous scholarship.

Objective of the Study

The content of a dissertation is often limited to an account of a particular research and for a particular audience. In the past seven years, the Department of Information Studies of the University of Ghana has produced a number of masters' dissertations whose contents and target audience relate to the Balme Library. This paper analysed the contents of these dissertations, with a view to investigating whether the findings have been known, accepted and implemented by the library.

The aim of a research is to introduce new ideas and try to implement these ideas to solve problems. A major significance of this study, therefore, is to ensure that findings are implemented to provide some solutions for the Balme Library's problems. It is also expected that this will motivate other libraries on which students have based their dissertation topics to obtain and analyse those dissertations and try to implement some of the good recommendations. The study was limited to only dissertations that focused specifically on the Balme Library. Therefore, comparative studies of the Balme Library with other libraries, or those that focused on academic libraries in general, were excluded.

Methodology

All dissertations relating to the Balme Library, University of Ghana, from 1998-2005, were selected from the Department of Information Studies and the Balme Library. The year 1998 was chosen as the benchmark because it was the year that the Department commenced the masters' degree programme thus replacing the graduate diploma programme. In all, 13 dissertations were covered (11 M.A. and 2 M.Phil.). Each dissertation was analysed in terms of type and year of dissertation and whether the author was a staff of Balme Library or not.

Findings

Table 1 gives the distribution of both M.A. and M.Phil. dissertations over the period covered.

Table 1: Type and Year of Dissertation

Year	M. A.	M.Phil.
1998	4	0
1999	2	0
2000	1	0
2001	0	0
2002	0	0
2003	2	2
2004	1	0
2005	1	0
Total	11	2

The fewer dissertations at the M.Phil. level is understandable because fewer students pursue M.Phil. degrees, and therefore a smaller number would present dissertations on the Balme Library. Two years (1998 and 2003) recorded the highest productivity of dissertations on the library. By contrast, no dissertation was undertaken on the Balme Library in 2001 and 2002.

Subject of Dissertation

Table 2 shows the distribution of the subject-matter of the various dissertations presented on the Balme Library. With the exception of collection development and library security which have two dissertations each, the rest show an even distribution of single works. The table also shows the diverse subjects covered by the dissertations.

Analysing the dissertations on the basis of the relationship of the authors to the Balme Library reveals in table 3 that non-Balme Library staff outnumbered Balme Library staff in the presentation of dissertations.

Table 2: Subject of Dissertation

No.	Subject of Dissertation	No.
1.	Collection development/management	2
2.	Customer satisfaction	1
3.	Disaster management	1
4.	User guidance systems	1
5.	Human resource management	1
6.	Income generation	1
7.	Library automation	2
8.	Library security	1
9.	Services to the physically challenged	1
10.	Total quality management	1
11.	User Education	1

Table 3: Dissertations by Balme Library and non-Balme Library Staff

Year	Staff of the Balme Library	Non-Staff of the Balme Library	Total
1998	2	2	4
1999	2	0	2
2000	0	1	1
2001	0	0	0
2002	0	0	0
2003	2	2	4
2004	0	1	1
2005	0	1	1
Total	6	7	13

Table 3 shows that in 1998 and 2003 equal number of Balme Library staff and non-Balme Library staff presented dissertations on the Balme Library. However, in 1999, two Balme Library staff presented two dissertations on the library, but there were no dissertation by non-Balme Library Staff. In 2000, 2004 and 2005, there were single presentations by non-Balme Library staff. The years 2001 and 2002 recorded no dissertation on the Balme Library. Overall, the table shows that non-Balme Library staff outnumbered Balme Library staff in the presentation of dissertations on the library.

Recommendations Related to the Balme Library

One of the major aims of every dissertation is to make recommendations relating to the subject of study. In the case of the Balme Library, the following is a summary of the recommendations that were made by the masters' students during the years covered by the study:

- Collection management

1. There is the need for the teaching faculty to take an active part in the selection of materials for the library. This had not been so for a long time as most faculties did not appear to have the time to help in this area.
2. The Balme Library should approve donations coming from outside before they are sent to the library so as not to receive unwanted materials.
3. The Balme Library should link up with the alumni to donate materials to the library. This will help to solve the problem of lack of materials.
4. The Balme Library should have a collection management policy.
5. Periodic stock-taking exercise should be undertaken by the Library.
6. The weeding of materials should be done more regularly and systematically in order to ensure that the materials are current.

- Customer satisfaction

1. Suggestion boxes should be placed in the library for users to make suggestions for the improvement of the Library.
2. The encouragement of the use of private photocopiers in the library should be considered seriously.
3. The Balme Library should aim at the improvement of inter-library lending services.
4. Training in customer service for library staff should be carried out on a regular basis.
5. Frequent surveys on customer satisfaction should be conducted by the Library.

- Disaster management

1. There is the need for a disaster-preparedness plan for the Balme Library.
2. Training in fire-fighting for library staff should form part of the training for disaster management.
3. Acquisition of fire extinguishers for the library should be seriously considered.
4. Replacement of old electrical fittings in the library should be done regularly.
5. There should be more emergency exits in the library.

- User guidance systems

1. The Library should have floor-directional signs to guide users to materials.
2. There should be more visibility for the library through the use of newsletters, library bulletins, open days, and library guides.

- Human resource development

1. In-service training for all library staff should be done periodically.
2. There is the need for quarterly staff meetings to promote a healthy atmosphere in the library.
3. A proper scheduling of leave rosters should be carried out to ensure that adequate number of staff would always be around at any point in time to serve users.

- Income generation

1. The Library should adopt more innovative ways of generating income.
2. The use of the computer laboratory to generate income should be seriously considered by the Library.
3. The University administration should be persuaded to release the library budget promptly in order to enable the library meet its commitments.
4. There should be a more judicious use of the library's financial resources to avoid waste.

- Library automation

1. There is the need to fully automate the university library system.

2. More computers should be provided for the functioning of the library.
3. The Library should have more CD-ROM workstations to serve its numerous users.
4. Frequent training should be organised for staff to be more computer literate.

- Library security

1. It is important to display mutilated library materials so as to deter others from mutilating materials.
2. Seminars on library security for staff and library users should be organised occasionally.
3. Screening of present and future library security employees is necessary to weed out inappropriate staff.
4. The use of staff identification badges should be encouraged so that offending staff could be properly reported.
5. There is the need to acquire a stand-by generator for the library to avoid power outages during opening hours.
6. The Library should carry out the enforcement of disciplinary measures against deviant behaviours.
7. A more liberal lending policy should be put in place to allow more materials to be borrowed than is currently the case.
8. There is the need to acquire an electronic theft detection system to detect thefts in the library.
9. The Library should employ and train its own security personnel rather than use personnel from the University Security Service who are not reliable and serious with their work.
10. A regular surveillance of readers using security cameras should be carried out.
11. A security evaluation team for the library should be established to evaluate the security situation from time-to-time.

- Services to the physically challenged

1. Resource persons at the Braille Library must be absorbed into the University system.
2. There should be provision of more space in the library for the physically challenged.
3. The library building should be modified to

provide easy access for the physically challenged.

- Total quality management

1. Team building should be encouraged to ensure employees' involvement in team work in the Library.
2. The Balme Library Mission Statement should be made available to all the employees.
3. The need to extend the library building should be considered so as to cater for the ever increasing number of users.
4. A more comprehensive evaluation of services should be carried out periodically.
5. All staff must understand the need for change in order to improve upon services.
6. The need to strengthen library-faculty relations is long overdue.

- User education

1. A compulsory user education programme for all freshers in the University should be introduced.
2. Faculty should be seriously involved in user-education.
3. There is the need for the inclusion of on-line user-education programmes.
4. A systematic evaluation scheme for the user-education programme should be in place.
5. There is the need for a more comprehensive programme of user-education for the Balme Library.

Recommendations Already Carried out by Balme Library

The study also sets out to determine which of the recommendations made in the dissertations had so far been carried out, so as to know those that are outstanding. The following are the recommendations that have been implemented:

- Collection management

1. The library, through the University Alumni Office, has developed links with the Alumni in and out of the country, who are providing materials for the library.

2. Recently, the Acquisitions Department has linked up with the teaching faculty to assist in the selection of materials for the library.
3. With the impending automation of the library, a new collection development policy is being prepared.

- Customer satisfaction

1. With the constant complaints of users (formally and informally) to library staff, a suggestion box has been placed in the library and this is well patronised.
2. With the provision of electronic services in all the university libraries in the country, a renewed attention has been placed on inter-library lending.

- Disaster management

1. Based on the advice of the Ghana National Fire Service, fire-extinguishers have been acquired for the library.
2. The Ghana National Fire Service is now in a position to conduct fire-fighting training.
3. The new extensions to the library building have made provisions for emergency exits.

- User guidance systems

1. Library publicity has been intensified with the use of the University intranet system and the *University Reporter*.

- Human resource development

1. The first stage of in-service training has been done for the library assistants and messengers. This will be an on-going training to cover other staff.

- Income generation

1. Fee-paying training programmes are now being organised at the computer laboratory to generate income. This is mostly done during the holidays when the laboratory is less used.

- Library automation

1. The library is undergoing a full-scale automation of all its services. This is through

a grant from the Carnegie Corporation of New York.

2. There has been an increase in the number of computers in the past two years, as a result of the automation process in the library.
3. On-going training in computer literacy is being provided for the staff, so as to get them ready to function in the new automated system.

Library security

1. A stand-by generator has been acquired by the library to solve the problem of power outages when the library is open.
2. The library automation system includes an electronic detection system which will help to curtail the loss of materials in the library.
3. There has been more enforcement of disciplinary measures in the past years relating to both staff and students who do not abide by library regulations.

Services to the physically challenged

1. Resource persons at the Braille Library have been absorbed into the University system. They are therefore now considered as full-time staff of the library.
2. The new library extension makes provision for more rooms for the physically challenged.

Total quality management

1. Team building has been encouraged in the library through delegation of authority and consensus building in decision-making.
2. There is an extension to the library building. Although there is a delay in the completion of the extension, it is hoped that this would be completed soon.
3. Efforts are being made to strengthen library-faculty relations. Teaching faculty has been invited for training programmes in the library especially in the area of the use of e-resources.

User education

1. Initially, the use of on-line databases is part of the user-education programme for fresh postgraduate students.

It may be pertinent to mention here that, the

implementation of most of these recommendations was more coincidental to the findings, than purposive.

Summary and Recommendations

It can be seen from the findings of this study that the Balme Library has been unable to carry out most of the recommendations relating to the library in the past seven years. Out of a total summary of 54 recommendations, only 23 or less than half have been implemented.

A number of reasons can be given for the poor implementation of these recommendations. First of all, the library is often not aware of these findings, as there is no coordination between the Balme Library and the Department of Information Studies with regards to the selection of dissertation topics and the supervision of dissertations. Secondly, though some of the masters' students were sponsored from the Balme Library, they either did not write on topics relating to the library, or even when they did, most of them did not see to the implementation of their own recommendations. Thirdly, some of the recommendations, such as those on income generation, disaster management, service to the physically challenged and library security, border more on university-wide policy decisions and not library-specific policies.

It is thus recommended that the Department of Information Studies should get the Balme Library staff to know about topics being written on the library. If this is done, the recommendations could be implemented by library management. Ideally, the Balme Library staff should be encouraged to supervise such topics as they know the library better. However, care should be taken in order not to allow the Balme Library staff who supervise such dissertations to unduly influence the findings. Also, the Balme Library should insist that students who are sponsored from the library to the Department of Information Studies and who write on topics relating to the Library be made to present seminars on their findings, so that their recommendations could be properly discussed and implemented.

Conclusion

This work has provided a very good lesson on the weaknesses of the Balme Library. A number of the recommendations by the students actually denote the

right situation in the library. However, it must be pointed out that previous experience has shown that one of the recommendations dealing with the exhibition of mutilated materials was implemented decades ago. However, it led to more mutilation in the library. It is expected that most of the outstanding recommendations that could easily be implemented would be carried out soon. It is also envisaged that, from now on, the library would pay more attention to dissertation topics that have bearings on the functioning and management of the library by following up on such dissertations. In this way, efforts could be made to know and implement the useful recommendations of these dissertations.

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* V.K. Fosu is Senior Assistant Librarian, Balme Library University of Ghana, Legon. He holds a B.A.; Grad. Dip. Lib.; M.Phil. from University of Ghana.

A.A. Alemna is Professor of Information Studies and University Librarian, Balme Library, University of Ghana, Legon. He holds B.Ed., Grad. Dip. Lib., M.A.L.S., Ph.D., FGA. He attended the University of Cape Coast; University of Ghana; and the University of Michigan. He is also a Fellow of the Ghana Academy of Arts and Sciences.

Information and Communication Technology (ICT) Systems in Botswana Government Departments

Ayoku A. Ojedokun

University of Botswana Library
UB Box 70130
Gaborone, Botswana
ojedokun@mopipi.ub.bw

and

Kgomotso H. Moahi

Department of Library and Information Studies
University of Botswana
P/Bag 0022
Gaborone, Botswana
moahikh@mopipi.ub.bw

Abstract

This paper describes Botswana government efforts at computerising major functions of its departments. The authors examined unpublished documentary sources from the Department of Information Technology (DIT) in the Ministry of Finance and Development Planning (MFDP) and conducted interviews with two corporations to obtain relevant information. The authors noted that the Government of Botswana has massively injected funds into critical ICT projects in order to improve budgeting, productivity and services to the public, as well as to remove bottlenecks to development and improve capacity to implement and monitor projects. The government has succeeded in computerising some of its major functions, and plans to implement many more computerisation projects during the ongoing implementation of the National Development Plan

9 (NDP9) spanning the period 2003/04 – 2008/09. The paper concludes that the achievements recorded may be one of the reasons Botswana is considered a success story in Africa considering information technology's vital role in stimulating economic development.

Introduction

It is generally accepted that computer application affects the nature of an organisation's structure, employment patterns, quality of service and work life of its employees. The importance of computerisation has become more apparent as computers move from their traditional role in the "back-office" to supporting the day-to-day activities of line workers and managers, particularly those involved in knowledge and/or information work. The computer's capabilities to be used to store, manipulate, access, analyse and communicate data more quickly than was possible in pre-computer times have particularly captured the attention of many managers and information professionals.

Computers are enabling both private and public sector organisations to offer services and information that are fast, cheap, accessible, and useful. They lower the cost of lateral communication, enable organisations to obtain more information, and increase the capabilities of line workers to perform information processing tasks. They have thus become valuable in enhancing management information and organisational control.

Public agencies, according to Bretschneider and Wittmer cited in Bretschneider and Heintze (2000), are now more information intense than private organisations, which in part, has resulted in a deeper penetration of computer technology for each advance in IT. However, the best that computerisation can

accomplish is to make management more effective and employees (major participants in all information management processes) more productive. It is through effective information management practices that the users of information - the managers of a firm - create all business value. This suggests that information acquisition and information utilisation are the essence of all managerial acts (Strassmann, 1996).

Investment in computer technologies is assisting governments to: improve the efficiency of internal operations through automation; improve quality of existing public services; create new types of services that were not previously available and increase the accessibility of those services. Computers have become an attractive and key element of the state capacity building initiatives in the developing world, including Africa, as many countries engage in activities that are meant to improve managerial, technical and productive efficiency. The push towards computerisation, however, is not only coming from within African countries, but also from various donor countries/agencies and multilateral aid institutions (Tettey, 2000). For example, according to Tettey (2000), the World Bank supports significant IT development in its lending policies. Also, with pressures from external forces such as globalisation, urbanisation and digital connectivity, no government can cope or sustain itself without being affected by these technological revolutions (Serero and Moreri, 2002). Computerisation is seen as a major way of improving information access and interpretation.

This paper, which is an extract from the doctoral dissertation of the first author, describes Botswana government's effort at computerising its major functions. The authors examined unpublished documentary sources from the Department of Information Technology (DIT) in the Ministry of Finance and Development Planning (MFDP) and conducted interviews with Botswana Power Corporation and Water Utilities Corporation to obtain relevant information on major ICT projects in each government department and the plans for the future.

The objective of this paper is to share, with information professionals in other African countries the efforts being made by the Botswana government to improve its economy and service delivery to its citizens.

The term information and communication technology (ICT) is used interchangeably with

information technology (IT) in this paper to describe the range of equipment (including computer technology), applications, services, and basic technologies that process information. In other words, wherever the term ICT is used in this paper, it shall mean IT and vice-versa

Botswana Government's Perception of ICT

The Government of Botswana has long recognised the need for computerisation of its functions through provision of a centralised system at the Government Computer Bureau (GCB). The use of information technology was introduced by government in 1966 in the Office of the Accountant General, for the processing of payroll and accounts using accounting machines which were later replaced by ICT Punched Card Tabulators in 1969. The Office of the Accountant General later became the IT Department of Government Computer Bureau (GCB) and an independent department in 1972 (Bose, et al., 2002). However, IT came into the mainstream of planning during the National Development Plan 7 (NDP7), after a feasibility study of IT requirements across government was conducted. The study recommended incorporation of IT systems in certain critical areas that were responsible for policy and strategic functions (Koloi and Mapitse, 1999).

Koloi and Mapitse (1999) stated that IT facilitates the most efficient and effective means of communication. According to the authors, it allows the provision of accurate and complete data collection, as well as strategies for achieving objectives, which could otherwise be inhibited by organisational structures. It eliminates time wasted in organisations' levels of productivity by substituting automation for manual functions. The Strategic Plan 2003-2006, which is the Government of Botswana Plan, also recognises the importance of ICT for improving access to public information and services, and as a tool for national development. The plan aims at providing the public with the facilities for quicker and easier access to services and information and to encourage ICT use by the public. It aims at strengthening existing infrastructure and continuing to build human capacity for using ICTs in government.

Botswana Government's ICT Vision for Development of IT was expressed in a document entitled "IT strategy 1996-1997: Vision 2003", and states that:

Botswana must recognise the importance of information and of developing efficient information systems and networks for the support of research, education, development and communication with the rest of the world.

The strategies developed to lay the roadmap for reaching the above vision include:

- Becoming a regional leader in the exploitation and use of IT in the achievement of national objectives;
- Developing a well trained IT workforce;
- Improving the implementation of data communications in both public and private sectors;
- Using IT to improve government services;
- Implementing quality IT Systems;
- Each ministry developing and generating its own information database;
- Ensuring government is less dependent on paperwork and more on electronically stored and communicated information; and
- Promoting private IT service and industry (Government Computer Bureau, 2003).

Government believes that ICT will contribute to the achievement of the two pillars of Vision 2016, that is achieving "an educated, informed nation" and "a prosperous, productive and innovative nation" (Republic of Botswana – BHDR, 2002). The "Vision 2016 – a long-term Vision for Botswana: Towards Prosperity for All," document was produced in September 1997. The year 2016 is significant in that Botswana will have been an independent nation for 50 years. The vision is intended to serve as a reference point for all future National Development Plans and all Mid-term Reviews (Bose, et al., 2002).

Thus, computerisation has become the key component in the government's campaign to improve productivity, as ministries are becoming increasingly aware of the potential of computer technology. The government's hope is that computer technology will provide that elusive ingredient which will bring solutions to problems of administrative and financial inefficiency, help define socio-economic visions, and enhance economic productivity. Government Computer Bureau (GCB), which has now been renamed the Department of Information Technology (DIT) within the Ministry of Science and Technology, as an ICT implementing department in government, has placed e-governance among the highly prioritised

projects to be undertaken during the on-going implementation of the National Development Plan 9 (NDP9) spanning the period 2003/04 – 2008/09.

E-governance refers to computer-enabled availing of government services such as registration, revenue collection, and provision of statistics, legislation or any business to citizens (Government Computer Bureau, 2003). The government is therefore pursuing e-governance to improve budgeting, productivity, and services to the public, remove bottlenecks to development, improve capacity to implement and monitor projects, as well as improve relationship with the private sector (Bose, et al., 2002). In other words, pursuing e-governance is meant to improve competitiveness in the global market and solidify democratic status as well as make pivotal impact on budgeting, public service productivity and investment (Serero and Moreri, 2002). Information and communications technology, being the main driver of e-governance, is seen as the creator of a conducive environment, which will pave a way for foreign investors. It can also act as employment generator that can make vital impact on the diversification of the economy, and therefore play a major role in the economic growth and its sustainability.

Before the commencement of the implementation of the National Development Plan 8 (NDP8), 1997/98 – 2002/2003 over 5000 microcomputers were installed in government offices throughout the country (Republic of Botswana, MFDP, 1997). By the end of NDP8, the number of microcomputers in government had increased to over 14,242 (Government Computer Bureau, 2002a). In the private sector, computer systems are also being used in delivering improved services to the public in banking, financial services and retail trade. Computers are also featuring in manufacturing and distribution (Republic of Botswana, MFDP, 1997). The Department of Information Technology (DIT) was assigned the responsibility of establishing national policy coordinating structures, which would agree and implement a National Information Technology (ICT) Policy for Botswana during NDP8 (Bose et al., 2002; and Serero and Moreri, 2002). The policy, which has already been formulated and is awaiting approval by Botswana Parliament, is intended to promote citizen's access to critical government services, thus shortening their travelling expenses and having their consensus on decision-making.

