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Analysis of Doctoral Thesis Citation Patterns: A Case Study of the Sam Jonah Library, Ghana.

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ANALYSIS OF DOCTORAL THESIS CITATION PATTERNS: A CASE STUDY OF THE SAM JONAH LIBRARY, GHANA.

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Abstract
The use of bibliometrics as an essential tool for collection development is well acknowledged by many researchers because it employs quantitative methods when seeking to measure and assess the output of scientific publications. A quantitative evaluation of publications and citations can be beneficial for effective collection development. The purpose of this study was to conduct an in-depth analysis of the citation patterns in the PhD dissertations submitted to the Graduate School of the University of Cape Coast between 2005 and 2016. A total of 35 PhD theses were submitted within this time period and were obtained from the Africana section of the Sam Jonah Library. The reference section from each thesis was photocopied and manually examined. Overall, 6,458 citations were analysed. Journal articles were the most cited publications, followed by books, reports and web resources. The findings also showed that a majority (73.3%) of the journals cited by PhD students could be accessed through Sam Jonah Library's subscribed online databases. The study concludes that although the use of these databases is high among PhD students, there is a need for greater awareness and training in the use of these databases.

Keywords: Bibliometrics, dissertation, database, collection development, University of Cape Coast, Sam Jonah Library

INTRODUCTION

Scholarly communication is a common term for describing the way in which research is disseminated. The PhD thesis represents a form of scholarly communication that requires a clear structure, well-established procedures, a formal writing style, precision in language and the citation of previous works consulted. Over the past two decades, assessing the research outputs or performance of post-graduate students has gained the attention of policymakers and educators worldwide because it provides a mechanism through which graduate students learn to undertake scientific enquiry based upon the work of previous researchers in their discipline to extend the current state of knowledge and bring improvements to society. According to Puuska (2014), 'academic research performance is increasingly evaluated at various levels in international comparisons, in global university rankings, as criteria for the allocation of funding between and within academic institutions, in the appointment of funding between and within academic institutions, in the appointment of scholars to academic positions and in research grant decisions'. In Ghana, theses and dissertations have been acknowledged by all tertiary institutions as essential means of measuring the research output of post graduate students and a prerequisite for awarding postgraduate degrees. They also represent an opportunity for librarians to determine whether their services or information sources are being adequately utilized. The core mandate of any academic library is to support the institution's mission through its collection (ACRL, 2007) because the support for teaching and research involves the provision of materials for classroom

teaching and for faculty and student research activities. Academic libraries must therefore have a strategy for collection building because having a comprehensive collection is unrealistic.

One of the challenges that confronts collection development is the issue of cost against patronage. Various studies (Kwadzo, 2015; Msagati, 2014; Kwafoa, Imoro, & Afful-Arthur, 2014; Ali, 2005) have sought to encourage the use of library collections through awareness creation. However, one would agree that awareness creation alone does not always result in the actual use or patronage of services. Over the last decade, the Sam Jonah Library has sought to determine user requirements by examining library records such as circulation, inter library loan and requests. However, these mechanisms have not always yielded the expected results, as they do not reflect the actualization of clients' information need. To ensure that the present and future information needs of users are met, there is a need for librarians to determine which resources are actually being used by their clientele. This is crucial to the survival of libraries, especially in an era when electronic information has eroded the monopoly of academic libraries as the sole access point to information. Libraries must therefore develop mechanisms that adequately and effectively determine which resources are being used by its clientele to avoid losing their patrons to competing information outlets. This study therefore seeks to analyse the references of PhD dissertations and thereby determine the extent to which students' actually use the library's subscribed online academic databases during their research works.

RESEARCH QUESTIONS

The following research questions will be formulated to guide the study:

1. What are the types of bibliographic forms used by PhD students?
2. What is the geographical distribution of resources (books) cited by PhD students?
3. What are the authorship patterns of journals cited by PhD students?
4. Which of the journals cited by PhD students can be found in the CARLIGH resources?
5. What is the productivity of journals cited by PhD students?

LITERATURE REVIEW

From the time of the Great Library of Alexandria where books were chained to desks to today, libraries have always been in the business of keeping records of human culture in diverse

formats and languages to meet the broad and varying needs of its clientele. A library's heart is its collections. A library's collection is therefore critical to its survival and must be geared towards meeting the needs and aspiration of its clientele. In response to the needs of the community, libraries have always been in the collection business. In fact, collecting is widely recognized as one of the oldest and most important functions of libraries (Bopp and Smith, 2011).