Critical ICT Systems in Government

There are a number of critical ICT systems that have been implemented in Botswana government departments. Computerisation projects completed in government departments during the NDP7, 1991/92-1996/97 include voters' registers, a new payroll system and vehicle registration (Republic of Botswana, MFDP, 1997). Critical ICT systems already implemented by various ministries during NDP8 include: National Registration System, Payroll System, and Computerised Personnel Management System (CPMS). Others include: Livestock Identification and Trace back System (LITS), Automated System for Customs Data (ASYCUDA), Vehicle Registration System (Serero and Moreri, 2002 and Bose, et al., 2002). Also completed during the NDP8 are computerisation of the Department of Supplies, Government Data Network I, Tax Payer Management System I, and Trade Statistics (Government Computer Bureau, 2002b). Water Resources Information System was also developed at the Department of Water Affairs Headquarters. The Water Utilities Corporation also implemented the Master Information Systems Plan (MISP), which included billing and invoicing, debt collection and disconnection for non-payment. The Teacher Management System (TMS) and the Student Selection System (SSS) were developed, and an Education Information System also initiated during NDP8. NDP8 also witnessed the automation of some post office counters, and the installation of Performance Management System by Botswana Post (Republic of Botswana, BHDR, 2002).

The implementation of IT Vision 2003 developed by the Government Computer Steering Committee has resulted in an increase in ICT spending by government. Expenditure on IT projects represented 0.2% of the NDP7 capital expenditure compared to 1.9% of the development budget during NDP8, a tenfold increase (Government Computer Bureau, 2003 and Sebetela, 2002) (table 1). This commitment to IT use in government is expected to grow to about 3.7% during NDP9 (Government Computer Bureau, 2003).

During the on-going implementation of the NDP9, IT projects are expected to include: upgrade of current systems, development of a website and installation of an asset management database, introduction of a document bank/management

system, installation of a forecasting package for manpower planning, roll out of the Computerised Human Resources System, purchase of a GSM and visual surveillance system for the police, procurement of equipment (PCs, Servers and printers, etc.) and networking (cabling, email and Internet) and a Refuge Database (at Dukwi Refugee camp) at the office of the State President. Projects carried over from NDP8 by DIT will also be implemented during NDP9. They include the development of the Government Accounting and Budgeting System, the Geographic Information System Centre, the Computerised Personnel Management System and the improvements to the Government Data Network. The ICT Strategies and E-Governance Botswana will be implemented during the National Development Plan 9.

The computerisation systems of the Ministry of Finance and Development Planning (MFDP) completed during NDP8 will be rolled out and improved during the on-going implementation of the NDP9 (table 2). These include the roll out of Department of Supply Computerisation System to all Government Departments, the Automated System for Customs Data (ASYCUDA) to all major border posts and improvement of the Tax Management System by incorporating additional modules. New computerisation projects will include, networking of the Audit Information System, upgrading of Central Selling Organisation (CSO) computer system to accommodate Vision 2016 monitoring the advance schemes for motor vehicle and housing, and the development of a website for all MFDP departments.

The Ministry of Agriculture (MOA) will continue with Livestock Identification and Trace back System (LITS) phase 2 (table 2). It will develop and implement land and natural resources information systems, agricultural information systems (crops), Department of Agricultural Research (DAR) soil and plant database system, seed stock control database system, and library and documentation system.

The Ministry of Education (MOE) will develop and implement the Education Information System (EIS), expand communication infrastructure to all educational institutions, and develop a library databases. It will roll out the document management system to all its departments, and the Teaching Service Management Human Resources System developed during NDP8 to all schools, as well as develop video conferencing infrastructure (table 2).

Table 1: Comparison of NDP7 and NDP8 IT Expenditure and Projection for NDP9

Ministry	Expenditure for NDP7 (Pula)	Expenditure for NDP7 on Computers (Pula)	Expenditure for NDP8 (Pula)	Expenditure for NDP8 on Computers (Pula)	Projected NDP9 expenditure ceiling (Pula)	Projected NDP9 expenditure hardware (Pula)
Parliament	17,500,000		135,000,000	N/A	220,431,000	
State President	1,412,396,010		3,459,797,000	13,425,000	4,534,515,000	
Min. of Finance & Development Planning	926,380,000	19,326,546	1,284,725,000	275,000,000	1,453,889,000	388,170,000
Min. of Labour & Home Affairs	100,907,000		617,607,000	30,000,000	1,233,365,000	
Min. of Agriculture	468,016,010		859,816,000	89,423,000	1,064,547,000	66,882,620
Min. of Education	1,272,749,820		2,802,143,000	19,000,000	3,709,923,000	
Min. of Commerce and Industry	136,400,000		423,792,000	7,000,000	533,944,000	
Min. of Local Govt	2,181,964,168		5,149,000,000	10,000,000	7,948,987,000	
Min. of Works, Transport & Communications	1,522,412,000		3,739,903,000	9,000,000	4,812,298,000	106,012,250
Min. of Minerals, Energy & Water affairs	1,319,448,010		3,793,362,000	17,000,000	4,625,416,000	41,868,000
Ministry of Health	304,620,010		1,886,458,000	15,000,000	3,273,528,000	
Administration of Justice	21,000,000		144,300,000	N/A	164,465,000	
Min. of Foreign Affairs	39,000,000		131,000,000	N/A	135,647,000	
Min. of Lands, Housing & Environment	N/A		1,507,564,000	3,000,000	2,013,143,000	
Total	P9,722,793,028	P19,326,546	P25,934,467,000	P487,848,000	P35,724,098,000	P602,932,870

% of NDP7 budget spent on IT = 0.199%

% of NDP8 budget spent on IT = 1.881%

Note: IT or ICT refers to the range of equipment, applications, services, and basic technologies that process information.

Source: Government Computer Bureau, 2003.

P = Pula (Botswana Currency)

P6 = IUS\$ (as at June 2006)

The Ministry of Trade, Industry, Wildlife and Tourism (MTIWAT), during NDP8 developed the Ministry's website, automated the office of Wildlife and National Parks, and provided computer equipment for the Ministry and its Departments, and Statement of User Requirement (SOUR) for Registrar of Companies. During the on-going implementation of NDP9, the Ministry will be completing the process of automation for the Headquarters of the Departments of Industrial Affairs (DIA), Tourism (DOT) and Trade and Consumer affairs, (DTCA), Registrar of Companies (ROC), and SOUR for Department of Wildlife and National Parks (DWNP). The Ministry will also automate the process of company registration and business names, trade and industrial licenses and tourism information management, develop document management and workflow management process; review and develop all DWNP systems and communications network (table 2).

The implementation of the Ministry of Local Government (MLG) IT projects, which started during NDP8, will continue during the on-going implementation of the NDP9. They include: Tribal Land Administration System for land use planning and management, installation of Human Resources and Payroll package to all the Local Authorities, Financial Management Computer System, and Project Management. Document Management System, a website; database for recording tribal ceremonies, and Social Benefits System will be developed during the current plan period (table 2).

The majority of the IT projects for the Ministry of Works, Transport and Communications (MWTC) were completed during NDP8. IT projects during NDP9 would include: networking infrastructure with primary focus on departmental offices outside Gaborone – the capital city, application development, deployment of computers and peripheral devices to support the proposed applications, development of IT Section in each department, and expansion of trained IT Users' base. A comprehensive review and

computerisation of the Road Transport Permits system earmarked to be executed as an integral part of the Vehicle Registration and Licensing (VRL) is a project carried over from NDP8. The review of the permit will be carried out under this project, while the computerisation component will be covered by the MWTCs' NDP9 IT project (Republic of Botswana, BHDR, 2002) (table 2).

The Ministry of Mineral, Energy and Water affairs (MMEWA) will carry out the following IT project during the on-going implementation of the NDP9: expansion of the network infrastructure; continuation of the development of digital cartographic capabilities initiated during NDP8; development of intranet; implementation of the Document and Workflow Management System; development of Energy Information System; expansion of the Water Resources Information System; installation of a computerised supplies system, inventory management system and a library information system; expansion of its computerised billing system, and the implementation of a Geosciences Information System that started towards the end of NDP8. (table 2).

The Ministry of Health will develop an Integrated Health Communication System and software for Princess Marina and Nyangabwe hospitals that were computerised during NDP8 (table 2).

The Ministry of Lands, Housing and Environment (MLHE) will work on a system that will improve information management and establish appropriate access to information during the NDP9 (Republic of Botswana, BHDR, 2002). The Customs department is developing a Taxpayer Management System (TMS) and an Information System for managing the Value Added Tax (VAT). The TMS will be used to harmonise all taxes and duties, including income tax. A refund system is also under development, while provisions for online filing of taxes are still in the early planning stages (Republic of Botswana – BHDR, 2002) (table 2).

Table 2: Summary of Critical ICT Projects by Ministry

Ministry	IT project title	Status		
		Planned	On-going	Completed
Office of the State President	Upgrade of current systems	Yes	-	-
	Website development	Yes	-	-
	Asset Management Database	Yes	-	-
	Document bank/management system	Yes	-	-
	Forecasting system for manpower planning	Yes	-	-
	Computerised Human Resources System	-	-	Yes
	Refuge Database (at Dukwi Refuge camp)	-	-	Yes
	Video Conferencing	Yes	-	-
	New Electoral System	Yes	-	-
	Purchase of a GSM and visual surveillance system	Yes	-	-
	Procurement of PCs, servers, & Printers	Yes	-	-
	Networking	Yes	-	-
Min. of Finance & Development Planning	Improvement of the Tax Management System through incorporation of additional modules	Yes	-	-
	Department of Supply Computerization system	-	-	Yes
	Automated System for Custom Data (ASYCUDA)	-	-	Yes
	Networking of the Audit Information System	Yes	-	-
	Upgrading of Central Selling Organisation (CSO) Computer System	Yes	-	-
	Website development for all MFDP departments	Yes	-	-
Min. of Agriculture	Livestock Identification and Trace back system phase II	-	Yes	-
	Land & Natural Resources Information Systems	Yes	-	-
	Agricultural Information Systems	Yes	-	-
	Department of Agriculture Research (DAR) soil and plant database system	Yes	-	-
	Seed stock control database system	Yes	-	-
	Library & Documentation System	Yes	-	-
Min. of Education	Education Information System	Yes	-	-
	Expansion of communication infrastructure to all educational institutions	Yes	-	-
	Document Management System	-	-	Yes
	Teaching Service Management Human Resources System	-	-	Yes
	Video Conferencing Infrastructure	Yes	-	-
Ministry of Trade, Industry, Wildlife and Tourism	Automation of the process of company registration and business names, trade and industrial licenses and tourism	Yes	-	-
	Develop document management	Yes	-	-
	Develop workflow management system	Yes	-	-
Min. of Local Government	Tribal Land Administration System for land use planning and management	-	Yes	-
	Installation of Human Resources and Payroll System	-	Yes	-
	Financial Management Computer System	-	Yes	-
	Project Management	-	Yes	-
	Document Management System	-	Yes	-

	Social Benefits System	-	Yes	-
	Development of document management system	Yes	-	-
	Website development	Yes	-	-
	Database for recording tribal ceremonies	Yes	-	-
	Food Resources System	Yes	-	-
Min. of Works, Transport & Communications	Networking infrastructure to departmental offices	Yes	-	-
	Computerisation of Vehicle Registration and Licensing	Yes	-	-
Min. of Mineral, Energy & Water Affairs	Expansion of network infrastructure	Yes	-	-
	Development of digital cartographic capabilities	-	Yes	-
	Development of Intranet	Yes	-	-
	Implementation of Document & Workflow Management System	-	Yes	-
	Energy Information System	Yes	-	-
	Water Resources Information System	Yes	-	-
	Expansion of computerized billing system	Yes	-	-
	Installation of computerized supplies system	Yes	-	-
	Installation of inventory management system	Yes	-	-
	Library Information System	Yes	-	-
Ministry of Health	Implementation of Geosciences Information System	-	Yes	-
	Integrated Health Communication System	Yes	-	-
Min. of Lands, Housing & Environment	Develop software for Marina and Nyangabgwe Hospitals	Yes	-	-
	Tax Management System	Yes	-	-
	VAT Management Information System	Yes	-	-

IT Developments in Two Government Corporations

Two government utilities corporations, the Botswana Power Corporation (BPC) and the Water Utilities Corporation (WUC), provide examples of the level of computerisation in government corporations in Botswana.

Botswana Power Corporation

Botswana Power Corporation is a parastatal organisation whose main activity is to generate, distribute and supply electricity throughout the country. Its aim is to provide better service to consumers. The use of computers in BPC started in 1983/84 with the use of the Government Computer Bureau (GCB) mainframe, and with dumb terminals at its Head Office. The main application was billing

using the COBOL program. In 1986, the Corporation introduced the Local Area Network (LAN) using the Novell products, and was one of the few companies to have done so at the time. This allowed BPC to introduce its own billing system - programmed in C, and much later introduced other applications such as word processing (Word perfect - WP), and Spreadsheet (Lotus 1, 2, 3 and SuperCalc). Around 1988, the corporation introduced ACCPAC products to run other accounting operations (e.g. general ledger, and account payable). About 1991, the Wide Area Network (WAN) was introduced, extending to Morupule Power Station and Francistown distribution.

In 1995, a new billing system, developed by Harris Computers in Canada, was acquired but was installed in June 1996 for the purpose of improving revenue collection and customer relations. Prior to

the installation, the old system used manual receipts, which were prone to errors. During this period, the billing system was centralised. The Harris System was bought for the purpose of decentralising the billing system in addition to the reasons given above. The new product (the Harris System), which was developed using INFORMIX 4GL, ran on Informix standard engine. The system also ran on UNIX. It is an integrated system with billing, customer care, project estimation modules, and Works Order Module. The product has now been customised to BPC's requirements. In 2004, the standard engine was upgraded to Informix online engine (v.9.4). The software was also recompiled in 4Js (General version). This allows BPC to port the application to other platforms. It could also be web enabled i.e. in the near future, and if BPC desires it, so that services could be made available via the World Wide Web (WWW). Botswana Power Corporation now has twenty-two LANs on its WAN using a combination of fibre-optics, leased lines, and wireless. It uses wireless within Gaborone. This allows BPC to introduce customer pay points anywhere within Gaborone. A few of the networks are however not yet active.

Water Utilities Corporation

The Water Utilities Corporation of Botswana is a parastatal organisation, which came about through an Act of Parliament in 1970 (revised in 1978) with the mandate to work along commercial lines (WUC, 2003). It is tasked with providing potable water to Botswana's urban areas.

Computerisation in Water Utilities started in 1987 with the use of the 'Mentor (Legacy) System' for billing. In 1991, the Corporation installed the 'Wizcount System' to handle financial activities, and the 'Paywell System' in 1997/98 for payroll. However, in 1999, the above systems were replaced the System Application Product (SAP R/3) – a widely used large-scale package designed to integrate different organisational processes. The system came with the following module: Financial Module, Materials Management Module, Human Resources Module, IS-U/CCS Module, Cost Controlling Module, Plant Maintenance Module and Real-time Data Management Module. This system thus allows integration of all the operations of the WUC. Water

Utilities Corporation also has LANs and WANs which also allow it to introduce customer pay points anywhere within Gaborone.

Conclusion

One lesson to be learnt from the Botswana government approach is the incorporation of major ICT projects into its national development plans, the phased implementation of the ICT projects, and the governments' commitment to achieving the strategies developed. This approach has enabled a great deal of achievements. National development plans, among others, particularly serve as major statements of government's development policies and strategies. It explicitly explains the development agenda of a country, and if followed through, can impact positively on the country's development.

This paper reveals significant progress made by the Botswana Government in attaining objectives laid out. Its spending on ICT are massive, and it is expected to grow.

The achievements of the Botswana government have improved service delivery and increased accessibility to government services. It has also built confidence in the government. This may be one of the reasons why Botswana is considered a success story in Africa considering information technology's vital role in stimulating economic development. It is therefore recommended that other countries in Africa could emulate the example of the Botswana government by computerising major services and functions of their government departments. The planning and implementation approaches (i.e. incorporation into national development plans and phased implementation) adopted are particularly worthy of emulation.

The Botswana situation reveals that investments in information technologies (of which computer technology is an important part) is dramatically increasing in Africa's public sector. It is, however, a reflection of the growing recognition that investment in technology can play a critical role in stimulating economic growth and productivity. The general belief is that information and communications technology acts as employment generator and can make vital impact on the diversification of the economy. It therefore plays a major role in the economic growth and its sustainability.

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* Ayoku A. Ojedokun is Senior Librarian at the University of Botswana. He holds B.Sc. (Hons) Chemistry, Master of Information Science (M.Inf.Sc.) degree from the University of Ibadan, Ibadan, Nigeria and PhD in Library and Information Studies, University of Botswana.

Kgomotso Moahi is Senior Lecturer and Head of Department of Library and information Studies, University of Botswana. She holds BA degree in Politics and Administration, M.Sc. (Information Studies and Social Sciences) and PhD in Library and information Studies.

A Comparative Analysis of Information Acquisition, Information Management Capacity and Administrators' Decision-making Effectiveness in Tertiary Institutions in South-Western Nigeria

E. A. Erwat and M. Fabunmi

Department of Educational Management,
University of Ibadan, Ibadan, Nigeria.
mfabunmi2002@yahoo.co.uk.

Abstract

The study was motivated by the information related problems commonly observed in the administration of Nigerian tertiary institutions. The study investigated the levels of information acquisition, information management capacity and decision-making effectiveness of administrators in 14 tertiary institutions in three out of six states of South-Western Nigeria. It also compared the levels of these three variables among the three types of tertiary institutions – universities, polytechnics and colleges of education. A survey research design was adopted, and a random sample of 1,357 or 75% of a total population of 1,799 administrators in the sampled institutions participated in the study. A Likert-type questionnaire was used to collect data. Findings revealed that although the levels of information acquisition, information management capacity and decision-making effectiveness were rated very high, there were significant differences among the three types of tertiary institutions. Institutions that used computers mostly in processing and storage showed higher scores on the three variables than those which used less of computers. Furthermore, communication and processing facilities were grossly inadequate and methods of processing

and storage of information were mostly manual. The study recommends that tertiary institutions should improve their communication facilities as well as modernise their methods of storage and processing of information by computerising their management information systems.

Introduction

The Nigerian educational system has been expanding at a rapid rate. As the system expands, so also do the problems of system planning, monitoring and control increase, with a corresponding need for increased information acquisition and information management capacity among educational administrators, planners and policy makers (Nwankwo, 1985). Effective management information systems are needed in all educational institutions to handle more efficiently such administrative matters as providing reports, handling of increasing enrolments, management of students records and timely release of results (Longe & Agabi, 1990).

Educational institutions possess huge amounts of data and information. Examples of data and information available in educational institutions are: correspondences, accounting documents, personnel files, payroll, minutes of meetings, students' registration and examination records, inventory of facilities, budgetary information, list of courses offered, time-tables for lectures, and so forth. Educational institutions today need to pay more attention to the management of their data and information for efficiency and effectiveness. Information reduces uncertainties and facilitates decision-making (Tsui & Schreisheim, cited in Opeke,

1984), and it is one of the resources which a manager controls, apart from human resources, materials, money and machines (McLeod, 1995).

National educational administrators in Nigeria seem overwhelmed by the rise of managerial workload due to rapid expansion of educational institutions and activities. Igwe (1995) studied information management and decision-making in the National Board for Technical Education (NBTE), Kaduna, and found out that NBTE was growing in complexity, with increasing number of personnel and programmes, and that the information management of NBTE was ineffective and inadequate due to lack of funds, modern facilities and information experts to manage information effectively. Igwe concluded that the poor information management negatively affected decision-making; that decisions were sometimes arbitrarily taken due to lack of appropriate or timely information. He also found that decisions made were sometimes changed when more accurate information was received; and that workers often had to visit the offices to confirm decisions made or communicated due to lack of communication facilities.

In present-day organisations, it is quite evident that the offices must be equipped with modern technologies to assist the managers and other workers do their jobs efficiently. This is the age of technology, and managers cannot afford to remain ignorant of the modern technologies available to assist them. Hutchinson and Reynolds (1990), who cited Earl, suggested that what is needed today is a 'hybrid' manager. This is a manager who has an up-to-date knowledge and competence in information technology in addition to a variety of other skills, such as management and interpersonal skills. He should also possess information skills. Nwankwo (1985) stated that today's organisations require managers who can get at, interpret and appropriately use information.

The 20th century has brought about information explosion. Megginson et. al. (1986) stated that people's knowledge is doubling in every five to ten years. There is an accelerated growth of knowledge in recent years. Managers, therefore, have to keep abreast making proper decisions. Mondy (1990) stated that the world is in the midst of both information and technological revolution. With regards to information revolution, the total amount of scientific information available in the world doubles every 20 months. Information in business also

continues to expand rapidly. Furthermore, there are also various types of computers and technologies that allow managers to use information more efficiently.

Laudon and Laudon (1995) noted that information technologies range from physical devices like paper, pencils, books, newspapers, cameras, tape recorders and computers to more symbolic tools like written languages and mathematical symbols. These tools enable people to visualise their environment, understand it and creatively control it. Information technologies today are sophisticated, with abilities to sensor, communicate, analyse and display information. Information technology (IT) is thus defined as collection, processing, storage and transmitting of information by electronic means (Stewart, 1991). IT, therefore, according to Stewart (1991), is useful for:

automatically capturing information; storing it so that it can be retrieved when wanted; manipulating the stored information; and distributing it electronically on screens, papers or control machinery. These are possible because there are three separate technologies that overlap one another, i.e. computers, telecommunications and automation.

Today, the world is in the middle of the "information technology revolution." Digital information technologies that use binary digits to represent information are replacing the printed word technologies, and in the process are transforming the world. Stewart (1991) supported this point stating that IT is affecting many aspects of peoples' lives and transforming offices. IT reduces cost and improves quality of information processing, automating much work done previously by people, thus improving quality of life, and bringing efficiency to offices. IT affects the manager's job in these specific ways:-

1. It affects the manager's decision-making by greatly increasing the quality, range and speed of the information available; therefore, it has a major contribution to make in improving decision-making (Stewart, 1991).
2. Managers may have more information than before from which they identify the information that they require and will actually use (Moss-Jones, 1990).
3. IT affects a manager's personal ways of working by making it easier for the manager to

do tasks for himself; the tasks which were previously done by support staff, such as retrieving, displaying, or filing of information and searching from specialised databases (Stewart, 1991).

4. Integration of activities, departments and units is made faster and is increased (Moss-Jones, 1990).

Therefore, it is very important that managers today should be computer literate and information literate (McLeod Jr., 1995). The manager should be able to get at the required information, process, use and disseminate it to the appropriate recipients. Thus there is the need for managers to have communication and problem-solving skills. Problem-solving skills are defined as all of the activities that lead to the solution of a problem. They are decision-making skills. Communication skills are the abilities to pass information and understanding to others either orally or in writing and in whatever means of communication.

The idea of management information systems (MIS) was not very popular when it was introduced in 1960's, primarily because there was a general lack of computer literacy among users (both managers and non-managers), and there was ignorance of the management role on the part of information specialists (McLeod, 1995). Today, IT has resulted in the development of sophisticated management information systems (MIS) (Hutchinson and Reynolds, 1990). Managers today need to be involved in the design and implementation of the MIS in their organisations. Deardeen (1965) supported this view, because managers are the ones who have intimate knowledge about the firms. There should be cooperation between managers and the information professionals.

Statement of the Problem

Among the information-related problems observed in the administration of educational organisations including tertiary institutions are the inability to find information needed to take a decision or respond to inquiry and the piling up of administrative matters causing discontent among staff, students and parents. The inadequate access to, or possession of relevant information has negative impact on the effectiveness of administrators' decision-making process. Moreover, there has been concern in Nigeria, and

especially among educational organisations in the country, to solve problems arising from inadequate storage, the flow and use of information. However, the ability to solve such problems demands a clear understanding of the situations in the educational institutions. Hence, the fundamental guideline is: To what extent do the administrators in Nigerian tertiary institutions have access to or possess information for decision-making? This is the question that this study sought to answer. Accordingly, the following research questions guided the study:

- (i) What are the sources of information usually used by administrators for effective decision-making and how adequate are these sources?
- (ii) What are the methods used for storage and processing of information and how adequate are these methods and facilities?
- (iii) What are the levels of information acquisition, information management capacity and decision-making effectiveness of administrators in tertiary institutions in South-Western Nigeria?

The study also sought to validate the following hypotheses. There is no significant difference in information acquisition, information management capacity, and decision-making effectiveness among administrators in the three types of tertiary institutions in South-Western Nigeria.

Research Design

An ex-post facto survey research design was adopted for the study, while the purposive sampling technique was used to select three out of the six states in South-Western Nigeria. These states are Ekiti, Lagos and Oyo. Out of a total of 1,799 administrators in the tertiary institutions in the three states, 1,357 (or 75%) were randomly sampled and 1,159 responded. Table 1 contains a list of the institutions, and population and sample sizes. The administrators used were heads of units and departments. All of them were on the rank of Executive Officer and above. The heads of academic units and departments were senior lecturers and above. The study was conducted during the 2002/2003 academic session.

The main instrument used to collect data in the study was a Likert-type questionnaire designated the "Information Management and Utilisation Questionnaire (IMUQ), which had a reliability coefficient of 0.64. The questionnaire comprised four

sections. Section A sought for personal data. Section B elicited information on information acquisition variable. Section C obtained data on information management capacity, and Section D collected devoted to data on decision-making effectiveness. The questionnaire contains 90 items altogether. Section A had five fixed-response items and one open-end item. The Likert-type rating scale was used for items in Sections B, C, and D. Copies of the questionnaire were administered to the 1,357 participants by the researchers. The statistical tools used for analysis of data are: percentages, Analysis of Variance (ANOVA) and the Duncan Multiple Range Test (DMRT). The hypotheses were all tested at the 0.05 level of significance.

Administrators in tertiary institutions also highly favour face-to-face discussions and personal contacts just like other managers in other organisations [Mintzberg, cited in Pugh, (1990)]. Table 2 shows that telephone conversations are among the least used, and that computer centres were not patronised as much as Internet and e-mail facilities in cyber cafes (40.9% versus 65.5% ratings respectively). According to Lengel, cited in Daft (1983), the richest form of communication is face-to-face, followed by telephone conversation. However, telephone conversation was one of the least patronised by the administrators in this study. The reason is that telephones were not available in many offices, or not functioning where they existed.

Table 1: Institutions and Number of Administrators

S/N	Name of Institution	No. of Administrators	Sample
1.	The University of Ibadan	305	229
2.	The Polytechnic, Ibadan	109	82
3.	Ladoke Akintola University of Technology Ogbomoso	100	75
4.	St. Andrews College of Education, Oyo	93	70
5.	Federal College of Education (Special), Oyo	70	53
6.	Yaba College of Technology, Lagos	120	90
7.	Adeniran Ogunsanya College of Education, Ijanikin	100	75
8.	Lagos State College of Primary Education, Epe	35	26
9.	Lagos State University, Ojoo, Lagos	120	90
10.	Lagos State Polytechnic	80	60
11.	University of Lagos	280	210
12.	Federal Polytechnic, Ado-Ekiti	142	113
13.	College of Education, Ikere-Ekiti	85	64
14.	University of Ado-Ekiti (UNAD)	160	120
	TOTAL	1,799	1,357

Findings

Research Question 1

What are the sources of information usually used by administrators for effective decision-making, and how adequate are these sources?

The results in table 2 show that, as it is the practice in government organisations, formal letters, memos, circulars, official reports, files, records, rules and regulations, journals and magazines form the main source of information for administrators. Similar findings were recorded by Aiyepoku (1982), Longe and Agabi (1990) and Opatola (1998).

The data in table 2 also show that computer centres were not patronised as much as Internet and e-mail facilities. This could be because the internet and e-mail facilities in cyber cafes are more accessible than the computer centres. This suggests that installation of local area networks within the institutions might make the facilities in the computer centres more accessible for maximum usage. Obanya (1999) advocated inter-connectivity within and among institutions and to the Internet as a priority to improve management, and also as a tool for teaching, research and routine activities. According to Eicheberger, cited in Longe and Agabi (1990),

"organisational efficacy of contemporary managers is viewed as a function of the quality of managers and the quality of information channels feeding and transmitting their activities." Tertiary institutions should install modern information technologies to improve communication. Modernising communication facilities in tertiary institutions would enable administrators to receive and dispatch information faster. This will quicken information processing. Administrators would have available to them relevant information needed to take decision or respond to inquiries.

As shown in table 2, telephones were patronised by just a small percentage of administrators (only 47.4%). This highlights clearly the problem of lack of functioning telephone systems in Nigerian tertiary institutions. Item 5 in table 3 shows further that communication facilities were considered grossly inadequate as only 32.7% of the respondents agreed that they were adequate. The table also shows that approximately ninety-one percent (of administrators agreed that they would like to get information across

more quickly than they do now and eighty-nine percent agreed that they would have wanted some information reaching them to have been channelled faster. These findings clearly indicate that facilities for communication in educational institutions need to be urgently improved. This is in agreement with the recommendation by Opatola (1998) in the case of the Oyo State Ministry of Education.

Research Question 2:

What are the methods used for the storage and processing of information and how adequate are these methods and facilities?

The study found that information processing and storage were mainly done manually (see table 4). Although the processing and storage of information by manual methods was commonly used, there was an increase in the use of computer facilities both in processing and storage. These findings agree with those of Mbagwu (1989) and Opatola (1998) in their studies of Imo State and Oyo States' ministries of education respectively.

Table 2: Sources of Information Usually Used by Administrators

S/N	Sources of Information	Frequency	Percentage*
1	Formal letters/memos/circulars	1096	94.6
2	Face-to-face discussion/personal contracts	1056	91.1
3	Official reports/documents	1047	90.3
4	Journals/magazines	1043	90.0
5	Files/records rules/regulations	1029	88.8
6	Colleagues	1022	88.2
7	Newspapers/TV/radio	1016	87.7
8	Superiors	1001	86.4
9	Library facilities	969	83.6
10	Board meetings/conferences/seminars	963	83.1
11	Informal letters/memos	907	78.3
12	Subordinates	771	66.5
13	Internet /e-mail in cyber cafes	759	65.5
14	Professional consultants	644	55.6
15	Registry/notices/porters' lodge	626	54.0
16	Telephone conversations	549	47.4
17	Computer centre	474	40.9
18	Gossip/rumour/grapevine/club meetings	300	25.9

* Percentage of respondents who indicated that they used the source.

Table 3: Adequacy of Information Flow and Communication Facilities

S/N	Item of Assessment	Agree %	Disagree %
1	Information always gets to me on time	74.1	25.9
2	I would have wanted some information reaching me to have been channelled faster to remove me from embarrassment	89.3	10.7
3	I would like to get information across more quickly than I do now	91.3	8.7
4	The means of communication in this institution is satisfactory	60.4	39.6
5	Communication facilities are adequate	32.7	67.3

The current methods and facilities for both processing and storage of information were not considered satisfactory. In table 5, 71.6% of administrators agreed that the method of processing data/information was satisfactory; but only 43.3% of them agreed that the speed of processing was satisfactory for the volume of data/information being handled. A large proportion (39.1%) of the respondents agreed

that the administrators regard the facilities for processing were grossly inadequate. For storage, the findings presented in table 5 show that administrators consider both the methods and facilities now being used barely adequate (59.0% and 50.3% of them agreed respectively). Nevertheless, 70.6% of administrators agreed that information could easily be retrieved when needed with the present methods of processing and storage.

Table 4: Methods of Processing and Storage

S/N	Item	Agree %	Disagree %
Processing			
1	By manual recording and filing in files	93.3	6.7
2	By consultation with colleagues and in meetings and seminars	87.4	12.6
3	By deep thinking and analysis	78.5	21.5
4	By use of calculators and filing in files	68.9	31.0
5	By Use of computer facilities	62.4	37.6
Storage			
1	In files and records kept in file cabinets/shelves	95.0	5.0
2	In diskettes or computer hard disk	59.3	40.7
3	In central collection unit.	42.5	57.5

Table 5: Adequacy of Methods and Facilities for Processing and Storage

S/N	Item of Assessment	Agree %	Disagree* %
Processing			
1.	The methods of processing data/information are satisfactory	71.6	28.4
2.	For volume of data/information being handled, the speed of processing is satisfactory	43.3	56.7
3.	The facilities for processing information are adequate	39.1	60.9
Storage			
1.	The methods for storage of information are satisfactory	59.0	41.0
2.	The facilities for storage of information are adequate	50.3	49.7
3.	Information can easily be retrieved when needed	70.6	29.4

The administrators in the universities used computers most in processing and storage of information, followed by administrators in the college of education and polytechnics respectively. This is presented table 6. Thus, the findings of this study reveal that there is need for tertiary institutions to modernise their methods and facilities for processing and storage of data/information by computerising their information systems. This will enable them to cope with the increased volume of data and the demand for information.

Okwilagwe (1995) had concluded that much time was spent by decision makers on searching for relevant information for urgent decisions. Bello (2001), who also cited Alani (1992), noted that many school administrators found it difficult to give accurate information when such information is required by the educational authorities partly because of poor record keeping. If the administrators are favourably armed with modern techniques, the situation would be bound to change.

agreed that they had adequate information acquisition capacity and decision-making effectiveness in the 14 tertiary institutions (table 7). The levels of agreement by type of institutions are also shown in the table. These findings show that administrators had access to information and actually made use of information in decision-making. This finding is contrary to that of Igwe (1995) who studied the National Board of Technical Education (NBTE), and concluded that decisions were sometimes arbitrarily taken due to lack of appropriate information. The findings of this study agree with other previous studies, such as Opeke (1984), Aiyepoku (1982), Tihamiyu (1990), Longe and Agabi (1990), Opeke and Nwankwo (1993), that administrators in government or educational organisations are information conscious, and that they seek and use information from various sources. Notwithstanding these findings, this study has also established the need to improve the levels of information acquisition and information management by the administrators. Table 7 revealed

Table 6: Use of Computers to Store, Process or Acquire Information in Tertiary Institutions

S/N	Item of Assessment	Agree (%)			Disagree (%)		
		U	C	P	U	C	P
Processing							
1.	By use of computer facilities	72.0	60.8	43.5	28.0	39.2	56.5
2.	There are computers in offices to process data/information quickly	51.8	47.5	30.9	48.2	52.5	69.1
Storage							
3.	In diskettes or computer hard disk	70.3	55.3	41.0	29.7	44.7	59.0
4.	Use of Internet/E-mail as useful source of information	73.1	64.2	50.6	26.9	35.8	49.4

Key: U = Universities C = Colleges of Education P = Polytechnics

Research Question 3

What are the levels of information acquisition, information management capacity and decision-making effectiveness of administrators in tertiary institutions in South-Western Nigeria?

The levels of information acquisition, information management capacity, and decision-making effectiveness were rated very high respectively as (85.4%, 75.0% and 86.3%) of the respondents

that information management was conspicuously rated lower than information acquisition and decision-making effectiveness. This indicates that some aspects of the communication, storage and processing of information in the institutions need to be improved. These are the areas that cause bottlenecks and lead to information acquisition and information management problems so often observed in Nigerian educational administration.

Table 7: Levels of Information Acquisition, Information Management and Decision-Making Effectiveness in the Tertiary Institutions

Institution	Information Acquisition		Information Management Capacity		Decision-making Effectiveness	
	Agree %	Disagree %	Agree %	Disagree %	Agree %	Disagree %
Universities	86.3	13.7	75.7	24.3	87.0	13.0
Colleges of Education	85.4	14.6	76.7	23.3	86.0	14.0
Polytechnics	83.5	16.5	70.4	29.6	84.9	15.1
Overall (in all the 14 institutions)	85.4	14.6	75.0	25.0	86.3	13.7

Test of Hypotheses

There is no significant difference in (i) information acquisition (ii) information management capacity (iii) decision-making effectiveness among administrators in the three types of tertiary institutions in South-Western Nigeria.

The One-Way Analysis of Variance (ANOVA) and Duncan Multiple Range Test (DMRT) were used to analyse the data for testing the above hypothesis. The results are shown in tables 8 to 10.

(i) Differences in Information Acquisition:**Table 8 (a): One-Way Analysis of Variance of Information Acquisition of Administrators by Type of Institutions**

*Significant at $P < 0.05$

Source	df	Sum of Squares	Mean Square	F Value	P	Remarks
Institution	2	1762.07	881.04	11.47	0.0001	S* Reject H_0
Error	1156	88782.20	76.80			
Total	1158	90544.27				

In table 8(a) the computed p is 0.0001 which is significant at $P < 0.05$ level. This indicates that there are significant differences in information acquisition of administrators by type of tertiary institution. This is confirmed in table 8 (b) where the means with different superscripts are significantly different. The hypothesis is therefore rejected.

There were significant differences in information acquisition of administrators by type of tertiary institution. The administrators in the universities

demonstrated the highest level of information acquisition, followed by those in colleges of education and polytechnics respectively. This implies that administrators in the universities seem to be more avid information seekers than those in colleges of education or polytechnics. This is contrary to the findings by Longe and Agabi (1990) that staff in colleges of education were more information conscious than those in the universities. The environment in the universities that emphasise research work, and the facilities available in the

universities, may be the cause for information-seeking behaviour among university administrators being more predominant than those in other tertiary institutions. Aiyepoku (1978), Opeke (1984) and Tiamiyu (1990) also found out that the nature of information sources available, quality of information available, the nature of work being done, and the situation influence the decision-maker in his search for, and use of information.

(ii) Differences in Information Management Capacity:

Table 9 (a): One-Way Analysis of Variance of Information Management of Administrators by Type of Institutions

Source	df	Sum of Squares	Mean Square	F Value	P	Remarks
Institution	2	1103.70	551.85	9.62	0.0001	S* Reject H_0
Error	1156	66301.51	57.35			
Total	1158	67405.21				

* Significant at $P < 0.05$

Table 9 (a) shows that $p = 0.0001$, which is significant at $P < 0.05$ alpha level. This indicates that there are significant differences in information management capacity of administrators by type of tertiary institution. This is revealed to be so in table 9 (b) where the means with different superscripts are significantly different. The hypothesis is therefore rejected. In table 9(a), the differences in information management capacity among administrators in the universities and colleges of education were not significant. However, the information management capacity of administrators in the universities and colleges of education was significantly higher than that of administrators in the polytechnics. The study also found that administrators in the universities used computers more in processing and storage of

information, followed by administrators in the colleges of education and polytechnics respectively.

In reference to table 10 (a), p is 0.0001 and is significant at $P < 0.05$ alpha level. This means that the differences in decision-making effectiveness among administrators by institutions are significant. Table 10 (b) confirms that the means with different superscripts are significantly different. The hypothesis is therefore rejected. There was no significant difference between the decision-making effectiveness of administrators in the colleges of education and those in the polytechnics. The decision-making effectiveness of administrators in the universities was significantly different and higher than those of administrators in the colleges of education and the polytechnics.

Table 9 (b): Duncan Multiple Range Test (DMRT) of Administrators' Information Acquisition by Type of Institution

Institution	N	Mean	Remarks
University	385	57.53 ^a	Means with different superscripts are significantly different Reject H_0
College of Education	535	57.90 ^a	
Polytechnic	239	54.91 ^b	

(iii) Differences in Decision-making Effectiveness:

Table 10 (a): One-Way Analysis of Variance Comparing Decision-making Effectiveness of Administrators and Type of Institutions

Source	df	Sum of Squares	Mean Square	F Value	P	Remarks
Institution	2	2270.90	1135.45	14.66	0.0001	S* Reject H_0
Error	1156	89552.31	77.47			
Total	1158	91823.21				

*Significant at $P < 0.05$

Table 10 (b): Duncan Multiple Range Test (DMRT) showing Administrators' Decision-making Effectiveness by Type of Institution

Institution	N	Mean	Remarks
University	535	90.17 ^a	Means with different superscripts are significantly different Reject H ₀
College of Education	385	87.98 ^b	
Polytechnic	239	86.74 ^b	

Conclusion

The study established that although the levels of information acquisition, information management capacity and decision-making effectiveness were very high, overall, there were significant differences across the three types of tertiary institutions. Tertiary institutions (i.e. universities) which used computers mostly to store or process information had higher scores on those variables than those tertiary institutions (i.e. colleges of education and polytechnics) which used less of computers.

Tertiary institutions should, as a matter of policy plan, the improvement of their communication facilities by installing functioning telephone systems, local area computer networks and modern information technologies. They should also modernise their information processing and storage facilities by computerizing their management information systems. More funds should be allocated by the tertiary institutions for improvement of communication and computerising of management information systems. Really, all employees in the institutions, especially administrators, should be encouraged to be computer literate. This can be promoted by organising computer literacy courses, seminars and workshops for them.

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*E.A. Erwat holds a doctoral degree in Educational Management, University of Ibadan, Ibadan, Nigeria.