However, the enormous volume of literature in various physical and electronic formats that is available to students and faculty in today's global competitive environment presents serious collection development challenges for librarians and information professionals worldwide. This has become even more critical, as libraries and information centres worldwide are experiencing decreasing budget cuts. Further, due to the advancements in information and communication technology (ICT), the library's monopoly as the sole custodians of information is fast eroding. This has necessitated that information professionals look to other mechanisms for developing a collection that meets the needs and usage pattern of its patrons. Bibliometrics has widely been accepted and used by many researchers as a mechanism for developing a library collection that meets the users' needs and aspirations.

A study by Astrom, Hansson and Olsson (2011) on the potential impact of bibliometric on the changing role of university libraries revealed that incorporating bibliometrics into academic librarianship is an essential part of the process of redefining and widening the professional role of the librarian. They also posited that this is motivated by a zeal to provide more complete services in the scholarly communication process. According to Narin (1976), as cited by Yeoh and Kaur (2008), information professionals have used citation analyses determine the suitability or usefulness of their collections for decades. Georgas and Cullars (2005) asserted that the annually increasing cost of subscriptions for periodicals, coupled with the escalation of publishing outlets, has caused libraries to appraise their strategies for collection building so they can effectively manage their procurement allocations. Therefore, identifying those periodicals or serials deemed essential to particular disciplines is critical to ensuring the development of a collection that is relevant to those same disciplines. Bibliometric tools such as citation analysis provide librarians with reliable assessment data and information that can guide their collection development and management decisions (Leiding, 2005 cited by Yeoh and Kaur, 2008).

Belter and Kaske (2016) used bibliometrics to demonstrate the value of library journal collections and posited that although bibliometric research is an everyday occurrence in the library and information sciences, it is rarely conducted in non-academic organizations or establishments. By analysing over 400,000 citations from researchers and scientists affiliated with the National Oceanic and Atmospheric Administration between 2009 and 2013, they revealed that bibliometric studies could be conducted in a variety of organizations and that intermittent citation analyses should be conducted by libraries attached to those organizations to ensure their collections reflect changes in users' citation patterns and referencing behaviour. Yeoh and Kaur (2008) used bibliometrics to determine the productivity of the journal titled *Research in Higher Education* and discovered a diversified usage pattern of bibliographic reference sources among the contributing researchers. With a cumulative total of 8,374 citations, they found a positive trend in the research collaboration of contributing authors. They also found a steady growth in the use of reference sources, periodicals and web documents in the citations, which is synonymous with the current publishing trends in the digital era. They concluded that such information would be essential for developing library collections in the electronic age.

Hovde (2000) examined the references of 109 freshman English research papers and noted that bibliometrics analysis provides both information professionals and faculty members with the opportunity to assess library services and usage and to determine the effectiveness of library skill instructions. Walcott (1994), seeking to find the most frequently cited journals by faculty at the Marine and Sciences Research Center at the State University of New York, adopted the bibliometric approach. He asserts that this approach was the most effective mechanism for improving the information centre's collection. LaBonte (2005), seeking to ascertain whether Sciences-Engineering Library at the University of California at Santa Barbara met the information needs of faculty members at the new California NanoSystems Institute, adopted the citation analysis approach. The last three publications of each faculty member were analysed. She found that the library had access to 98% of the journals cited by faculty members. She also noted that this information was useful for mapping the citation patterns of new interdisciplinary fields and that it was essential for future collection management decisions.

Waller (2005) conducted reference analyses of the various sub-divisions in economics and concluded that citation studies provide an overview of the literature usage trends within a

particular discipline or field of study. He asserted that bibliometrics or citation analyses have the potential to help librarians understand the patterns and trends of publications within various sub-divisions of a particular discipline. This, he asserted, has implications for collection development policies, in view of the changing composition and research interests of faculty. Ibeun (2001) categorized the journals used by Nigerian fisheries scientists into four areas. He posited that the cost of acquisition of the first twenty-five titles on the list is N2.4 million (US$ 25000). However, evidence from budgetary allocation showed that none of the fisheries' libraries had ever received even N.5 million (US$ 5000) for capital expenditure. He therefore concluded that the adaptation of bibliometrics for judicious selection combined with a well-articulated cooperative acquisition is a solution to the problem of inhibiting journal acquisition in Nigerian fisheries' libraries.