*M. Fabunmi is Senior Lecturer in the Department of Educational Management, University of Ibadan, Ibadan, Nigeria. He holds a doctoral degree in Educational Management.

Planning and Implementation of the University of Ghana Library Automation Project

Theodosia S. A. Adanu

Balme Library

University of Ghana

P. O. Box 24

Legon, Ghana

theodosia@libr.ug.edu.gh

Abstract

The paper reviews the three-year Carnegie Corporation funded library automation project of the University of Ghana Library System, two and a half years into the project. It highlights the automation environment before the Carnegie project and describes essential factors that have contributed to the automation process to date. The contribution made by external players is emphasised while challenges posed by the project and lessons learned are presented. The paper concludes by assessing experience gained and the challenges that lie ahead before the system takes off.

Introduction

Computers have been used for about four decades now for different functions in libraries, especially in the developed world (Borgman, 1997). Whereas fully automated libraries are the norm in the developed world, this can not be said of libraries in the developing world, including Africa. Few libraries in Africa are fully automated.

The term "library automation" is used to refer to the extensive use of mechanical, electronic or micro-electronic equipment to perform the basic functions and activities associated with the library (Mittal,

2005). The functions that may be automated are: acquisition, cataloguing, circulation, serials management and reference. Library automation could also simply be described as the use of "computer technology in libraries" (Mahmood, 1999).

Library automation involves not just the acquisition of computers but networking of these computers, as well as the purchase and installation of software for an integrated library system (ILS). The integrated library system is the software that handles basic housekeeping functions of a library. Unfortunately, it has not been easy for public universities in Africa, including East Africa (Mulimila, 2000) and Ghana to fully computerise their library activities.

Background Information to Balme Library, University of Ghana

For a long time, the public university libraries in Ghana, including the University of Ghana library system had aimed to automate all their library services. Amekuedee (1995) corroborates this, as it is evident in his findings that "without doubt, the fever of computerisation has gripped three university libraries in Ghana." The major barrier to library automation in Ghana, as it is the case also with many Nigerian libraries, has been the lack of funds (Amekuedee, 1995; Ekpenyong, 1997).

The University of Ghana with the help of funds from the Carnegie Corporation of New York has overcome the barrier of lack of fund, and is currently in the process of fully automating its library processes. The University of Ghana is one of the five-state funded universities in Ghana. It was founded in 1948. Both undergraduate and post graduate programmes are offered at the University of Ghana. Courses are offered in the arts, sciences, engineering, nursing, medicine, agriculture, and social sciences. The

University currently has an external campus, a few kilometres from the main University campus, known as the Accra City Campus. The University currently has a student population of about 28,482, most of who are non-residential and staff strength of about 4,368.

To enhance teaching and learning in the University, there is one main library, the Balme Library as well as satellite libraries. Together they make up the University of Ghana Library System. The satellite libraries are libraries of all institutes, schools and colleges, as well as hall and departmental libraries. The Balme Library acquired its first computer in February 1989. Various organisations in the past have donated computers to the library. These computers have been used for different things but not for automation of library routines. This is because, although computers are integral to library automation, the software that would be used for automation is equally critical. Other resources needed for successful library automation are dedicated staff, barcodes, and barcode readers. All these require adequate financial resources and made it difficult for the pursuit of library automation.

The University of Ghana Library System however embarked on automation some ten years ago. It began with the computerisation of the cataloguing process in the Balme Library 1995, using the Bibliofile ITS for Windows software from The Library Corporation (TLC). Some years after, the Law Faculty Library began using the Winnebago library software for cataloguing. Unfortunately, due to inadequate fund the other library processes and other libraries in the University system were not automated. Amekuedee (2005) corroborates the partial automation of the University of Ghana Library System.

It was not until 2003, eight years after the first attempt at automation that a proposal was presented to the Carnegie Corporation on *Enhancing and Leveraging Comparative Strengths and Competencies in the University of Ghana through ICT*. The proposal was accepted. The automation of the University of Ghana Library System formed part of the project.

The mission of the University of Ghana is "to develop world class human resources and capabilities to meet national development needs and global challenges through quality teaching, learning, research and knowledge dissemination." (University of

Ghana, 2006). A proposal was put together to support the process already initiated to provide sustainable academic and administrative development for the attainment of the University's mission by increasing access to ICT use and integrating it in teaching, learning and administration. The aim of the proposal was thus to seek funding for two major and related items. These are:

- (i) the expansion and strengthening of the University's ICT base and reshaping its management information system; and
- (ii) the automation of the University's library system in order to allow for efficient and much greater access to an increased university population both on the main campus and in other locations, without too much physical expansion.

The project covers a three-year period beginning November 1, 2003 and ending October 31, 2006. At the end of the project period, the cataloguing and circulation processes of the Balme Library and some of the satellite libraries would be automated. In addition to this, there would be an Online Public Access Catalogue (OPAC).

The objective of this paper is to review the three-year library automation project funded by the Carnegie Corporation and to ascertain the extent of progress made two and a half years into the project and highlights what is left to be accomplished before the system takes off. The paper focuses solely on events that took place after the acceptance of the proposal. The paper also identifies external factors that have aided the success of the project to date, challenges faced and lessons learned. It is hoped that the paper will be a guide to other libraries as they automate their library processes.

The University of Ghana Library System is currently undergoing full automation. Since every library automation experience is unique, it is hoped that this paper on the library automation experience of the University of Ghana will add to the existing knowledge on library automation in general and contribute significantly to the African experience.

Literature Review

The literature is rife with information on various aspects of library automation processes. Ekpenyong (1997) highlights the span of library automation in the University of Ibadan Library, Nigeria, and also reflects on the World Bank funded Book Project that

started in 1991 which aimed at enhancing research and teaching at the university. Akinfolarin (1998) provided a progress report of automation at the Adeyemi College of Education Library in Nigeria. The historical development of both the College and the library is given. The various operations which the software can perform, including menus and sub-menus, are also listed. The problems which the automation exercise is likely to face are discussed and solutions proposed.

Ondanri-Okemwa (1999) examined the major problems associated with managing a library automation project in a developing country. He used the Moi University experience as a case study of the type of problems that a library project manager in a developing country is likely to face. He listed some of the managerial hurdles as poor infrastructure, shortage of local technical expertise, lack of information technology and shortage of qualified managers. He suggested that training local personnel and equipping the training institutions may partly solve some of the problems. He made further suggestion that management and information technology skills should be emphasised in whatever training programmes may be initiated in a bid to overcome the shortage of local technical expertise. Manda (2003) focused on the factors that went into planning for the automation of the University of Dar es Salaam Library. His paper concluded that coordination and cooperation of the stakeholders is essential to the outcome of the process.

Amekuedee (2005) carried out a study to find out which library processes had been automated in Ghana's three older public university libraries namely, the Balme Library, the Kwame Nkrumah University of Science and Technology (KNUST) Library and the University of Cape Coast (UCC) Library. He concluded that university libraries in Ghana have a long way to go to be fully automated.

Schedule of Activities for the Library Automation Project

Since the acceptance of the proposal by the Carnegie Corporation and provision of funds of about 280,000 US dollars for the library component of the project, some progress has been made towards the eventual automation of the University of Ghana Library System. The project design had three distinct phases as follows:

Phase 1 (1-8 months)

- Needs analysis and definitions of objectives for the new system
- Visits to libraries to observe library systems in operation
- Checklist of features of desirable system
- Specifications of operational requirements
- Request for information (RFI) from vendors
- Request for proposal (RFP) from vendors
- Demonstration of system(s) by vendors
- Retrospective conversion of card catalogue using Bibliofile ITS (cataloguing module)

Phase 2 (9-24 months)

- Preparation of sites for hardware installation
- Installation of hardware i.e. workstations, servers, etc
- Installation of library system software
- Training of selected staff to use system by system vendors
- Testing system on small trial database
- Loading of machine readable records already created using Bibliofile ITS (cataloguing module)
- Continue with the creation of databases
- Continue with retrospective conversion of card catalogue

Phase 3 (25-36 months)

- General training of library staff
- Full implementation of system – parallel running of old and new systems
- Continue with retrospective conversion of card catalogue
- Performance evaluation – compare system objectives with system performance; formulate evaluative comments about the system by the consultant, project manager, systems librarian and heads of sections of the library
- Maintenance of the system

Phases 1 and 2 have been completed to a large extent. The project is currently in the third phase.

Requirements for Successful Library Automation Project

Certain essential components contribute to a successful automation project. These include: a consultant, adequate infrastructure, retrospective conversion of the card catalogue, integrated library

software and training. The progress made on these factors will be reviewed accordingly.

Consultants

Consultants have been very helpful throughout the whole process of proposal writing and during the take-off of the project. A local consultant was identified and employed. His role includes overseeing and guiding the whole process.

Infrastructure and Personnel

Some of the essential requirements for library automation include: networked computers, dedicated staff, library software and good technical support. Some resources that were in place before the take-off of the project were networked computers, some dedicated staff and good technical support. In addition, all the satellite libraries on the main campus in the project are already connected to the university network with the exception of the College of Agriculture and Consumer Sciences. The Information Communications and Technology (ICT) Directorate of the University is working on connecting this college to the University network. The Noguchi and College of Health Sciences libraries are both local area networked, but are not on the University network. This poses challenges for the automation process.

Retrospective Conversion of the Card Catalogue

Retrospective conversion (Recon) is the process of turning a library's existing paper catalogue records into machine-readable form. Retrospective conversion usually entails using catalogue cards to find or create bibliographic records in a database of machine-readable records and bringing those records into the existing local database. (University of Oregon, 2005).

Recon is important since it helps build the searchable database for the Online Public Access Catalogue (OPAC), which is a computerised online catalogue of the materials held in a library. The library staff and the public can usually access it at several computer terminals within the library, or from home via the Internet. Since the mid-1980s, it has replaced the card catalogue in most libraries. Since the mid-1990s, character-based OPAC interfaces are

being replaced by Web-based interfaces. OPACs are often part of an integrated library system (Wikipedia, 2006). The OPAC is the only aspect of the automation process that the user or patron sees and experiences. As such, it is important that a lot of care is taken in building the database that will feed the OPAC.

The requirements needed for a successful Recon are barcodes and barcode scanners. The proposal made provision for barcodes and barcode scanners. These have been purchased and distributed to all the satellite libraries for the retrospective conversion exercise.

The cataloguing software, the Bibliofile ITS for Windows, which has been in use in the main library of the University of Ghana is the software used for the retrospective conversion of the card catalogue. Retrospective conversion is a difficult but important exercise that must be carried out for successful automation. Nineteen additional Bibliofile ITS for Windows licenses were purchased in order for all the satellite libraries in the project to be able to embark on the retrospective conversion of the card catalogue. Each license cost five hundred dollars (US\$500). In addition to this, customised barcodes were purchased for the Balme Library and each of the satellite libraries. Recon is no doubt an expensive but necessary venture.

Retrospective conversion of the card catalogue may be outsourced or carried out in-house by the library staff themselves. In the case of the University of Ghana, the latter option was chosen. Recon was done mainly by the staff of the cataloguing department in the Balme Library. Library assistants working in other sections of the library were trained in the use of the Bibliofile in order to help with Recon. The incentive offered was payment on any books entered after normal working hours. In addition, staff from the satellite libraries were trained in the use of the Bibliofile and assigned supervisors who were professional librarians from the Cataloguing Department of the main library. After a while, when it was discovered that the pace was slow students were hired and trained to help with Recon. In a period of about three months, the students had increased the database by more than 40,000 records. For as long as money was available to pay the students, they were hired to help. Unfortunately, professional librarians cross-checking the data entry could not keep up with the pace of the hired students. This

resulted in a backlog of books to be cross-checked long after data had been entered. While the books could not also be shelved because they had not gone through the entire Recon process that would precede re-shelving.

The process of retrospective conversion adopted in the University of Ghana Library System was to pull down the books from the shelves and enter the information about them into the database. The reason for this strategy was to enable the library staff put barcodes on the books. A minor reason was to avoid entering information from cards when the books themselves would not be on the shelves. It constituted a lot of work but progress was made. The entry in the database was done mostly by the library assistants and cross-checked by the professional librarians. The whole process of retrospective conversion has been faced with different challenges. The main challenge faced was labour. Labour is needed for the different stages of the retrospective conversion. The complete Recon comprises data entry by students and/or library assistants, cross checking by professional librarians, typing and pasting of spine labels and getting the books back on the shelf. Currently, there are enough records entered and loaded into the system for the initial training and system evaluation. The focus now is on developing a plan to get the books that have been removed from the shelves and entered in the database back onto the shelves in an orderly manner. Labour is still an issue. It is therefore not strange to walk round the libraries and find half empty shelves.

Integrated Library System

The library system, Millennium, from Innovative Interfaces, has been selected and purchased. The components include cataloguing, circulation and OPAC. Provision has been made for the serials module and debt collection module. The choice was made for Millennium because it is internationally distributed with international subsidiary vendors. Also, it has a strong user support group. Besides, it is good for consortia purposes. It allows for multiple catalogues on one server or catalogues on separate servers can be linked together. Also, one server may be used as a union catalogue accessible by all in the consortium.

The choice of Millennium was preceded by a Request for Proposal (RFP) to library software vendors. Also, two members of staff were sponsored

to visit different automated libraries in Iowa State in the United States of America in 2001. The visit was to expose them to the workings of a variety of library systems in order to make an informed choice. Some of the library systems they were exposed to included Innovative's Millennium, Ex-Libris and Endeavour Voyager. A lot of information was received from the Director of Information Technology and branch libraries of Iowa University Library, who had worked with system vendors. He helped them to identify the strengths of the different library software.

A Millennium team was formed to correspond with a similar team in the University of Ghana to guide the project through the various stages till the completion of the project. The University of Ghana Library System is currently at the implementation stage. The server has been configured to vendor specifications. The software has been installed on the server. The initial conference call prior to implementation took place on July 20, 2005. Information on ftp access was provided for the transfer of patron and bibliographic data, and data has been delivered to the Millennium team. The database is currently running prior to the first initial training with a team from Millennium, in March, 2006 at the Balme Library. After that initial training, the library staff are now in a position to use the system and evaluate it.

Training

Human beings are often resentful of change and innovation. Change training is therefore important into the new and unknown. In this particular situation, it is from a manual library system to an automated library system. According to Spacey et al (2003), training is generally suggested as the solution to technological change. As a result, various forms of training were organised to move staff towards the goal of embracing and working in an automated environment. The areas of training have included computer literacy, Recon and training on the use of the Millennium software.

Team Activities

Various teams were thus constituted. The teams include cataloguing/retrospective conversion, communications/publicity, circulation/OPAC, training, user education and systems installation/operations. The main responsibility of the *cataloguing/recon*

team is to monitor the recon process, document workflow and indicate cataloguing parameters, e.g. print labels, monthly cataloguing statistics etc. The *communications/publicity team* is to provide the university community with library automation updates and so prepare them for the transition. The *circulation/OPAC team* is to document the circulation section workflow and set circulation parameters. The *user education team* has the responsibility of mastering the OPAC in order to educate users. The *training team* is to acquaint itself with the different modules and train staff in the use of the whole system. The *systems installation team* is the technical team that sees to the smooth running of the system. Members of the teams cut across gender, status and libraries. The response has been very good. This shows an "overwhelmingly positive attitude towards library automation" by staff. (Amekuedee (2005))

The Role of External Agencies

The Carnegie Corporation

The Carnegie Corporation of New York was created by Andrew Carnegie in 1911 to promote "the advancement and diffusion of knowledge and understanding." This was done mainly through grants. The mission of the Carnegie Corporation is that, under Carnegie's will, grants must benefit the people of the United States, although up to 7.4 percent of the funds may be used for the same purpose in countries that are or have been members of the British Commonwealth with a current emphasis on Commonwealth Africa. (<http://www.carnegie.org>).

This made the University of Ghana eligible for funding by the Carnegie Corporation. The role of the Carnegie Corporation in the library automation experience cannot be overemphasised. The corporation provided all the funds needed to purchase an integrated library system and other resources for the automation process.

The library automation component of the Carnegie project includes the Balme Library and eight satellite libraries. These are: the libraries of the University of Ghana Business School, the Law Faculty, the Institute of African Studies, the School of Performing Arts, the College of Agriculture and Consumer Sciences, the Noguchi Memorial Institute for Medical Research (NMIMR), College of Health Sciences, and the Accra City Campus. The College

of Health Sciences, and the Accra City Campus are however not located on the Main University Campus. The remaining satellite libraries will also be automated eventually.

Mortensen Centre, University of Illinois, Urbana-Champaign, Illinois

The Carnegie Corporation made funds available for staff from the Mortensen Centre to act in an advisory capacity and to offer training in identified areas. Two and a half years into the library automation project, three visits have been made by staff from the Mortensen Centre. They played an important role in creating awareness about the project to the University authorities. They dialogued with the Vice Chancellor, pointed out the expected outcome of the project and the role of the University when the grant expires. In addition, their advice has helped very much in the project making significant progress. One very useful advice for the Recon was that it was best to input into the database first, materials that were in demand as well as staff publications. This helped in solving the library's dilemma of making sure that when the system eventually takes off, recommended books would be seen in the OPAC and be available for use. They also helped staff to see the importance of forming teams in order to share responsibility and also bring everybody along.

Challenges of the Project

This project has not been without its challenges. Some of the challenges are discussed below:

Data Corruption

One big challenge was that the Bibliofile ITS for Windows being used for Recon ceased to work on two different occasions due to data corruption. Altogether, the project lost about six months of work and data. This slowed down Recon and resulted in a major setback in the automation process. Staff had been working against time with the knowledge that implementation could only take place after an appreciable number of records had been entered into the database. What was least needed was an interruption in the Recon.

Change from Flat Network to Subnetting

Another challenge was when the satellite libraries

were cut off as a result of the implementation of the ICT directorate's policy of subnetting at a time when technical support for the library was not available. According to Posey (2005), "subnetting is basically just a way of splitting a TCP/IP network into smaller, more manageable pieces. The main purpose of subnetting is to help relieve network congestion." With the change from a flat network to subnetting, the satellite libraries were unable to have direct links to the main ITS server located in the Balme library. As a result, work stopped for a while. The problem was resolved after some weeks with the reconfiguring of the 2000 server in such a way that it would be able to communicate with all the different subnets in which the satellite libraries had been grouped.

Bibliographic Data

The bibliographic data sent was not without problems. Patron and bibliographic data were sent on Monday August 1, 2005. The patron data was accepted since it met vendor specifications. There was however a slight problem with the bibliographic data. There should have been a separate field for each item record but for the titles with multiple copies, there were different item records in the same 949 Marc field. This did not meet vendor specifications. The database was therefore cleaned up for a re-transfer of bibliographic data. The clean-up took between two to three months. Bibliographic data has since been sent.

Post-Carnegie Funding Plan

Funds provided by Carnegie will run out and the legacy of an automated environment will still be in place. The question then arises as to how the automated environment will be sustained. The options available include funds available from the University for running the library, which is a percentage of the Academic Facility User Fees (AFUF). The AFUF is the academic fees paid by students. Another avenue available for funding is the Teaching and Learning Innovative Fund (TALIF) for tertiary institutions in Ghana. TALIF is basically a pool of financial resources that can be accessed by groups or organisational units within the tertiary campus communities to carry out new initiatives or experiment with innovative approaches to deal with problems in teaching, learning and management. TALIF aims at financing specific innovative projects based on

approved funding proposals and clearly defined measurable results. A proposal is already underway to solicit funding from TALIF when the project ends.

Lessons Learned from the Library Automation Experience

Some of the lessons learned include the following:

- In planning the time span for any automation project, adequate provision should be made for unforeseen interruptions in the retrospective conversion process.
- A good technical team should be in place to solve technical problems promptly. In addition to this, there ought to be a good rapport between the technical team of the library and the ICT staff of the whole university where such a separation exists.
- Initially, a lot of work takes place behind the scenes with no immediate or visible results. Thus, a constant update of the project is needed to sensitise both library staff and the whole University community from the onset of the project.
- Inclusive teams should be constituted comprising a mix of all staff categories and given job descriptions from the beginning of the project. This helps to build ownership of the library automation project by the library staff.
- A management team should be in place to coordinate the whole project.
- Monetary provisions should be made in the budget to be used to encourage and motivate staff at various points of the project.
- Issues concerning back-up should be brought up and discussed with system vendors before the system is purchased and the license signed.
- The best strategy for retrospective conversion is for most of it to be done during the inter-semester break and the long vacation, when users will not be unduly disturbed.
- For libraries where books have never been bar-coded, when the library embarks on automation, and retrospective conversion begins, the only option for a successful retro conversion would be to remove from the shelves.