METHODOLOGY

The quantitative approach for research design was adopted for this study because of its ability to subject the research findings to comparisons with the results of similar studies. Additionally, this approach allow researchers to summarize vast sources of data and is reliable and valid because it employs prescribed procedures. Furthermore, this method allows researchers to control the data collection environment, so extraneous variables are not introduced into a study (Muijs, 2010). According to Johnson (2015), many people have criticized quantitative research because of its inability to provide significant detail about a phenomenon. Despite these problems, the design has the potential to provide information about the citation patterns of PhD students at the University of Cape Coast.

The population for the study comprised all of the PhD theses submitted to the Graduate School of the University of Cape Coast. It included only theses submitted from 2005 to 2016. These theses were obtained from the Africana Section of the Sam Jonah Library of the University of Cape Coast. As of November 6, 2016, the Africana Section had a total of thirty-five (35) PhD theses in its collection. Below is the breakdown of the PhD thesis collection.

Table 1: PHD theses published per year

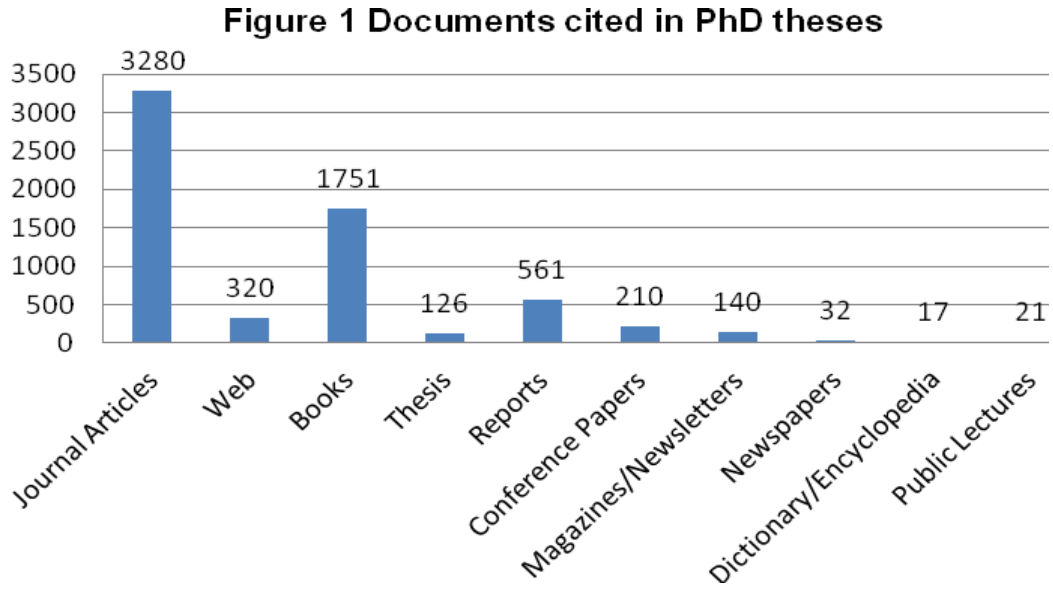
Year	No. of Theses
2016	2
2015	4
2014	6
2013	2
2012	2
2011	2
2010	4
2009	1
2008	3
2007	2
2006	3
2005	4
Total	**35**

Source: (Kofi & Biney, 2008; Sam Jonah Library, n.d.)

The reference section of each thesis was photocopied and manually inspected, and citations were retrieved from them. The data obtained were then input into Microsoft Excel for analysis. The theses were labelled using the first letters of the author's first name and surname, together with the years of submission or completion of thesis (e.g., AM2005). The researcher also solicited the help of two Research Assistants to examine and extract citations from the references and bibliographical sections of those theses that were sampled for the study. Three weeks were required for data collection. The extracted data were grouped according to the research questions. Tables and text are used to demonstrate some of the data collected.

FINDINGS AND DISCUSSIONS

Research Question One: What types of bibliographic forms (literature) are used by PhD students?