Conclusion

The Library automation project at the University of Ghana is in its final year of implementation. A lot of

hard work has gone into bringing the project to this point. The project, which was expected to take that. When the project formally comes to an end in October 2006, there will still be a lot of cleaning up to do and a lot of training for both staff and library patrons. The library automation experience of the University of Ghana could aptly be described as a learning process, which other African libraries can learn from.

The Carnegie Corporation would have fulfilled for the University of Ghana Library System what remained a dream for such a long time. As work continues in an automated environment, the staff of the University of Ghana library system will remain grateful to the Carnegie Corporation.

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*Theodosia S. A. Adanu is an assistant librarian, in charge of the electronic resources, at the Balme Library, University of Ghana, Legon. She attended the University of Ghana, Legon, where she obtained a B.A. (Hons), a post graduate diploma and M.Phil. in Library Studies.

Bradford's Law: Part 1- An Explanatory Approach for Librarians

Victor Janvier Bikai-Nyunai,

Advanced School of Mass Communication
Department of Documentation
University of Yaounde II, Soa
P.O. Bo. 1328, Yaounde
Cameroon.
bikaibros@yahoo.com

Abstract

This paper is the first in a series of two papers on Bradford's Law. This paper reviews the law in a simplified manner for the benefit of library and information science students and researchers, who might otherwise be put off by the usually highly mathematical exposition of the Law. The explanation is intended to set the stage for an interdisciplinary explanation of the Law in the second paper.

The Verbal Formulation and its Characteristics

Bibliometrics is one of the exciting dimensions of librarianship. As Pritchard (1969) defined it decades ago, bibliometrics is an "application of mathematical and statistical methods to books and other media of communication." Rowley and Turner (1978) testified that bibliometrics models are being applied to librarianship in areas such as information processing systems to improve the efficiency of activities such as serial holdings, and acquisition policy among other applications. There is evidence that bibliometrics is increasingly becoming important in the context of library applications. Paradoxically, due to the constant use of mathematics in this branch of library operation research, bibliometrics models are

inaccessible to the majority of active librarians from students to practitioners and even some teachers (Bookstein and Kocher (1979). The immediate consequence is that bibliometrics has very little impact on most library and information science curricula development. Although Durrance (1980) advocated the teaching of quantitative methods in general and Schrader (1981) advocated the teaching of bibliometrics in particular, the trend is that the shortage of capable promoters of bibliometrics teaching will continue to be a serious issue of consideration for this generation of library and information science education.

Bradford's Law, one of the aspects of bibliometrics, was first published in 1934 and was basically a verbatim statement with little similarity to the more sophisticated bibliographic approach suggested by Brookes (1968) decades later. Since then many more developments in the area have taken place in such a rapid and sophisticated way that one would wonder whether they are still connected to the original law. So, the question is how to sort all this out and define an essential framework, free of the meander of the Bradford's Law derivations.

The Bradford's Experiment

Bradford discovered that some articles may appear in a large number of abstracting and indexing services while the majority of articles were not covered by any of these bibliographic services. He questioned this anomaly.

Bradford made two hypotheses:

- (a) Journals devoted to special subjects are specialised.
- (b) Articles are scattered throughout all periodicals with a frequency approximately related inversely to the scope.

Bradford observed the phenomenon of articles scattering in the specific subjects of applied geophysics for the period of 1928-1931 and Lubrication for the period of 1931-1933. He found that articles were scattered throughout all periodicals and further established that all the publishing periodicals can be subdivided into three groups.

1. Group A, is a sub-collection of journals devoted to a subject. They produce more than four references per year individually.
2. Group B, is a fraction of journals more or less devoted to a subject. They produce individually between one to four articles per year.
3. Group C, is the fraction of journals less devoted to a subject. Their productivity is situated somewhere between zero and one publication a year.

The results are shown in table 1 below.

Table 1: Distribution of Journals (Sources) Productivity per Subject Studied

	Geophysics			Lubrication		
	A	B	C	A	B	C
Sources	9	59	258	8	29	127
References	429	499	404	110	133	152

What table 1 says is that in the specific subject of applied geophysics, Group A accounts for nine journal titles producing all together 429 articles. Group B accounts for 59 titles or sources producing 499 articles or references. Group C accounts for 258 sources producing 404 references. The same way we can interpret the lubrication part of the table: Group A from the specific subject of lubrication accounts for eight journal titles and produces 110 references. Group B is made up of 29 journal titles producing 133 articles. Finally, Group C contains 127 journal titles producing all together 152 articles.

One can notice in table 1 that for each subject studied, the number of sources contained respectively in groups A, B, C, are related, that is, for Geophysics; Group A has 9 sources or journals;
Group B has $9 \times 5 = 45$ (= 59 more or less);
Group C has $45 \times 5 = 225$ (= 258 more or less).

At this stage a consensus can be reached on two characteristics from table-1:

1. the first agreement is that, the numbers 9, 59, 258 can be assimilated to a geometric progression, meaning that if one knows the immediately preceding number, to get the following he/she will multiply the preceding by a constant called a multiplier. In the case of the Bradford's experiment the constant is 5.
2. the second agreement is that 429, 499, 404 references respectively produced by the groups A, B, C, can also be considered to be equal if one neglects the differences.

This discovery led Bradford in 1934 to state the Law that bears his name as follows:

If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus, when the numbers of periodicals in the nucleus and succeeding zones will be as $-1: n: n^2 \dots$

How to Experiment the Bradford's Law

Let us imagine a hypothetical bibliographic search process presented in table 2. These are the data from Saracevic and Perk (1973).

Data Representation

Table-2 is Bradford's distribution and is subdivided into five columns. The first column (J) gives the frequencies of occurrence of a given level of production. These frequencies are no less than the number of journal titles producing the same level of output. The second column (A) represents the production level of each individual journal title. It is important to notice that this column has been arranged in order of decreasing productivity. The third column (JxA) is the product between the frequencies and the output, that is, the total number of articles from journals having the same level of production. The fourth column is that of the production ranking. The fifth column reflects Bradford's grouping that we referred to in the earlier sections. Group A is for journals producing more than four articles, group B for journals producing between one and four articles and group C for journal producing between 0 and 1 article. L1 indicates the level in which only one journal produces 98 references. L2 indicates the level in which two journals produce individually 60 references and, therefore together, produce 120 articles.

Table 2: Presentation of Bradford's Like Data

Number of Journals J	Each Contributing Number of Articles A	Total Number of Articles Contributed J & A	Journal Production Ranking	Bradford Grouping of the Universe of Journals
1	770	770	1	L1
1	197	197	2	
1	185	185	3	
1	182	182	4	
1	138	138	5	
1	107	107	6	
1	98	98	7	
1	89	89	8	L2
1	78	78	9	
2	75	150	10	
1	74	74	11	
1	65	65	12	
1	61	61	13	
2	60	120	14	
2	56	112	15	GROUP A
1	47	47	16	
1	43	43	17	
1	42	42	18	
2	41	82	19	
1	38	38	20	
2	37	74	21	
2	36	72	22	
1	35	35	23	
1	34	34	24	
1	32	32	25	
2	30	60	26	
2	29	58	27	
1	28	28	28	
3	27	81	29	
4	26	104	30	
1	25	25	31	
1	24	24	32	
1	22	22	33	
3	21	63	34	
2	20	40	35	
1	18	18	36	
5	17	85	37	
2	16	32	38	
2	15	30	39	
3	14	42	40	
5	13	65	41	
6	12	72	42	
6	11	66	43	
9	10	90	44	
9	9	81	45	
3	8	24	46	
10	7	70	47	
11	6	66	48	
6	5	30	49	
13	4	52	50	GROUP B
17	3	51	51	
23	2	50	52	
63	1	63	53	GROUP C

(from Saracevic and Perk 1973)

The Stratification of Journals Universe

The concepts of nucleus and zones are the main concepts of Bradford's Law and the most controversial at the same time. While it is widely admitted that the nucleus or the first zone depends on the subject being studied as it is stipulated in Drott (1981) and others, some critics such as Bookstein and Kocher (1979) contend that the stratification of the journals universe into zones is an arbitrary exercise. Following Drott's statement, Goffman and Warren (1969) stated that the stratification of journals into zones is not up to an individual but is a scientific process. So they introduced the distinction between the maximal and the minimal journals zoning.

First, the maximal subdivision is the one that yields a maximum number of zones with the smallest nucleus (table-3). Table-3 shows columns J, A, JxA, the same as in table-2 explained earlier to which other columns are added. The fourth column (Xi) shows the number of references per zone, the fifth column (Zi) the number of journals per zone, the sixth column (i) the zone ranking and the seventh column (a) shows the multiplier. The columns are divided horizontally in seven zones for a maximal subdivision and six zones for a minimal subdivision. The next section will explain how the seven or six zones have been determined.

Criteria of the Best Partition.

The theory of partitioning, squeezed between the maximal and the minimal way of subdividing a set of Bradford's kind of data, would corroborate the subjective approach to partitioning had it been the Goffman and Warren (1969)'s demarcation. Goffman and Warren (1969) however suggested that it is not up to an individual to choose subjectively a method that would yield the best partition for a given set of data. In contrast to the subjective partitioning they propose rational criteria for partitioning Bradford's data into zones. Their study is based on data drawn from mast cells and schistosomiasis to determine a minimal nucleus, that is the smallest core of journals devoted to a subject. They believed that the identification of such a core would be of tremendous importance to journal acquisition and collection development in general. If the minimal nucleus is the result of a maximal subdivision of the literature in zones, the smallest number of articles which can affect that maximal subdivision is A/m .

Let us define the intervening variables:

- LRa = largest number of relevant articles appearing in a single journal,
- J_i = number of journals per level of production.
- m = number of zones
- A = Total number of relevant articles
- A/m = minimal nucleus
- B_i = Total number of journals containing only one relevant article.
- g = number of articles per author.
- Z_i = number journal in ith zone, with $i = \{1, 2, 3, \dots, m\}$

The criteria of a best partition of the journals universe into zones are stated as follows:

Conformity Criteria

The validity of conclusions in research depends on the research methodology which includes among other things data gathering. Brookes (1977) confirmed that most of the anomalies encountered in the Bradford's law originated from non homogeneity of the data. Saracevic and Perk (1973) used natural instead of common logarithms in their study, this is a deviation from the nature of Bradford's data. How will one know that these conclusions are valid? The only way to know that is to test the data for conformity. There is no single way of doing that. But according Drott (1981) the tendency seems to be that the best test of conformity is the Kolmogorov-Smirnov for the graphical formulation.

For the verbal formulation, four tests of conformity can be operated:

1. Given a set of data $\{A_1, A_2, A_3, A_4, \dots, A_n\}$ and its mean, computed after the partitioning has been proceeded, this set will conform to Bradford's data if and only if the dispersion of the distribution A_i with $i = \{1, 2, 3, \dots, n\}$ is minimum, that is when its standard deviation, converges to 0.
2. A distribution characterised by a set of data analogous to the one in the following chart (figure 1), is said to be conformed to Bradford's law if the following two conditions are met:
 - (a) $A_1 = A_2 = A_3 = A_4 = \dots = A_n$ (more or less)
 - (b) $J_2/J_1 = J_3/J_2 = J_4/J_3 \dots = J_n/J_{n-1}$,
or $a_1 = a_2 = a_3 = \dots = a_{n-1}$ (more or less)
3. Given that $A = A_1 + A_2 + A_3 + A_4 + \dots + A_n$, one should have the following met:

$$A/m > B_i/2$$

If this condition is not met, it means that there would be the last succeeding zones with equal number

Table 3: A Maximal Subdivision Into Zones

Number of journals J	Each Contributing Number of Articles per Journal A	Total Number of Articles Contributed J & A	Number of References per zone X_1	Number of Journal per zone Z_1	Zones Ranking 1	Multiplier
1	770	770	770	1	1	
1	197	197	702	4	2	$\frac{4}{1} = 4$
1	185	185				
1	182	182				
1	138	138				
1	107	107				
1	98	98				
1	89	89				
1	78	78				
2	75	150	722	9	3	$\frac{9}{4} = 2.25$
1	74	74				
1	65	65				
1	61	61				
2	60	120				
2	56	112				
1	47	47				
1	43	43				
1	42	42				
2	41	82				
1	38	38				
2	37	74	731	17	4	$\frac{17}{9} = 1.88$
2	36	72				
1	35	35				
1	34	34				
1	32	32				
2	30	60				
2	29	58				
1	28	28				
3	27	58				
4	26	104				
1	25	25	712	33	5	$\frac{33}{17} = 1.94$
1	24	24				
1	22	22				
3	21	63				
2	20	40				
1	18	18				
5	17	85				
2	16	32				
2	15	30				
3	14	42				
5	13	65				
6	12	72				
6	11	66	717	120	6	$\frac{120}{33} = 3.6$
9	10	90				
9	9	81				
3	8	24				
10	7	70				
11	6	66				
6	5	30				
13	4	52				
17	3	51				
25	2	50				
63	1	63	63	63	7	$\frac{63}{120} = 0.5$

of journals containing the same number of articles which is contrary to the substance of the Law.

Number of Zones Condition

The number of zones can be computed under these conditions:

- (a) If $LRA > B_1$, then $A/m = LRA$, therefore $m = A/LRA$
- (b) If LRA is less than or equal to B_1 , then $A/m = g(B_1/2)$ therefore, $m = A/g(B_1/2)$

1.3.3.3. Nucleus size condition

- (a) **A nucleus reduced to a single journal**

If one encounters the following situation:

$LRA > B_1/2$ ($> =$ greater than)

this means that the nucleus is reduced to the only most productive journal at the top of the ordered list.

- (b) **A nucleus consisting of more than one journal**

If at the contrary one notices that:

$LRA < B_1/2$ ($< =$ less or equal)

it means that the nucleus includes a number of journals all at the top of the ordered list and the production of that nucleus must be greater than $B_1/2$.

In application to table-3's data, one can see:

$$\begin{aligned} LRA = 770 > B_1 &= 63, \text{ this implies that} \\ A/m &= LRA \\ A &= 770 + 702 + 722 + 731 + 712 \\ &\quad + 717 + 63 = 5185 \\ m &= A/LRA = 5185/770 = 6.7 \\ m &= 6.7 \\ m_{\max} &= 7 \text{ zones} \\ m_{\min} &= 6 \text{ zones} \end{aligned}$$

In the specific case when LRA is greater than $B_1/2$, the minimal nucleus is reduced to a single journal. From table 3 one can also state that:

$$LRA = 770 > B_1/2 = 63/2 = 31.5$$

In conclusion, based on the above, the nucleus or the first zone is limited to the single most productive journal (containing 770 articles) and one can do a maximal subdivision of seven zones ($m_{\max} = 7$ zones) as computed above. The other zones must have 770 articles or less, meaning that when adding up the number of references per zone, one should stop at the number equal or immediately less

than the production of the nucleus.

The second zone has four journal titles, producing all together 702 references. The third zone has 9 journals and 722 references, and so on.

The seventh column (a_i) is that of the multipliers. It is the consequence of the data in the fifth column (number of journals per zone). If the number of journals in a zone is Z_i , then the multiplier " a_i " will be computed as follows:

$$\begin{aligned} a_{i+1} &= (Z_{i+1})/Z_i \\ \text{with } i &= \{1, 2, \dots, 7\} \end{aligned}$$

Column seven gives the values of the multipliers:

$$a_i = \{4, 2.25, 1.88, 1.94, 3.6, 0.5\}.$$

Second, the minimal subdivision (table 4) is the one that yields a minimum number of zones with the largest nucleus possible. The conditions of a best partition remain the same as in a maximal subdivision whether one deals with a nucleus reduced to a single journal or including some top journals in the ordered list.

Conditions on the Computation of the Number of Zones

We said earlier that one can determine the number of zones " m " as it follows:

$$m = A/LRA$$

or

$$m = A/g(B_1/2)$$

- (a) if m is a decimal for instance $m = 6.7$, the minimal subdivision will consist of $m = 6$ zones.
- (b) if m is a whole number for instance $m = 5$, there can only be a maximal subdivision into $m = 5$ zones.

To compute the number of articles per zone from the top down on the ordered list, one will add articles produced until the number is equal or immediately greater than the production of the nucleus.

Significance of the Bradford's Heritage

Interpretation of the Results

Most of the things that one should know as basics about Bradford's Law are in tables 3 and 4 which summarise the results of the entire Bradford experiment.

Table 3 summarises the process of the maximal subdivision into zones. It is assumed that the data in table 3 are the subject search result that one has

just made. It is fair to conclude that there is one major specialised journal producing 770 articles and that is the nucleus made of only one journal. As we know that articles are scattered over the universe of journals, one can imagine that additional articles must be hidden in some other journals. In order for one to get about the same number of additional articles as in the core (nucleus), that is, 702 articles for a maximal subdivision, one will need to search through four additional journals. It is not possible to search through the fifth journal in the second zone in the context of a maximal subdivision, because the production of that second zone would be 809 articles which is more than the nucleus' production. That cannot yield a maximal number of subdivisions and the number of references cannot be more than that of the core.

Looking at table 3, one should note that the number of journals (four) in that second zone of the maximal subdivision is obtained by multiplying (one) (number of journals in the first zone) by 4 (second zone's multiplier). To get about the same number of articles as produced in each of the two preceding zones one will need to search again through 9 or (4×2.25) additional journals, which will yield 722 articles. Four is the number of journals in the second zone and 2.25 is the multiplier of the third zone, and so on.

There are some striking characteristics of this experiment which need to be acknowledged: First, table 3 shows that apart from the first zone, within any other zone the number of articles increases arithmetically while the number of journals increases geometrically. This means that to reach the total number of articles produced in the core, as the zone rank increases, it will require the search more journals which will produce the fewer or less articles. Second, the seventh column shows that the third, fourth and the fifth zones have about the same multipliers which are respectively 2.25, 1.88 and 1.94 (thus, can be assimilated to 2). Third, the extreme zones adversely do not follow the rule of compatibility. The multiplier of the second zone is four while that of the sixth and seventh are 3.6 and 0.5 respectively. This is typical of the Bradford's Law's data. The intermediary zones usually fit the Bradford's Law which is justified by the compatibility of their respective multipliers. The extremes do not follow the law which is justified by the incompatibility of the multipliers. The explanations to that irregularity will be addressed in

the second paper of the series, focusing on the graphical approach to Bradford's Law.

Table 4 summarises the minimal subdivision process. Its interpretation is almost analogous to that of the maximal subdivision in table 3 above. However, to compute the number of articles within a zone, one will add the production of successive journals until number of articles is equal to or immediately more than the nucleus' production. Looking at the seventh column, zones 3, 4 and 5 have almost the same multipliers which are respectively 2.4, 2.16 and 2.26. At the same time, zones 2 and 6's multipliers are respectively 5 and 1.45, which do not conform to the similarity of the other multipliers above. Again, this is typical of the Bradford's distribution.

Applications

The main ground of applications of the Bradford's law is the process of decision making in library and/or information services environment. O'Connor and Voos (1981) have identified such applications in collection buildings via citation analyses and in collection development through journal citations. Brookes (1973) reported numerous avenues of application of the Bradford's Law in such areas as the circulation service in libraries or information centres. The phenomena to be observed could be either the items borrowed or the users borrowing. A ranking of these variables may yield distributions that fit Bradford's Law. The question at this point, is how could one use the results of these applications? Drott (1981) identifies two major uses: the prediction and evaluation. He stated that prediction could tell what titles would be useful or how users would behave. Evaluation could provide theoretical standards against which retrieval or acquisition could be measured.

Evaluating and predicting information services is at the heart of the information professional practice. A lot of energy and time has been put into this area to improve librarianship and information services productivity. Pioneering works such as Zweizig (1982) and McNamee (1984) have influenced the information management towards increasing productivity, although some critics such as D'Elia (1985) have questioned the scientific ground of these models of evaluation and prediction in an information environment. Bibliometrics emerges in this context as the potential avenues that will lay the ground of

Table 4: A Minimal Subdivision Into Zones

Number of journals J	Each Contributing Number of Articles A	Total Number of Articles Contributed J & A	Number of References per zone X ₁	Number of Journals per zone Z ₁	Zones Ranking 1	Multiplier
1	770	770	770	1	1	
1	197	197	702	5	2	$\frac{5}{1} = 5$
1	185	185				
1	182	182				
1	138	138				
1	107	107				
1	98	98	847	12	3	$\frac{12}{5} = 2,4$
1	89	89				
1	78	78				
2	75	150				
1	74	74				
1	65	65				
1	61	61				
2	60	120				
2	56	112				
1	47	47	830	26	4	$\frac{17}{9} = 1,88$
1	43	43				
1	42	42				
2	41	82				
1	38	38				
2	37	74				
2	36	72				
1	35	35				
1	34	34				
1	32	32				
2	30	60				
2	29	58				
1	28	28				
3	27	58				
4	26	104				
1	25	25	779	59	5	$\frac{26}{12} = 2,16$
1	24	24				
1	22	22				
3	21	63				
2	20	40				
1	18	18				
5	17	85				
2	16	32				
2	15	30				
3	14	42				
5	13	65				
6	12	72				
6	11	66				
9	10	90				
9	9	81				
3	8	24				

10	7	70				
11	6	66				
6	5	30				
13	4	52	832	145	6	$\frac{145}{59} = 1,45$
17	3	51				
25	2	50				
63	1	63				

the scientific based information services evaluation and prediction. This requires therefore that the teaching of bibliometrics in library/information science programme be given appropriate consideration.

The Mathematical Formulation

Statement of the Graphical Formulation

The distinction between the verbal and the graphical aspects of the Bradford's Law was first made public by Bradford (1934) and Bradford (1950) published respectively in the Journal of Engineering and later in a monograph in Washington. But the proposition assumed in Bradford's works that the graphical version of the law was a mathematical translation of the verbal formulation has been questioned by many researchers. Vickery (1948) pointed out that Bradford formulated two laws, instead of one in two versions as previously established.

He demonstrated that the formulation from which Bradford derived his straight line was not congruent to the verbal formulation and that the mathematical expression of the verbal statement of the Law was not a straight line.

Wilkinson (1972) called this conceptual inconsistency ambiguity and Brooks (1977) called it Bradford hybridity. This fact is widely documented in the literature by Rowley and Turner (1978) among others. This clarification initiated by Vickery made possible the refinement of the Law by an interdisciplinary core of researchers. First, Kendall (1960) a professional statistician, collected data of journal references from statistical methodology and operational research, analysed them and found that if one plots cumulated sums of references against the logarithms of the cumulated sums of journals, the resulting curve will show a remarkable linearity. Secondly, Leimkuhler (1967) derived from Bradford's data a density distribution, $F(x)$, such that:

$$F(x) = [\log(1+Bx)]/[\log(1+B)]$$

$F(x)$ is the cumulative fraction of references, " x " is the corresponding fraction of the most productive journals and " B " is a constant characteristic to the documents collection. Although this formula presents significant scientific advantages, the difficulty in estimating its parameters made it unpopular in the literature. Third and finally, the established formula that expresses mathematically the Bradford's Law has been credited to Brooks (1968), and the formula's expression is as it follows:

$$R(n) = K \log (n/s)$$

$R(n)$ is the volume of retrieved relevant articles from n journal titles searched in a specific subject. " k " is the slope of the straight line. " n " is the rank of journals and " s " is the intercept of the straight line with the horizontal axis. That is the most popular formulation of the Bradford Law that one will often encounter in the literature.

Characteristics of the Curve

Data Presentation

Data that conform to Bradford's Law should be presented in an orderly manner as it appears in tables 5 and 6 respectively, that is, Bradford's data on the specific subject of lubrication in Bradford (1934) and Ye-Sho Chen (1986)'s data.

In tables 5 and 6, the first columns J and J' represent the number of journal titles contributing for a certain number of references. Columns A and A' represent the contribution of journals in terms of number of articles or references produced. Columns $J \times A$ and $J' \times A'$ are products representing the total number of references retrieved per level of contribution.

$R(n)$ and $R'(n)$ represent the cumulative contribution, that is the amount of references retrieved after searching n journal titles. Columns " n and n' " are those of the ranking of journals production and are different from columns J and J' or from a column

Table 5: Dispersion of articles among journals in lubrication

J	A	J & A	R(n)	n	log (n)
1	22	22	22	1	0.000
1	18	18	40	2	0.301
1	15	15	55	3	0.477
2	13	26	81	5	0.699
2	10	20	101	7	0.845
1	9	9	110	8	0.903
3	8	24	134	11	1.041
3	7	21	155	14	1.146
1	6	6	161	15	1.176
7	5	35	196	22	1.342
2	4	8	204	24	1.380
13	3	39	243	37	1.568
25	2	50	293	62	1.792
102	1	102	295	164	2.215

Source: Bradford (1934)

of row index. Columns $\log(n)$ and $\log(n')$ are the common logarithms (base = 10). In some systems the natural logarithms (base = e) are capitalised to differentiate them from the common logarithms.

Curve Sketching

Brookes (1977) assessed first a typology of Bradford's curves. He retained two forms of hybrids, type I and type II.

Hybrid Type I curve

Type I form of Bradford curve is the most widespread in the literature. The reason is that it is the form that was proposed by Bradford himself. One may find that sketching in Bradford (1934), Drott et al. (1979) and many others. When the regression line is derived with an appropriate statistical package, the curve should look like the one in Figure 1 which is the base of our following description of the Bradford's curve.

The First Portion

This portion stretches from "M" to "C". This part of the curve is characterised by a steep rise (exponential). The reason of this early exponential growth of the curve is commonly attributed to the rush of authors to publish their works in those journals with high and positive reputation (bandwagon effect). This portion represents the core or nucleus of

journals, that is the top journals with high density of references production.

But the fact that one deals with cumulative references production does not appear on the graph that the core corresponds to those journals of high productivity, that's another wild turn of Bradford's law. Finally, because journals of the core are physically limited to a certain maximal number of references they can publish, the curve will intercept the $R(n)$ axis at a point "M" that I call crush activity point and that others call "saturation" point.

The Second Portion

That portion is said to be a straight line. It stretches from "C" to "P", CP is a straight line whose equation is:

$$R(n) = k \log(n/s) \\ = k \log(n) - k \log(s);$$

n is the rank of a journal

k is the slope of the straight line

s is the intercept of the straight line with the $\log(n)$ axis.

let us assume $R(n) = Y$

$$k = a$$

$$\log(n) = X$$

$$k \log(s) = b$$

the equation of CP will take the general form:

Table 6: Dispersion of Articles Over Sources

J'	A'	J' & A'	R'(n')	N'	log (n')
1	242	242	242	1	0.000
1	114	114	356	2	0.301
1	102	102	458	3	0.477
1	95	95	553	4	0.602
1	58	58	611	5	0.699
1	49	49	660	6	0.778
1	34	34	694	7	0.845
2	22	44	738	9	0.954
2	21	42	780	11	1.041
2	20	40	820	13	1.114
1	18	18	838	14	1.146
4	16	64	902	18	1.255
2	15	30	932	20	1.301
1	14	14	946	21	1.322
2	12	24	970	23	1.362
5	11	55	1025	28	1.447
3	10	30	1055	31	1.491
4	9	36	1091	35	1.544
8	8	64	1155	43	1.634
7	8	56	1211	50	1.699
6	6	36	1247	56	1.745
5	10	50	1297	61	1.755
4	17	68	1365	65	1.812
29	3	87	1452	94	1.973
54	2	108	1560	148	2.394
203	1	203	1763	315	2.592

Source: Adapted from Ye-sho Chen (1986)'s Data

$$Y = aX + b$$

this straight line represents the prediction curve in figure 1.

The Third Portion

This portion departs from "P" and drops away from the linear curve. That demarcation portion from the linearity was called "Groos droop" in Groos (1967). In theory, it is suggested that a set of data fits the Bradford's Law if the curve that represents these data coincide with the straight line. This means that the hybrid type I's data whose curve has just been described does fit Bradford's Law for the straight line portion but not for the upper and the lower portions of the curve. This means that Bradford's

Law does predict neither the most productive journals nor the least.

In application of the data from tables 1 & 2 by plotting on the same scale $R(n)$ and $R'(n')$ respectively against $\log(n)$ and $\log(n')$ one gets the curves in Figure 2. By inspection of the sketch, one can see that on both curves, heavy line for Ye - sho

Chen and light line for Bradford's data, there is a steep rise up to a certain point and followed by a straight line. Both curves do not present the "droop" phenomenon. That absence has been noticed on curves sketching by researchers such as Aiyepoku (1976) But the straight line fit phenomenon proves that data are conforming to Bradford's law.

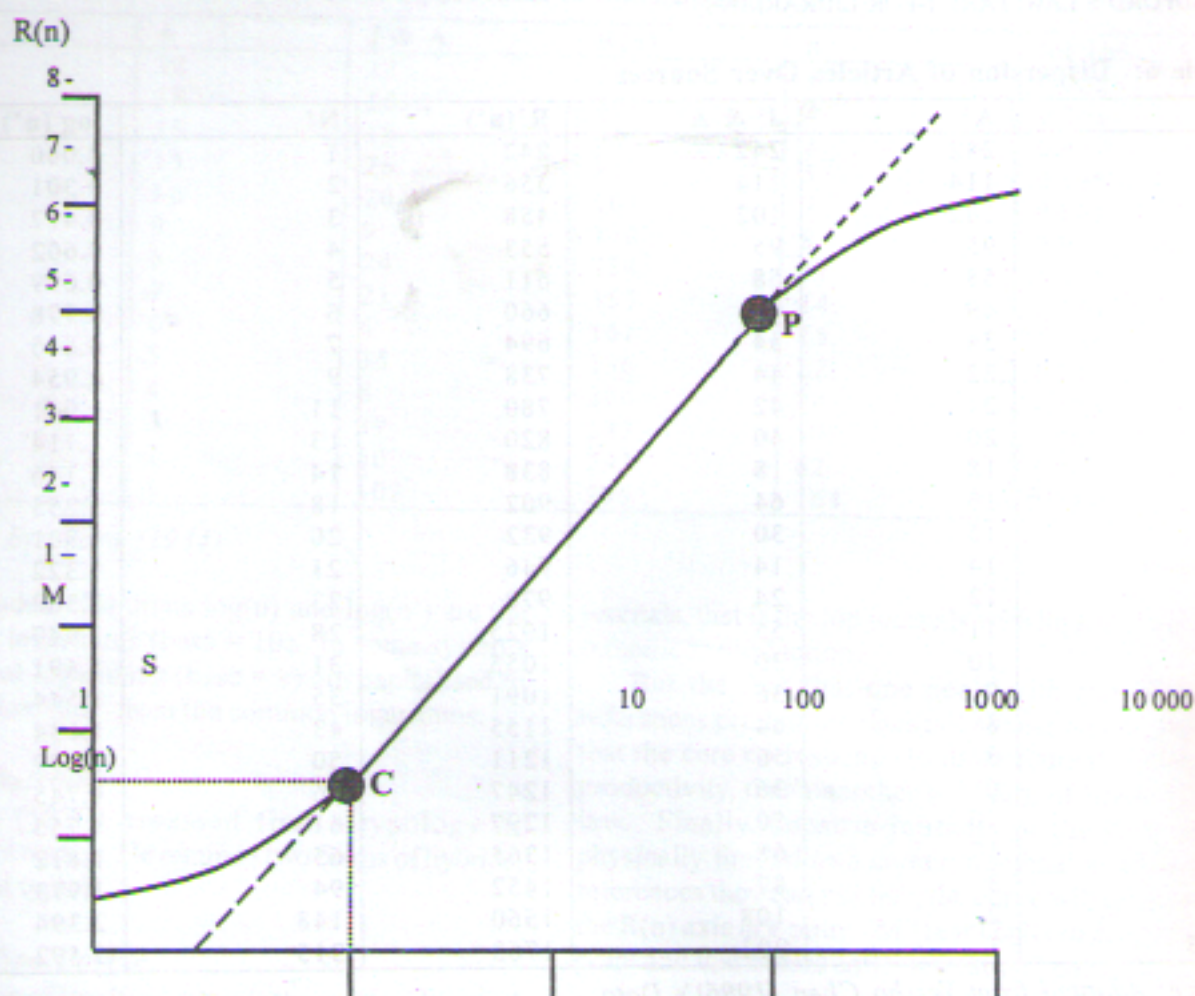


Figure 1: A Generic Hybrid Type I Curve

Hybrid Type II Curve

This type of curve sketching is documented in Vickery (1948), Brookes (1977), among others. The main contrast with Type I is that the first portion of Type I is concave whereas that of Type II is convex on the one hand by reference to $R(n)$ -axis. On the other hand, in the third portion of Type I the curve drops below the straight line while it rises above the straight line for Type II which is illustrated in Figure 3. And

finally, the intercept "S" of the straight line is with the vertical axis for Type II while it is with the horizontal axis for Type I.

This Type II curve above is adapted from Brookes (1977). It shows a steep rise of the cumulative sums of $G(r)$ from rank 1 at point D to rank x_1 under the straight line. From rank x_1 to rank x_2 the curve becomes a straight line. From rank x_2 and on the curve goes above the straight line.

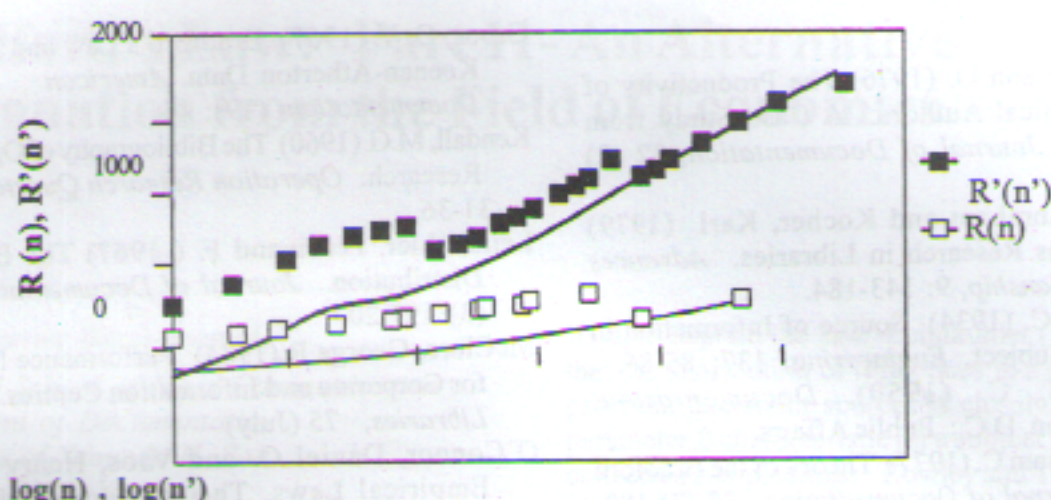


Figure 2: Sketching of $R(n)$ and $R'(n')$ on the Same Scale

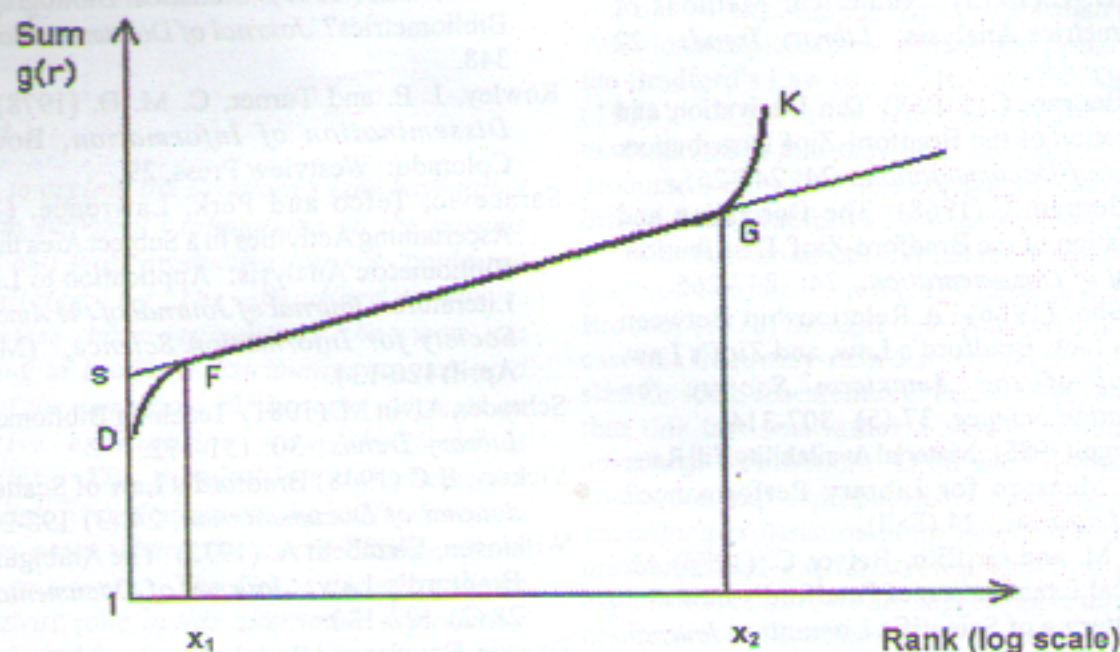


Figure 3: Illustration of Type II curve

Fitting the Theoretical Curve to the Observed Data

According to Drott and Griffith (1978) there is no adopted way to fit a set of data to Bradford's Law. It is commonly done by inspection. However, given the nature of the data, a regression by the least squares method might be the best alternative for an estimation of the slope and the intercept. With an appropriate statistical package, these derivations of parameters are easy to do. It is necessary to understand, however, that only the straight line portion of the curve is concerned with the regression line.

Conclusion

The most important notions to retain from this paper are the nucleus and the zoning of the journals universe. They are important in collection management and resources allocation in serial acquisition. In a given subject only a few journal titles from which a researcher can be sure to cover scientific development. Thus, in the context of budget cuts or limited budget that is prevalent in African libraries, the application of this law would assist libraries to allocate their limited funds only to those core journals in the nucleus.

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* Victor Janvier Bikai-Nyunai is Senior Lecturer, at the Advanced School of Mass Communication, Department of Documentation, University of Yaounde II, Soa Yaounde, Cameroon. He attended the University of Yaounde, Cameroon and the Universities of Michigan and Southern California, both in USA. He holds B.Sc. (Mathematics and Physics), Masters degrees in Economics and Library Science and Ph.D. in Information and Library Studies.

Bradford's Law: Part 11- An Alternative Explanation from the Field of Economics

Victor Janvier Bikai-Nyunai,

Advanced School of Mass Communication
Department of Documentatio,
University of Yaounde II, Soa
Po. Box. 1328, Yaounde
Cameroon
bikaibros@yahoo.com

Abstract

Attempts to explain the Bradford's Law have failed to provide sufficient explanations on the reasons the most and least productive journals could not be predicted by the Bradford's curve. Nevertheless those segments of the curve not conforming to Bradford distribution are accepted as part of the same Law. This paper suggests an alternative explanation from the field of Economics. The proposition questions the straight line fit and supports the existence of an inflection point where the curve changes from concave to convex. The Groos Droop and the crash activity zone in this alternative explanation are predictable from the economic theory perspective.

Introduction

This paper, (the second of the series on the Bradford's Law), intends to shed some light on what has been said to explain this bibliometrics law. A review of the literature shows clearly two distinct forms of explanations: the empirical and the mathematical. The empirical explanation concerns mostly the verbal formulation of the Law. This stream focuses on characteristics of a search of journals or a subject

field, to explain the law. Leimkuhler (1967) stated that the distribution of references in a collection of pertinent document sources is closely related to a parameter β characteristic on a subject field and the collection completeness. Rowley and Turner (1978) gave some reasons such as editorial standards, bandwagon effect, and physical limitations of a journal to explain the Bradford's distribution. Additional explanations of the verbal formulation of the Bradford's Law can be also found in Drott et al (1979). The most frustrating about these explanations is that they hold neither for the most productive journals in the crash activity and Groos droop of the Bradford's Law respectively.

The mathematical explanation concerns the graphical formulation refined by Bertram C. Brookes. Brookes (1978) thought that Bradford's law was a case of a frequency-rank distribution (or frequency-size for some researchers). Price (1976) suggested that this law was rather a case of a cumulative advantage distribution. Drott and Griffith (1978) contended that a probabilistic mechanism is the underlying explanation of the law. But even for the mathematical explanations. For this general explanation failure, we are suggesting in this paper a new look at the Bradford's Law from the Economics perspective.

The first section of this paper is concerned with the analogies of the Bradford's phenomenon in Economics. The second section is an elaboration of the point of view, that the Bradford's distribution is an instance of production function in economic theory. Finally, the third section draws some educational implications.

Analogies from Economics

An analysis of the Bradford's Law, especially its graphical representation based on Brookes (1968)'s

theory, exhibits characteristics which are quite similar to the production function curve in Economics. These characteristics are the crash activity zone, the Groos droop, and the straight line.

The Crash Activity Zone

In the first paper of this series, first the portion of the Bradford's curve was interpreted as the saturation zone, corresponding to the most productive journals. I labelled this characteristic the crash zone of the Bradford's Law because that interpretation is not apparent in Brookes (1978)'s curve which deals with cumulative number of articles. An Economics interpretation of that portion will simply be a progressive rise of an output (articles) due to an increased use of an input (journals). Such increasing rise of the output is usually characteristic of the output curve of a line of production for a new output. In Economics, this initial zone of a production curve is usually referred to as the zone of increasing marginal returns.