Source: Field work, 2017

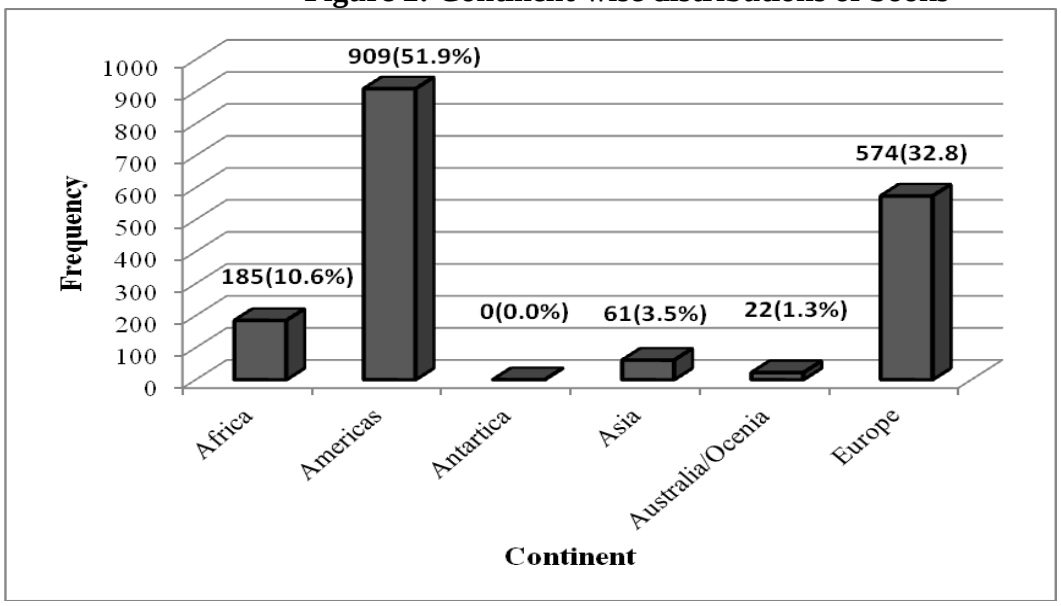
Analysing the citations of PhD students revealed that students resort to various sources for their theses (Fig. 1). However, journals articles were the most cited publications by PhD students (50.8%) (n=3280); books constituted 27.1% (n=1751) of the citations, reports constituted 8.7% (n=561), and public lectures and dictionary/encyclopaedias received the fewest citations, with 0.3% (n=21) and 0.3% (n=7), respectively. These findings suggest that PhD students prefer journal publications to all other forms of publications. This can be attributed to the current nature of journal publications compared to publications such as books, dictionaries and encyclopaedias. Additionally, the information-seeking behaviour of PhD students can be attributed to the high incidence of journal citations. Most post-graduate students embark on topical searches when seeking information for their theses. Since journal articles are topic oriented, they are often the first point of call for most postgraduate students.

This finding is consistent with a study by Borthakur (2015), who revealed that books and journals were the most widely used informational resource for post-graduate students compared to web/internet resources and other forms of literature. This is also in accordance with the study by Gooden (2001), who revealed that in post-graduate theses, there are more citations to articles published in scientific journals than there are to other types of publications. Further, a

bibliometric study by Vallmitjana and Sabaté (2008) on the citations in PhD theses revealed that journal publications were the most frequently used documents, representing 79 percent of the total. Gohain and Saikia (2014) also examined the referencing pattern among PhD students in the chemical sciences and revealed that the most preferred informational source used by PhD students was journal publications or articles. However, this finding is inconsistent the study by Doraswamy and Pulla Reddy (2001), who revealed that books were the most preferred source of information and contributed the highest number of citations among PhD students.

Research Question Two: What is the geographical distribution of books cited by PhD students?

Figure 2: Continent-wise distributions of books



Source: Field work, 2017

To explore the continental distribution of the publications cited by PhD students, the researcher used the country of publication, as indicated by PhD students in their citations. The result is presented in figure 2. The data in figure 2 show that 51.9% (n=909) of the books cited in PhD theses were published in the Americas, mostly in the United States of America, 32.8% (n=574) were published in Europe, and 10.6% (n=185) were published in Africa. The findings clearly portray Africa as a rising continent in the area of publishing. This is similar to the findings of Confraria (2013), who opined that despite or contrary to the popular opinion that Africa has a low or fragile research and development pedigree, it contributes approximately 2.5% of the world's publication output annually.

The findings also indicate that Europe and the Americas are the leading publication continents. This is similar to the findings of Zafrunisha (2012), who found that most publications cited by PhD students are published in the developed world. This is also similar to the study by Pete and Gudadha (2015), who established that most PhD citations are published in Europe or North America.