The Groos Droop

The literature that was documented on this specific characteristic of the Bradford's curve, has described the phenomenon but fell short of explaining it. It is possible that the Groos droop is a characteristic of the law of diminishing returns in economics. To be convinced of this, one should ask the question: how much can we expand the output (number of relevant articles on a given topic) as the number of journals increases (holding all other factors constant?). The answer is that we can not expand the output indefinitely. The marginal production (production of an additional journal), first increases, and then stagnates and finally decreases. The marginal production behaviour will influence the behaviour of the production curve which, in our point of view, is the so-called Bradford's curve. The formation of the Groos droop will start a bit before the point when the marginal production begins to converge to 0; that is when the quantity of relevant articles in journals becomes minimum.

The Straight Line

Brookes' formula $R(n) = k \log(n/s)$ represents a continuous straight line function. But the fact that its graph shows a convex look in one extreme and a concave in the other, militates in favour of the argument that somewhere along the curve, there is

a unique point where the curve changes its shape from convex to concave, or vice versa. This argument questions the hypothesis of a straight line, as well as the least square fit for the data.

The Disturbing Problem of Type II Curve

What we know to be true so far

Type I is an exponential relation between the dependent variable (number of references) represented on the vertical axis and the independent variable (journals) or log of their rank, represented on the horizontal axis. If these assumptions are respected, there can never be a Type II curve for Bradford's data.

Why Type II curve?

Let us begin with Vickery (1948) mostly cited for Type II curve. What he did was plotting as the dependent variable the number of journals (cumulative total of periodicals, it could have been their ranking) on the vertical axis against the independent variable, the number of references (the cumulative total of references) on the horizontal axis. This plotting is the reverse of Type I or the exponential function. One knows that the reverse of an exponential function is a logarithm function. One also knows that the sketching of a logarithmic function takes the form of Type II. So, Type II seems to be the reverse of Type I depending on the way data are plotted. This means that if Vickery had changed his vertical axis into the horizontal and vice versa, he could have had the normal Type I curve.

An Economic Theory Explanation of Bradford's Distribution

We are going to construct a hypothetical situation to demonstrate this explanation which is more or less standard explanation of the theory of production in microeconomics (Wonnacott, Paul and Roland, 1979):

Assumptions

1. Let us assume that Bradford's curve is a function, such as $Y = f(J, C)$.
2. Y is the cumulative number of references, or the total production of references.
3. f is an exponential function
4. J represents journals, the only factor of production (the only independent variable.)

5. C represents all other factors that may influence theoretically the production of references, but that we are considering constant (*ceteris paribus*)
6. Y_a is the average production of references (due to journals input)
7. Y_m is the marginal production of references (due to journals input).

Data Presentation

Table 1 presents the hypothetical data borrowed from Salvatore (1974).

Curve Sketching

Figure 1 depicts the hypothetical data shown in table 1, based on the assumptions laid out above.

Interpretation of the Graph

The total production (Y), the average production (Y_a), and the marginal production (Y_m) of references are sketched on the same scale and are interpreted with respect to each other. The behaviour of the Y_a and Y_m is determined by the shape of the total production curve (Y).

Table 1: Search Results of Sources Over a Certain Period of Your Choice

J	Y	Y_a	Y_m
0	0	0	-
1	3	3	4
2	8	4	5
3	12	4	4
4	15	3.75	3
5	17	3.4	2
6	17	2.8	0
7	16	2.28	-1
8	13	1.63	-3

Given a point P2 on the production curve, and an angle α , the value of the Y_a at P2 on the curve is equal to $\tan \alpha = [P2J_2]/[OJ_2]$ that is the slope of the straight line from the origin of the coordinates to P2. Another interpretation of Y_a is also the total production (references) per unit of input (a journal).

The value of the marginal production Y_m between two points P2 and P3 is equal to $\tan \alpha = [P_3B]/[P_2B]$, that is, the slope of the production curve Y between the two points. Another interpretation of Y_m is the additional production (references) which resulted from an increase of one unit of input (an additional journal) from J_2 to J_3 . The graph of figure 1 depicts the three stages of production.

Stage 1

This stage runs from the beginning of the activity P1 up to P3, that is until Y_a equals Y_m at point E. In this stage, the production curve is concave in theory, corresponding to a steep rise (P1P2) of the total production of articles (Y). At the same time, the marginal production rises quickly and reaches its maximum at M2, then starts falling. The average production of its counterpart also rises, but slower, in comparison to the marginal production (Y_m). At the point (E) when the average production (Y_a) is maximum, it equals to the marginal production (Y_m). In this stage, the marginal production curve Y_m is above the average production curve Y_a , this means that the productivity per unit of factor of production is high. In other words, the journals involved as factors in that process of production have a very high production of references. These highly productive journals are no less than the journals belonging to the nucleus. OP1 is a theoretical line, because it does not exist in reality. There is no reference if there is no journal searched and there is nothing as a half journal searched. That is why at the same time OA1 and M0M1 respectively the curves of Y_a and Y_m for the theoretical production curve OP1, are dotted to express their unreality.

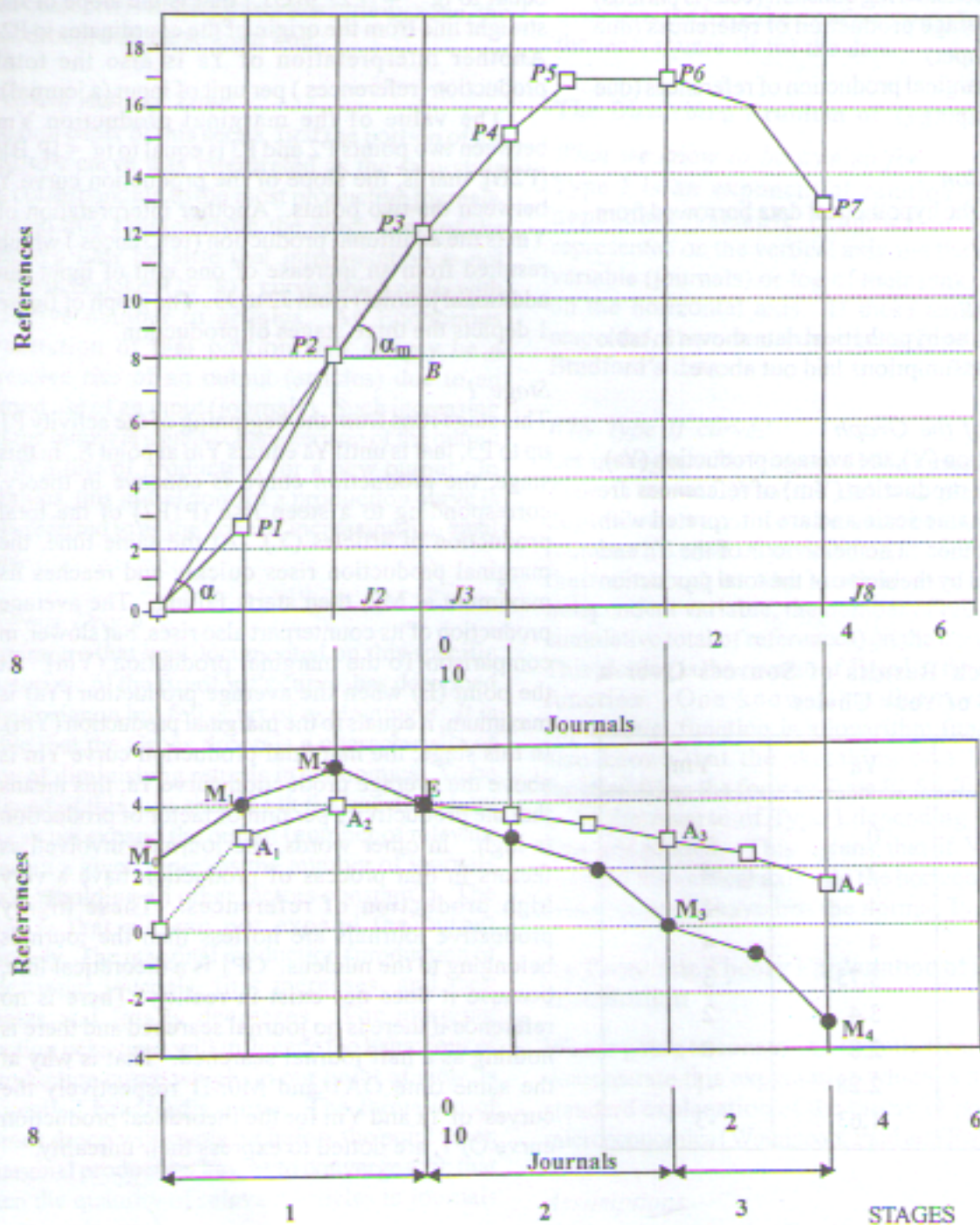


Figure 1: A Graph of the Data on Table 1

10 0 2 4 6 8

Journals

10 0 2 4 6 8

Journals

1 2 3 STAGES

Stage 2

This stage departs from P3 to P6. In this stage, Y_m runs from point E (when Y_a equals Y_m) to point M3 (when $Y_m = 0$). Within this stage, the concavity of the production curve changes into a convexity at P3. From P3 the production curve rises logarithmically until it reaches its maximum at P5. At the level of production P3, the Y_a starts declining. This means that the average number of relevant papers per journal searched declines. At the same time, the number of relevant papers for an additional journal (Y_m) searched decreases geometrically to equal 0 at M3 corresponding to a maximum production in references searched at P6. Note that in this stage, the average production curve (Y_a) is above the marginal production curve (Y_m). This second stage corresponds to the Groos droop in Bradford's curve.

Stage 3

This stage stretches from P6 to P7. It is the stage of an absolute decline in the production of relevant number of articles. The marginal contribution of journals in that stage is negative, while also the average production declines and converges to 0 but without reaching it, as long as the total production Y is positive, that is, as long as there is at least one relevant reference that one may find at the journal of rank $n+1$ searched. This stage illustrates the law of diminishing returns in Economics.

It is evident from the foregoing, presentation that the so-called Bradford's curve is very similar to the production curve in economics. If that similarity is accepted, then the principle of a straight line to fit the Bradford's curve is denounced.

A Point of View

In view of the production function explanation of the Bradford's Law in this paper, the question in this section is, did Bradford make a scientific

contribution? The answer is yes and no, depending on how one looks at it.

If one looks from the information community's perspective, the overwhelming feeling is that Bradford made a significant discovery. The body of literature that has been formed around that law is irrefutable evidence. However, the map of knowledge can be subdivided into four parts: (1) what we know that we know, (2) what we know that we don't know, (3) what we may not know that we don't know and (4) what we don't know that we don't know. 1, 2 and 3 form all together the world of objective knowledge or Popper's world-3. The mission of the scientific research endeavour is to expand 1, 2 and 3 by reducing the uncertainty of 4. This means that when a discovery is situated in Zone 4, it is a scientific discovery because it broadens the boundary of the world knowledge. If, on the contrary, a "discovery" is situated in Zone 2 or 3, it is a re-discovery and that is regarded as relative contribution. It would seem that Bradford's Law is an information science version of the production function already in existence in economics.

Interface between Economics and Information Science and Implications

The above discussion has shown that the perception of Bradford's Law as a scientific discovery may seem debatable. Perhaps the term re-discovery might be an appropriate description. However, the evidence is overwhelming that the field of bibliometrics in general is an interface between information science and economics. The impact of economics in information science is on the rise. The number of journals devoted to the subject increases daily. The number of information science researchers interested in economics of information is growing. Van House, Malcolm Gezt, Jana Varlejs, Spence, are some authorities in that growing area. Recurrent topics, such as the value, the evaluation, and the measurement of information, have become the foci of information science inquiry. In this perspective, bibliometrics can be seen as the bridge through which will be channelled economics materials needed for the construction of the information science paradigm.

Educational Implications

Wersig and Neveling (1975) pointed out some decades ago that:

Information Science did not develop out of

another field of study (like Psychology) or from the intersection of two fields (like Biochemistry), but out of the needs of an area of practical work called documentation or information retrieval.

This statement will be true as long as models of curriculum of certain era will continue to prevail in Information Science context. Paris (1988) identified the intellectual isolation as a circumstance for which library/information schools develop *du déjà vu*. The logical recommendation after that finding is to urge library, and library/information science schools to reach out and expand their intellectual vision. Kochen (1983), Greer (1987) advocated at length the urgent need for a broadening of the narrow library science curriculum. Williams (1988) went further to propose specifics of what ought to be included in the information science curriculum. In this context, Wersig and Neveling's (1975) statement needs to be refined. Information science is at the crossroad of many fields, and its curriculum needs to be designed. That is where bibliometrics can be considered in the construction of the information science paradigm. This would mean that traditional library science historical and comparative approaches in research should give priority progressively to experimental inquiries, in which logic, mathematics, statistics, and inference are necessary tools for the research methodology.

Conclusion

It has been established in this paper that a significant relationship exists between economics and bibliometrics and particularly between the production function curve and the Bradford's curve. The similarity between the two curves is the fundamental argument raised, to question the straight line fit in Bradford's curve. Consequently, the least square regression for the best geometrical fit of the Bradford's distribution seems to be reconsidered. Finally, as a production function, the Bradford's distribution can be subjected to the many applications already tested in Economics.

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* Victor Janvier Bikai-Nyunai is Senior Lecturer, at the Advanced School of Mass Communication, Department of Documentation, University of Yaounde II, Soa Yaounde, Cameroon. He attended the University of Yaounde, Cameroon and the Universities of Michigan and Southern California, both in USA. He holds B.Sc. (Mathematics and Physics), Masters degrees in Economics and Library Science and Ph.D. in Information and Library Studies.

Projecting a Positive Image of Public Libraries in Nigeria through Public Relations

Umunna N. Opara

Department of Library and Information Science
Federal Polytechnic, Nekede
PMB 1036, Owerri, Imo State, Nigeria
nenii20022003@yahoo.com

Abstract

This paper examined the state of the public library in its early stages of development in Nigeria, as well as its current state, and it came to the conclusion that the public library does not enjoy the goodwill of both the government and the people. The paper therefore advocates for public relations as a veritable management strategy by which the library can be steered away from its present state of near-neglect onto the course of growth and development. Certain public relations techniques like marketing, publicity, lobbying, friends of the library group, etc. are suggested. The paper recommended that public relations practice should be embraced by public libraries in Nigeria, and that library and information science schools in the country should start teaching public relations courses to their students.

Background

The public library has the traditional role of acquiring books and audio-visual materials and making them available to patrons regardless to citizenship, age, educational level, economic and social status, or any other qualification or condition. The public library is not only publicly owned but also usually accessible to any citizen in the area. Just as its clientele is heterogeneous, so the ideas and information available

in it span the entire spectrum of knowledge and opinions. This, no doubt, imposes heavy financial burden on it. In the developed countries, the public library is perceived as a powerful instrument for nation-building, and is thus adequately funded. On the other hand, the public library in developing countries, especially, Nigeria is so incapacitated that it cannot effectively discharge its traditional and statutory functions due to poor recognition, and inadequate financial support. Financial support for the public library is not considered as essential as for other social services. The public library is not seen as essential to the lives of the people. It is hardly regarded as playing complementary role to the education of the citizenry. This points to a weakness in the public relations profile of the public library in Nigeria.

However, in order to understand the evolution of this predicament, it is necessary to briefly examine and compare the state of the Nigerian public library in its early years and presently.

The Early Years of the Public Library in Nigeria

There are certain conditions that are necessary for any library to flourish in any society. According to Aguolu and Aguolu (2002)

The establishment of any library is predicated upon two fundamental assumptions: namely, that the authorities setting it up are prepared to see to its continued existence by adequate financial support and that the people whom the library serves appreciate its informational and educational values.

The public library in Nigeria from the late 1950s to the late 1970s enjoyed better recognition and support than presently not only from the government but also from the educated elites who supported its cause. Mchombu (1991) and Mambo (1998) have noted that

during this period in Africa, the public library received as much priority as other essential services like hospitals and schools. The government realised that it had the obligation to educate people and to feed them intellectually. The post-independence African leaders were convinced that Africa needed political as well as intellectual emancipation, and they understood the power of the library as an instrument for promoting intellectual emancipation.

While declaring open the National Central Library of Tanzania in 1967, the then President of Tanzania, Dr. Julius Nyerere, as quoted by Aguolu (1989), declared:

A public library should not just be a place where books can be borrowed. It must be a centre for much wider educational and cultural activity. A library should be one of the centres for adult education work of all kinds – varying from the promotion of the desire for literacy by story-telling and discussion to the erudite lectures of visiting professors.

Seen as a veritable instrument of mobilising people for a group or individual goal, Ikoku (1971) described the library as "... foyer of living ideas that permeates and animates all aspects of national life." Indeed, the period under review can be described as the glorious years of libraries generally and the public library in particular. It was also an era in Nigeria when intellectualism was supreme.

Present State of the Public Library

Since the 1980s there has been a steady decline in the public library development in Nigeria. Much of the period between the 1980s and presently was characterised by global economic crisis. As a result of the oil glut of the 1980s and the debt burden, there were less resources available for development generally and far less for the public library. According to Aguolu (1989), for library to flourish in any society, the economy must be sufficiently vibrant to motivate the government to commit funds to its development. The problem is not so much with the poor economy, but that of poor recognition of the importance of the library in the socio-economic development of the country. Commenting on the state of public libraries in Africa, Rosenberg (1993) stated that:

Public libraries set up in the first flush of independence are no longer seen as crucial to

development and are certainly given no place in present structural adjustment programme.

This poor attitude arose as a result of non-recognition of the fact that no economic reform is likely to succeed without adequate attention to the education sector.

Perhaps, the mute nature of library operation contributes more than any other thing else to the poor perception of the public library. Poor recognition and support stem from poor or wrong perception of the importance of the library. This background emphasises the need for an appropriate management strategy to address the problems of the inadequate visibility of the public library in Nigeria. Such a management strategy should aim at changing the present mind set of government and the public about the public library. It is the position of this paper that no management strategy can do this better than public relations.

Public Relations

The New Standard Encyclopaedia (1994) defines public relations as "the group of activities or measures undertaken to promote in the public mind a favourable feeling towards a corporation, institution, product or person." This definition correctly identifies perception and the attitude resulting there from as products of the mind and, therefore, any measure aimed at correcting perception and attitude should be directed at the mind. The British Institute of Public Relations as quoted by Cutlip and Cetner (1978) defines public relations as the "deliberate, planned and sustained efforts to establish and maintain mutual understanding between an organisation and its public." Thus, public relations is borne out of the need for mutual understanding between an organisation and its public for the benefit of both. Public relations is also seen as the function by which organisations, including libraries and media centres, establish and maintain open two-way communication between the organisation and its various public (Ries, 1987). The two-way communication, according to the author, involves data gathering, diagnosis, planning and evaluative techniques.

Public relations is aimed at changing unfavourable opinion and attitudes toward an organisation. Thus, Cutlip and Cetner (1978) define it as "the planned effort to influence opinion and action through socially responsible performance

based on mutually satisfactory two-way communication." Ford (1990) sees this definition as the most explicit and inclusive. Nolte (1974) defines public relations as "all the things done (or not done) that affect public opinion (whether favourably or unfavourably)." Implicit in this definition is the possibility of either bad or good public relations which will elicit favourable or unfavourable public opinion of the organisation.

Ford (1990) has anchored the practice of public relations on the premise that society is composed of many diverse organisations that are interconnected in a variety of ways. This results in individuals and organisations being highly interdependent. It also requires an elaborate communication/media network in order for all of these groups to be continuously informed about what each is doing. In fact, an organisation must be able to explain or communicate its actions or activities to the various public that it serves or else it will face scathing criticism and possible neglect. Since libraries (particularly public libraries) are always vulnerable, an effective public relations programme is no longer a luxury but a necessity.

From the foregoing, public relations in libraries may be defined as the planned effort of a library to influence the opinions and actions of its public through socially responsible performance based on mutually satisfactory two-way communication. Library public relations must be a coordinated and continuous effort to communicate a positive image of the library. A well-rounded public relations programme will promote the availability of the library's resources, services, and programmes (TLA Public Library Standards, 2000). Well planned and sustained public relations in libraries would increase the visibility of the library within the community, and also get the public to understand and appreciate the role of the library as a social institution (Kantumoya, 1993). The cardinal objective of public relations in the public library is to win the recognition and support of government, as well as the public for whom it is established. The library can achieve this by embarking on a programme of activities that will enable the library to gain relevance among its various public. Once the public perceive the public library as relevant to their socio-economic and political endeavours, the library is likely to gain public recognition and support.