Table 2: African Sub-regional distribution of books

Region	Frequency	Percentage (%)
North Africa	2	1.1
East Africa	28	15.1
Central Africa	1	0.5
West Africa	138	74.6
South Africa	16	8.6
Total	**185**	**100.0**

Source: Field work, 2017

Table 2 shows the sub-regional origin of books published in Africa. Overall, 185 books published in Africa were cited by PhD students. Seventy four point six percent (n=138) of the books cited by PhD students were published in West Africa, 15.1% (n=28) were published in East Africa, 1.1% (n=2) were published in North Africa, and 8.6% (n=16) were published in South Africa. The findings also show that most of the books published in Africa were published in Ghana and Nigeria. This is inconsistent with the study by Surulinathi (2012), who found South Africa to be the leading publishing country in Africa, followed by Algeria, Egypt and Morocco. It is also inconsistent with the findings of Confraria (2013), who indicated that South Africa and Egypt alone have contributed to more than 50% of Africa's book output since 1981.

Research Question Three: What is the authorship pattern of journals cited by PhD students?

Table 3 Authorship patterns of journal citations

Authorship	Frequency	Percentage (%)
Single Author	933	28.4
Two Authors	948	28.9
Three Authors	507	15.5
Four or More Authors	870	26.5
Institutional Author	22	0.7
Total	**3280**	**100**

Source: Field work, 2017

Authorship is another critical element of scholarly communication because it determines on first glance the value that readers put on particular publication or scholarly work. Authorship patterns contribute to strengthening an author's standing, which is a critical ingredient for his/her financial, social and professional advancement (Dubini, Galimberti and Micheli, 2010). Analyses of the journal citations of PhD students showed that journals were either single authored, multiple authored or institutionally authored (Table 3). The findings showed that of the 3,280 total journals cited by PhD students, 28.4% were single authored, 70.9% were multiple authored, and 0.7% had institutional authorship.

This finding is consistent with the studies of Farahat (2002), Cunningham and Dillon (1997), Vimala and Reddy (1996) and Arya and Sharma (2011), which clearly indicate the dominance of collaborative research over solo research. However, the studies by Siamaki et al. (2014), Bhedekar and Sonawane (2014) Ezema and Asogwa (2013) and Dubini et al. (2010) indicate PhD students' preferences for single-authored publications.

Discipline-wise distribution of authorship patterns

The findings of this study indicate that multiple authorship is prevalent in all of the academic disciplines sampled for this study (Table 3). However, some disciplines recorded higher levels of collaboration than others did. Biological sciences recorded the highest level of

collaboration, with 82.5% of the journals cited in that disciplines being multiple authored, followed by the social sciences, with 69.7% of journals cited being multiple authored. The discipline with the least collaboration was agricultural sciences, for which 61.3% of the journals were multiple authored. This difference can be attributed to the general characteristics of the field and the individual study or research habits of researchers in the agricultural sciences.

Table 4 Discipline wise distribution of authorship patterns

	Single Author		Multiple Authors		Institutional Authors		**Total**	
Discipline	N	%	N	%	N	%	N	%
Biological Sciences	105	16.5	527	82.6	6	0.9	638	100.0
Physical Sciences	377	30.6	855	69.3	1	0.1	1233	100.0
Agriculture	135	35.8	231	61.3	11	2.9	377	100.0
Arts	38	38.0	62	62.0	-	0.0	100	100.0
Social Sciences	278	29.9	650	69.7	4	0.4	932	100.0
Total	**933**	**28.4**	**2325**	**70.9**	**22**	**0.7**	**3280**	**100.0**

Source: Field work, 2017

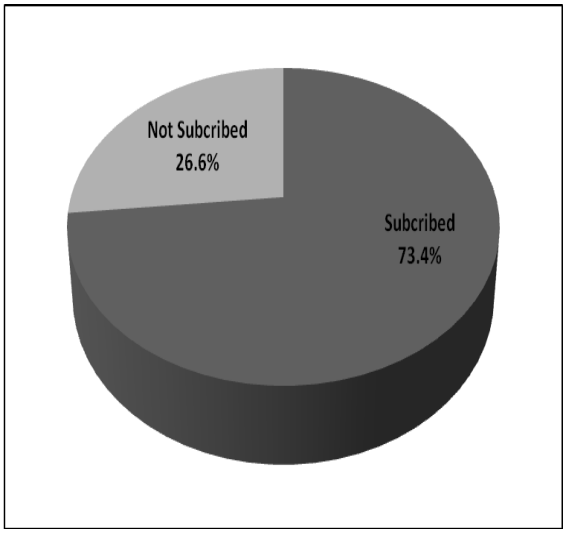
This finding was consistent with the study by Bales et al (2014), who indicated that papers or publications with multiple authorship are significantly more likely to appear in high-impact journals in the sciences than are papers authored by single authors. Further, Bandopadhyay (2003) analysed 11,221 citations cited in 92 doctoral theses from five different disciplines of science, namely, Mathematics, Physics, Mechanical Engineering, Political Science and Philosophy, and concluded that collaborative research is prevalent in the sciences.