The public relations practice being advocated here should involve the creation of a public relations unit in the library with someone who is trained in public relations. Furthermore, the practice of public relations in the public library should not be exclusive to the library management. If the desired goals must be attained, the functions must be diffused among the library staff. According to Kies (1987):

Recognition of this involvement is especially important in such public service, non-profit institutions as libraries. An organization's formal programme of planned public relations is indeed primarily a management function, but all of the organization's employees, not only the management level, need to be concerned and involved in the overall public relations of the organization.

This is because the image and success of an organisation do not depend on its management alone.

Ford (1990) reported the upsurge in public relations programmes in libraries in the United States of America. A 1978 Gallup study revealed that most adults in the USA were not using libraries and were unfamiliar with services they provided. This was, perhaps, due to the fact that the library message had not been effectively and systematically communicated to its public.

However, Wylie (1983) conducted a national survey of library public relations programmes in the United States of America and found that public libraries were three times more likely to have public relations programmes than academic libraries. Smykla (1999) in another survey in the United States found that over 79% of his respondents indicated that since the public relations and marketing department was created in their libraries, library funds have increased sometimes substantially. As a result of its positive impact on the fortunes of libraries in the US, public relations is now well integrated into library management functions, and the practice is adequately recognised, appreciated and rewarded. For instance, the H.W. Wilson Company and the Library Administration and Management Association (LAMA), a division of the American Library Association, jointly sponsored the John Cotton Dana Library Public Relations Award. It is the most prestigious of all library awards in the public relations field which recognises and honours outstanding achievements in library public relations. There is

therefore no doubt that library public relations has helped libraries in the US in winning more support from governments and the people of that country.

However, the scenario in Nigeria is different, this writer has observed that most Nigerian public libraries do not have public relations units and, therefore, no public relations programmes. One exception is the Kaduna State Library Board. Its public relations department is headed by a librarian with qualification in public relations. Enugu and Imo State Library Boards until recently had functional public relations departments headed by professional public relations personnel. Faced with financial woes, Nigerian public libraries should join representatives from other types of institutions across the nation in telling their stories through public relations as a means for increasing public awareness of and support for their services.

Recommended Public Relations Techniques for Public Libraries

Among the public relations techniques which the public libraries in Nigeria may use to turn around their fortunes are: marketing, publicity, lobbying, formation of library groups, library talks, public lectures, sponsorship of public events, courtesy to library users and readership promotion.

Marketing Techniques

For the public library message to be as effectively communicated as possible there is a need to utilise certain marketing techniques. Marketing here is defined as a continuing process of identifying unmet needs and the development of products and services to meet these needs (Dragon, 1983). This type of marketing relates to organisational, non-profit and social marketing. It is usually not conducted for profit, but is carried out for the public good. Non-profit marketing is the design, implementation, and control of programmes, seeking to increase the acceptability of a social idea, cause or practice to a target group(s) (Kotler, 1982). Library marketing should seek to discover through marketing research what the clients need; to develop a product or service that will meet that need appropriately to service the client, and to establish and retain a lasting relationship with the client.

The library must organise its services into saleable products. The benefits of the different products and

services to the different user groups must be well articulated to be appreciated by the target users. The public libraries must realise that information services as well as traditional library services are no more unique to libraries. Therefore, it is necessary to emphasise that the library is where the users can obtain current and unbiased answers to their needs. For library marketing to be a success, the library must discard its current product-oriented approach to serving its clientele. To this end, Ford (1990) advised that librarians must shift their focus from the traditional bureaucratic *modus operandi* to client-centred and responsive approach to doing business from a marketing vantage point. This way, the public library can encourage the use of its services and gain public support.

Publicity

The general public including frequent or highly educated users, need to be educated about many of the library's resources and services. Research has shown that there is profound ignorance of most common library resources and services. The public knows that the public library stocks books but may not know that there are special information resources, such as talking books for the visually impaired. The public may also not know that the library provides Internet services as well as repackaged information for the non-literates. Some may be aware that children's programmes are provided but not realise that educational and audio-visual materials are also available for this age group. There is, therefore, the need for the library to continually create awareness of its resources and services. This can be achieved through press interviews (especially in the electronic media), press releases, facility visit and establishing favourable relations with the mass media

Lobbying

Lobbying is an attempt to influence both the executive and legislative arms of government to adequately fund the library. It requires constant pressure and persuasion. Lobbying can be done through interviews, writing memos, the library's annual report, using influential members of the community to bring pressures on the respective arms of government, etc. Advocacy visits or courtesy calls on the governor of a state or the presiding officer of the house of assembly can be arranged by the library

management. The uniqueness of the library and its needs must be well articulated and presented. Management must realise that political public relations is the most significant part of the whole public relations package because the government is the sole financier of the public library in Nigeria.

Friends of the Library Group

There are individuals within the community who are favourably disposed toward the library, could be identified as friends of the library group. The group could be a great asset if it is composed of vocal and influential members of the community who have access to government. Members of the group must be willing to speak up in favour of the library at every given opportunity. Management must always provide current information on major developments in the library.

Library Talks to Community Groups

This might be better described as community relations. The library's planned public relations programme must include reaching out to various groups in the library's community like professional groups, school pupils, the different arms of government, intervention agencies, etc. This is often done in places outside the library. The talk should focus on the library and the services it provides. During such talks, management could draw the attention of the audience to special part of the library collection or a specific service (like printing or information consultancy), which may be of particular interest to the audience. The thrust of the talks is to package the library in such a way that it could win the sympathy and support of the different groups.

Exhibitions

These are presentations of the library's resources and services in a private or public environment where members of the public are invited to visit the venue. Exhibitions could be very beneficial to the library if it is properly organised. Exhibitions can be used to draw attention to library materials, services and programmes. Exhibitions can be organised on special events/days. This way, the library will be identifying itself with local festivals or important social activities.

Public Lectures/Discussions

The public library must identify itself with contemporary political, economic and social issues affecting its community by organising lectures or symposia on topical issues like HIV/AIDS, African Union Day, etc. By so doing, the library will project itself as a player in community and national development.

Sponsorship of Events

Sponsorship is the provision of resources to build a relationship of mutual benefits designed to satisfy the objectives of all parties (Otuekere-Ubani, 1996). Public relations is about creating goodwill and promoting understanding. Sometimes creating entertainment by associating with matters of interest to the public is the best way to draw attention to the public library. Public libraries could organise/sponsor quiz competitions and inter-school debates among school children. Individual members of the community and organisations could be invited to sponsor the events (Opara, 2003). Sponsorship of events of public interest has proved effective in projecting the sponsoring bodies positively in the public mind.

Courtesy to Library Users

The first impression a first-time user of the library could influence future library use. Therefore, the frontline staff must be courteous, and, show willingness to assist the user. The public librarian should project positive image to all library users. No library user should leave unsatisfied, even when the material or information being sought is unavailable in the library. The public library management must realise that the larger the number of patrons using the library, the higher is its prestige or ranking.

Readership Promotion

In Nigeria, readership promotion has been left to the National Library alone. The public libraries must not only complement the efforts of the National Library in this regard but should also use it to project themselves. This could increase patronage and support.

Conclusion

If the public library in Nigeria must be seen to be

relevant to the people for whom it is established, there is the need to project a positive image of the library and the librarian. At a time when the library must compete with other essential services for the limited financial resources of state, the public library needs to effectively publicise all the positive things it does for its community. If this is not done, it is unlikely to earn the support it merits.

Recommendations

The following recommendations are proposed, based on the preceding discussion:

- Public libraries in Nigeria must embrace the practice of public relations. All members of staff are to be involved in public relations.
- A public relations unit should be created, and should be manned by a specialist who would provide professional direction.
- It will be helpful if the professional staff in particular to regularly attend workshops and seminars on public relations practice.
- Library and information science schools in Nigeria should introduce public relations course in their curricula.

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* Umunna Opara is Principal Lecturer in the Department of Library and Information Science, Federal Polytechnic, Nekede, Owerri. He attended the University of Ibadan, Nigeria where he obtained B.Ed (Hons), M.L.S. and Ph.D.

Improving the Quality of Library and Information Science Journals in West Africa: Proceedings to the Stakeholders Conference, edited by L.O. Aina, A.A. Alenmu and Iyabo Akintola, Ibadan: Third World Information Science, 2006, 153p. (ISBN 978-32836-2-5-5). *Improving the Quality of Library and Information Science Journals in West Africa* is a timely and essential addition to the growing literature on library and information science (LIS) in Africa. It focuses on a unique area of research and publishing, LIS journal publishing. The book covers a good development considering the poor quality of most LIS journals in Africa. The publication reports the contributions of thirteen authors from various parts of Africa. Their papers cover various scenarios of activities, problems and suggestions for improvement in the quality of LIS journals in Africa. Other issues covered in the proceedings include the publication of LIS journals in Africa and comparative of their management, the need for scholarly journals to be peer-reviewed by credible persons in the discipline, the appointment of editorial boards to be chosen nationally, or internationally, and the criteria for determining the quality of journals.

Each paper in the publication begins with an abstract which gives a concise view of the paper as an approach which makes the kernel of each paper easy to digest by the reader. The papers are written in simple and easily comprehensible language which is devoid of overloading. They are carefully selected to avoid all sources of ambiguity and difficulty in LIS journal publishing and management in Africa. Problems relating to LIS journal publishing include shortage of quality manuscripts, inadequate funds for journals, inadequate funding and inadequate support for quality manuscripts.

poor quality, high mortality rate, poor promotion or neglecting and neglecting or lack of periodicity in publishing. Examples of issues and problems confronting LIS journal publishing in West Africa, East Africa and South Africa are given to provide a broad view of the general nature of problems confronting LIS journal publishing and their viability in Africa. A wide array of suggestions aimed at improving these issues abound in the proceedings. These include: targeting international markets, making use of the internet website for buying and selling journals, advertisement, conference and display, promotion, marketing and marketing services, provision of a marketing environment by government, training and marketing of editorial board members in editorial and marketing skills, computer literacy and better funding.

This publication will surely be a very big need to all who are an authoritative guide for scholars and stakeholders in LIS journal publishing with regard to identification of the problems of LIS journal publishing in Africa and possible solutions to them. This is a big step towards solving them with editorial, technical and marketing skills to produce high quality LIS journals which will enjoy greater visibility nationally and internationally.

This publication is a major contribution to the information environment. It is a very rare book which has a depth of an exceptional level of the which is able to interpret the quality and focus, greater visibility of LIS journals in Africa. It will therefore be a major contribution to the library, information science and other stakeholders in the management and publishing of LIS journals in Africa. Furthermore, the academic and scholarly value of this publication is not in doubt as will enrich the teaching of information science in library schools in Africa in the area of book and journal publishing.

Book Review

Improving the Quality of Library and Information Science Journals in West Africa: Proceedings of the Stakeholders Conference. Edited by L.O. Aina, A.A. Alemna and Iyabo Mabawonku. Ibadan: Third World Information Services, 2005, 155p. (ISBN 978 - 32836 - 2 - 6).

"Improving the Quality of Library and Information Science journals in West Africa" is a timely and quintessential addition to the growing literature on library and information science (LIS) in Africa. Specifically, it focuses on a unique area of the librarianship profession, LIS journal publishing, and this is indeed a good development considering the poor quality of most LIS journals in Africa. The publication reports the contributions of thirteen authors from various parts of Africa. Their papers cover various core areas of activities, problems and suggestions for improvement in the quality of LIS journals in Africa. Other issues covered in the proceedings include: the proliferation of LIS journals in Africa and complexity of their management, the need for scholarly articles to be peer refereed by credible peers in the discipline, need for members of editorial boards to be credible nationally and internationally, and the criteria for determining the quality of journals.

Each paper in the publication begins with an abstract which gives a concise view of the paper – an approach which makes the kernel of each paper easy to digest by the reader. The papers are written in simple and easily comprehensible language which makes for easy reading. They are carefully selected to cover all areas of ambiguity and difficulty in LIS scholarly journal publishing and management in Africa. Problems confronting LIS journal publishing as outlined include: shortage of quality manuscripts, limited markets for journals, inadequate funding and lack of training outlets for editors, inappropriate

pricing, high mortality rate, poor promotion or marketing and lateness or lack of periodicity in publishing. Examples of issues and problems confronting LIS journal publishing in West Africa, East Africa and South Africa are given to provide a broad view of the generic nature of problems confronting LIS journal publishing and their visibility in Africa. A wide array of suggestions aimed at redressing these issues abound in the proceedings. These include: targeting overseas markets, maintaining an international editorial board, buying advertisement space in overseas journals, conference exhibitions and displays, patronising abstracting and indexing services, provision of an enabling environment by government, training and retraining of editorial board members in editorial and marketing skills, computer literacy and better funding.

This publication will satisfy the yearning needs of editors for an authoritative guide for editors and all stakeholders in LIS journal publishing with regard to identification of the problems of journal publishing in Africa and possible solutions to them. This is with a view to equipping them with editorial, technical and marketing skills to produce high quality LIS journals, which will enjoy greater visibility nationally and internationally.

This publication is a major contribution to the information environment, which before now experienced a dearth of an essential text of this nature on ways to improve the quality and hence, greater visibility of LIS journals in Africa. It will therefore serve as an invaluable handbook to editors, publishers, library associations and other stakeholders in the management and publishing of LIS journals in Africa. Furthermore, the academic and scholarly value of this publication is not in doubt as will enrich the training of information professionals in library schools in Africa in the area of book and journal publishing.

This publication is also highly recommended to students of librarianship, researchers in book development, libraries of tertiary institutions and other information professionals all over Africa. The editors of the proceedings need to be congratulated for an excellent publication, which is a must read for all editors and stakeholders in LIS journal publishing in West Africa and indeed Africa as a whole.

The publication is a well bound and presented in a glossy and attractive cover, which will promote patronage.

Dr. (Mrs.) Rose B. Okiy

Delta State University

P.M.B. 1, Abraka, Nigeria.

E-mail: rosebini@yahoo.com.

Improving the Quality of Library and Information Science Journals in West Africa: Proceedings of the Stakeholders Conference, Edited by I. O. Aina, A. A. Alom and Iyabo Mahawonke. Ibadan: Third World Information Services, 2002. 152p. ISBN 978-32836-3-3-62.

"Improving the Quality of Library and Information Science Journals in West Africa" is a timely and substantial addition to the growing literature on library and information science in Africa. Specifically, it focuses on a wide area of the library and information science profession, and this is indeed a good development considering the poor quality of most LIS journals in Africa. The publication reports the contributions of fifteen authors from various parts of Africa. Their papers cover various areas of activities, problems and suggestions for improvement in the quality of LIS journals in Africa. Other issues covered in the proceedings include the profile of LIS journals in Africa and complexity of their management; the need for scholarly articles to be peer-reviewed; creditable points in the discipline; need for members of editorial boards to be credible nationally and internationally; and the criteria for determining the quality of journals.

First page in the publication begins with an abstract which gives a concise view of the paper – an approach which makes the format of each paper easy to digest by the reader. The papers are written in simple and clearly understandable language which makes for easy reading. They are carefully selected to cover all areas of ambiguity and difficulty in LIS scholarly journal publishing and management in Africa. Problems concerning LIS journal publishing are outlined in the form of quality management and limited market. A number of points regarding the lack of training system for editors, inappropriate

publishing high mortality rate, poor promotion or marketing and lateness or lack of periodicity in publishing. Examples of issues and problems concerning LIS journal publishing in West Africa, East Africa and South Africa are given to provide a broad view of the generic nature of problems concerning LIS journal publishing and their viability in Africa. A wide array of suggestions aimed at reducing these issues abound in the proceedings. These include: targeting overseas markets; maintaining an international editorial board; paying advertisement space in overseas journals; conference exhibitions and displays; patronising abstracting and indexing services; provision of an e-mailing environment by government, training and retaining of editorial board members in editorial and marketing skills; computer literacy and better funding.

This publication will satisfy the pressing needs of editors for an authoritative guide for editors and all stakeholders in LIS journal publishing with regard to identification of the problems of journal publishing in Africa and possible solutions to them. This is with a view to equipping them with editorial, technical and marketing skills to produce high quality LIS journals, which will enjoy greater visibility nationally and internationally.

This publication is a major contribution to the information environment, which before now experienced a dearth of an essential text of this nature on ways to improve the quality and hence, greater visibility of LIS journals in Africa. It will therefore serve as a valuable handbook to editors, publishers, library associations and other stakeholders in the management and publishing of LIS journals in Africa. Furthermore, the academic and scholarly value of this publication is not in doubt as will enrich the training of information professionals in library schools in Africa in the area of book and journal publishing.

Professional News and Events

Editor-in-Chief Conferred with the Fellow of the Nigeria Library Association (FNLA) Award

Prof. L.O. Aina, the Editor-in-Chief of the African Journal of Library, Archives and Information Science (AJLAIS), was among seven distinguished Nigerian librarians, who were honoured with the Fellow of the Nigeria Library Association (FNLA) award. This is in recognition of his contribution to the development of the profession in Nigeria in particular and Africa in general.

Other recipients were Dr. Linus Ikpahindi, the Chief Executive Officer of the National Library of Nigeria, Dr. James Daniel, the immediate past President of the Nigeria Library Association, Mr. Emmanuel Oyegade, the Director of Oyo State Library Board, Ibadan, Mrs. Ucha Mbofung of the Ajayi Crowther University Library, Oyo, Mrs. Chinwe Agbakoba of USIS, Abuja and Mr. G.N. Okolie, a retired librarian.

Professor Alemna, Elected to Fellowship of the Ghana Academy of Arts and Sciences

Professor A. A. Alemna, the University Librarian, University of Ghana, Legon, was recently elected to the Fellowship of the Ghana Academy of Arts and Sciences. He is the first librarian to be so honoured. The Ghana Academy of Arts and Sciences was founded in 1959 on the initiative of Ghana's first president, Osagyefo Dr. Kwame Nkrumah. Its aim is generally to promote the pursuit, advancement and dissemination of knowledge in all branches of the sciences and the humanities. The mission of the Ghana Academy of Arts and Sciences is to encourage the creation, acquisition, dissemination and utilisation of knowledge for national development through the promotion of learning.

Professor Aina steps down as Editor-in-Chief

The founding Editor-in-Chief of the African Journal of Library, Archives and Information Science

(AJLAIS) will step down in January 2008. The Associate Editor-in-Chief, Professor Tihamiyu has been named the Editor-in-Chief Designate, with effect from January 1, 2007. The year 2007 will be a transition period. Prof Aina started editing the journal in April 1991 and by this issue, 16 volumes and 32 issues have been produced under his editorship. The highlight of his tenure was that all the issues were produced on schedule, a rare feat, by an African journal. Professor L.O. Aina is Professor of Library and Information Studies at the University of Botswana. Other management appointments will be announced during the coming year. The re-organisation of the management of the journal is to put it in good stead to face the modern challenges of journal publishing.

A New LIS Journal is Launched

East African Journal of Information Sciences (EAJIS) has recently been launched in Kenya. It is a peer-reviewed, bi-annual journal designed to promote information sciences by fostering exchange among scholars of all information science disciplines on theory, application policy among other spheres of interest. For further information contact: Dr. W. Thairu, The Chair – EAJIS, Department of Information Technology, School of Information Sciences, Moi University, Eldoret, Kenya. thairus@africaonline.co.ke

WALISJE loses its President

The pioneer President of the West African Association of Library and Information Science Journal Editors (WALISJE), Dr. S.O. Olanlokun died suddenly on the 31st of March 2006. He was elected in June 2003. Until his death, he was the University Librarian of the University of Lagos Library, Nigeria. He was the immediate past Editor-in-Chief of the Nigerian Libraries. May his soul rest in peace.

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AIMS AND SCOPE

African Journal of Library, Archives and Information Science is established mainly to provide a forum for librarians, archivists, documentalists, information scientists and other information related professionals in Africa to report their research findings but with emphasis on African setting. The Journal is refereed by distinguished scholars. Emphasis is on empirical research; however, manuscripts of high quality on theoretical aspects of the three information related disciplines will be considered for publication.

MISSION

To provide on a regular and sustainable basis an excellent scholarly journal for reporting empirical research findings in the information profession in Africa

VISION

To be the main resource base for library, archives and information science research in Africa

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Contributors are to submit the manuscript by e-mail file attachment using MS word only. The title, author's name, position and place of work should appear on the first page. Subsequent pages, not more than 15, should include an informative abstract of not more than 100 words. A manuscript will be considered only if it has not been published elsewhere.

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Mazikana, P.C. (1987) Archives and Oral History: Overwhelming Lack of Resources. *Information Development*, 3 (1) 13-10.

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Aboyade, B.O. (1989) *The Provision of Information for Rural Development*. Ibadan: Fountain Publications, 104 p.

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Neill, J.R. and Kotei, S.I.A. (1981) Towards a National Information System for Botswana. In: Inganji, Francis (ed.) *Use of information and Documentation for Planning and Decision Making*. Gaborone: NIR, pp. 36 - 53.

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