The finding is also consistent with the study by Vimala and Reddy (1996), who analysed the trends in authorship patterns and collaborative research in Zoology. They revealed that although multiple authorship is dominant in zoology, single authorship or solo research also exists. Additionally, Arya and Sharma (2011) examined publication and authorship trends in the Veterinary Sciences, which is a major branch of biological sciences, and indicated that multiple authorship was the preferred option for most scientists compared to single or individual research. The finding is also similar to the study of Navaneethakrishnan et al. (2014), who indicated that most the publications in the Social Sciences and Humanities are multiple authored.

Research Question Four: Which journals cited by PhD students can be found in the CARLIGH resources?

Access to literature is fundamental to academic research. Thus, the University of Cape Coast, similar to many academic institutions in Ghana, subscribes to various academic databases. The databases are meant to provide students and faculty members with access to various journals. According to Bergstrom and Bergstrom (2004), this is heavily challenged by the rapid increases in the price and subscription costs of academic databases. Nonetheless, universities worldwide are continuously increasing their subscriptions to these journals. From the analysis (Fig 1), journals are the primary source of information for most PhD students. This research question sought to determine how many of the PhD journal citations can be accessed from the academic databases to which the Sam Jonah Library subscribes.

Figure 3: Journal-wise subscriptions



Source: Field work, 2017

Table 5: Databases used by PhD Students

Database	Frequency	%
Ebsco	181	19.0
AJOL	28	2.9
Wiley	140	14.7
Science Direct	150	15.7
Hinari	83	8.7
Cambridge	20	2.1
Springerlink	99	10.4
Jstor	127	13.3
Oxford Journal	20	2.1
Taylor & Francis	59	6.2
Sage	34	3.6
Emerald	10	1.0
DOAJ	2	0.2
Total	**953**	**100.0**

Source: Field work, 2017

Analysing the data collected for the study showed that the use of subscribed online databases was high among PhD students. The analysis indicated that the journal citations of PhD students during the study period (2005 to 2016) were distributed among a total of 1051 journals.

Of these, 73.4% (n=771) could be accessed through the online databases to which the Sam Jonah Library subscribes, but the remaining 26.6% (n=280) could not be accessed in this way. However, some of the journals could be accessed in more than one database. Table 5 indicates that 19.0% of the journals could be found in the Ebsco database, 13.3 percent could be found in the Jstor database, 14.7% could be found in the Wiley database, 10.4% could be found in the Springerlink database and 1.0 percent could be found in the Emerald database.

This is consistent with the study by Lump (2014), who indicated that journal subscriptions by universities have risen by 50% since 2010. He attributes this to technological changes in the publishing industry and to an increased reliance on journals by students and faculty. The finding is also similar to the study of Mayor (2004), who revealed that the high demand on journals by students and faculty has necessitated many research library consortia in the United States to renegotiate their subscription agreements with publishers, with a focus on more flexible licensing terms that would allow libraries to access a publisher's journals for several years, with penalties for early cancellation.

Further consistent with this finding is that of Bergstrom and Bergstrom (2004), who posited that with the advent of electronic publishing and distribution, coupled with the decrease in paper-based distribution systems, more universities are increasing their access or site licenses to journals associated with professional associations and university presses. This has been attributed largely to the physical, storage and access flexibility that these online journals or publishers provide their clients. The major constraint for journal subscription is cost. However, improved access to subscription cost has the potential to improve services and lower costs for many tertiary or research institutions.

Research Question Five: What is the productivity of the journals cited by PhD students?

Table 6: Productivity of cited journals

S.No.	Percentage Citation (%)	No. of Citation	No. of Journals Covered	Percentage of Journals (%)	Average Productivity of Journals
1	0-25	613	51	4.9	12.0
2	26-50	598	146	13.9	4.1
3	51-75	597	291	27.7	2.0
4	76-100	572	563	53.5	1.0
	Total	**2380**	**1051**	**100.0**	**2.3**

Source: Field work, 2017

Accessing or determining journal productivity has become the core challenge for most information professionals, especially in today's globally competitive information market, where the prices of journals escalate each minute. Journal productivity serves as the basic guideline or yard stick that enables information professionals to determine core publications used by their clientele. The data in table 6 indicate that 25% of all citations are contributed by the 51 journals in the first group, whereas 75% of the citations are contributed by the 563 journals in the third group. The average productivities of journals in the first, second, third and fourth groups are 12.0, 4.1, 2.0, and 1.0, respectively. This shows a decreasing order of productivity of the ranked list of journals. This finding is consistent with the study by Ravichandran et al. (2014), who affirm this same decreasing order of productivity.

Table 7 Bradford's Zones

Zones	Number of Citations	No. of Journals	Cumulative Number of Citations	Cumulative Number of Journals
1	791	82	791	82
2	793	294	1584	376
3	796	675	2380	1051

Bradford Multiplier, n = 3.6

The study also sought to determine the applicability of Bradford's law of scattering. As shown in table 7, there are 67 journals that represent 8.9% of the total cited journals, 209 journals that represent 27.8% of the total cited journals and 475 journals that represent 63.3% of the total cited journals. This reveals that the journal distribution, as per Bradford's law, is 82:294:675. The analysis indicates that the total number of journals cited by PhD students could not be predicted accurately from just the number obtained for the core, zone as predicted by Bradford. This finding is consistent with the study of Nash-Stewart, Kruesi and Del-Mar (2012), who posited that although the journal distribution for the first and second zones broadly matches Bradford's law, the uncertainties in the third zone create difficulties in prediction when using only a set of core journals. The finding is also similar to the study by Ravichandran et al (2014), who concluded that the dispersion of journal titles in Library and Information Science does not satisfy the classical formulation of Bradford's law of scattering. This finding, i.e., that the size of

the third zone differs from that predicted by the classical Bradford model, may be due to the highly interdisciplinary nature of the PhD theses sampled for this study.

CONCLUSION

This study shows the various kinds of literature or sources cited by PhD students in their theses, the authorship patterns, the places of publications of these sources and the productivity of the cited journals. The result showed that journals were the most preferred literature source used by PhD students. Therefore, there is a need for greater investments in both the physical and electronic journal collections of the library. The study also showed that although single still persists in some disciplines, collaborative research or multiple authorship is a well-recognized feature of modern research, in which researchers and scientists acknowledge the expertise of each other to understand the complex problems and challenges that confront various disciplines and society in general. The study also revealed that most of the books cited by PhD students were published in Europe and the Americas. This finding thus calls for the library management to get in touch with publishers from these continents to build a collection that reflects the preferences and tastes of its clientele. The results obtained in this study largely affirm the findings of previous studies. The core aim of the study was to determine which of the Sam Jonah Library's subscribed academic databases are being used by PhD students by analysing the students' thesis citations. Overall, it is concluded that although the use of these databases is high among PhD students, there is a need for a greater awareness of and training in the use of these databases. It is also paramount that librarians and information professionals pay attention to the interdisciplinary nature and differences among these databases to reflect the information needs of all PhD students.

RECOMMENDATIONS

Based on the findings, the following recommendations are made:

1. The Library must increase the awareness of the existence of Sam Jonah Library's subscribed databases through radio programmes and by placing adverts for the databases on online graduate platforms.

2. The Sam Jonah Library, in collaboration with the graduate school, must organize seminars or lectures for graduate students on the use of the Sam Jonah Library's subscribed databases. These seminars must also teach PhD students how to properly cite their sources or, better still, be geared towards introducing them to reference management software such as Mendeley, Zotero, and Endnotes.
3. The study showed that differences exist across disciplines or fields in terms of their use of electronic sources. The Sam Jonah Library must therefore ensure that it is subscribed to academic databases that cover all disciplines within the university, especially in the areas of law, history and music.
4. The study also showed that PhD students still cite publications as old as 18 years. The Sam Jonah Library must therefore subscribe not only to the current issues of journals but to the back issues as well.
5. Since journals are the most cited reference materials for PhD students, it is important that the Sam Jonah Library invest more in electronic resource collection development. Although moderate investments have been made over the years, more investment will be needed to enhance service delivery.

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