



JIMMA UNIVERSITY
COLLEGE OF NATURAL SCIENCES
DEPARTMENT OF INFORMATION SCIENCE

ANALYZING THE USE PATTERN OF EMERALD ELECTRONIC JOURNALS
PACKAGE: THE CASE OF ADDIS ABABA UNIVERSITY

A THESIS SUBMITTED TO THE DEPARTMENT OF INFORMATION SCIENCE,
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By

HAILEYESUS ABERA

Advisors

MILLION MESHESHA (Ph.D.)
KEDIR MOHAMMED (M.Sc.)

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Jimma University

APPROVAL SHEET

This research thesis entitled “*Analyzing the Use Pattern of Emerald Electronic Journals Package: The Case of Addis Ababa University*” has been read and approved as meeting the partial fulfillment for the requirements of Degree of Master of Science in Electronic and Digital Resource Management in the Department of Information Science, Jimma University, Ethiopia.

Departmental Graduate Committee

Elsabet Wodajo (M.Sc.)	-----	-----
Chairman	Signature	Date
Million Meshesha (Ph.D.)	-----	-----
Principal Advisor	Signature	Date
Kedir Mohammed (M.Sc.)	-----	-----
Co-Advisor	Signature	Date

DECLARATION

I declare that this thesis is my original work and has not been presented for a degree in any other university.

Haileyesus Abera	-----	-----
	Signature	Date

This thesis has been submitted for examination with our approval as university advisors.

Million Meshesha (Ph.D.)	-----	-----
Principal Advisor	Signature	Date
Kedir Mohammed (M.Sc.)	-----	-----
Co-Advisor	Signature	Date

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ACRONYMS

AAU	Addis Ababa University
ARL	Association for Research Libraries
COUNTER	Counting Online Usage of NeTworked Electronic Resources
CSV	Comma Separated Values
E-journals	Electronic Journals
E-Metrics	Electronic Metrics
HTML	Hyper Text Markup Language
ICOLC	International Coalition of Library Consortia
ICTs	Information Communication Technologies
IF	Impact Factor
INASP	International Network for the Availability of Scientific Publications
IP	Internet Protocol
ISSN	International Standard Serial Number
JCR	Journal Citation Report
JR1	Journal Report 1
PDF	Portable Document Format
PERI	Programme for the Enhancement of Research Information
SPSS	Statistical Package for the Social Sciences

OPERATIONAL DEFINITIONS

- Core journals:** The most frequently used journals in the collection, identified by means of Bradford's Law.
- E-journals package:** Refers to bundled e-journals which include a set of Emerald journal titles subscribed by AAU in 2012 and 2013.
- E-journals:** Is any journal that is available online, including both electronic-only journals and journals that are available both electronically and in print
- Impact Factor:** The ratio of the number of citations which a journal receives in the course of a given year to the number of articles published by that journal within the two preceding calendar years
- Pattern:** How often full-text articles are downloaded from a specific journal title by users during a given period of time. Those journal titles that are downloaded frequently are assumed to be used more.
- Use:** Refers to a single full-text article downloaded (both in PDF and HTML formats) from a specific journal title.
- Users:** Includes entire community of AAU such as students, academic and administrative staffs, and others.

ABSTRACT

In recent years, there has been a dramatic shift from print to electronic journals use among users in academic libraries. Libraries spend a significant part of their budgets to subscribe package of e-journals offered by publishers. However, package of e-journals which include all or set of a publisher's journal titles have been criticized for including journal titles that may not be at the top of the priority lists of libraries. Thus, their contents may adapted poorly to meet the true needs of academic libraries with respect to their local users' need in curricular and research activities. In developing countries like Ethiopia, university libraries role in assessing the value of e-journals package made available by publishers seem to be limited. It thus lacks sufficient evidence to see how effective and efficient are the e-journals collection in meeting the purpose for which they are intended. One way for libraries to demonstrate the implied value of their e-journals collection to users need is to conduct use studies. Hence, this study attempted to analyze the use pattern of Emerald e-journals package by Addis Ababa University users. A descriptive survey study design was employed, to analyze the COUNTER-based use data of e-journals supplied by the publisher. The full-text articles downloaded by users from each e-journal in the package between January 2012 and May 2013 were analyzed by means of bibliometric laws. Furthermore, impact factor of e-journals from JCR 2012 was compared with use of e-journals. The finding of the study revealed that there was a high degree of skew in use of e-journals in the collection; few core journals (8.33% of all journals) satisfied a significant portion (33.48%) of the total download requests. A large number of journal titles were rarely used while some were never used at all; an average of 32.26% of all journals satisfied 80% of the total download requests. The ranking of journals based on the number of full-text articles downloaded in 2012 and 2013 was quite consistent. There was a significant relationship between frequency of use of journals and their impact factor. To this end, it seems not the right approach for the university library to subscribe package of e-journals offered by publishers without having concern for what titles are included. The use and impact factor of e-journals can be used in collection development practices to the selection of e-journals for renewal decisions in subsequent year's negotiations.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

New information technologies have had many influences on the information world. In academic library's setting, e-resources such as Web-based catalogs, e-journals, e-books, and databases constitute the core collections and services library's offer (Miller, 2000). In particular, e-journals have formed an indispensable resource to academic and research community of university libraries. E-journals provide users for unprecedented ways to access scientific literatures by transcending the limitations posed in print journals use. Some includes ease of access from desktops around the clock, ease of downloading, citing and currency of content (Rusch-Feja and Siebeky, 1999). Consequently, there has been a dramatic shift from print to electronic journals use among users in academic libraries over the last decade (De Groote and Dorsch, 2001; Sathe et al., 2002; Brady et al., 2006). By 2008, it was estimated that 96.1% of journal titles in Science, Technology and Medicine, and 86.5% in the Arts, Humanities and Social Sciences were available online (John Cox Associates Ltd, 2008), to meet the growing needs of users. To this end, in developed countries like the United States, expenditures on e-journals collection comprise about 70% of average academic library's budget for serials subscription (Luther, 2002).

In the realm of e-journals collection development, academic libraries sign agreements with publishers for "big deals", where publishers provide a bundle or package of e-journals for a single subscription fee to the whole e-journals collection in the package (Frazier, 2001). However, many studies have been criticized the big deal agreements, because of monopoly, price hikes, and the inclusion of journals that may not be at the top of the priority lists of libraries (Ball, 2004; Johnson, 2004; Frazier, 2001). To this end, some universities in the United States therefore rejected the big deals and negotiated new agreements with publishers. For instance, Cornell University agreed to identify journal titles from a package and only include them as part of the license agreement with Elsevier (Duranceau, 2004). Other universities were also threatening to cancel their subscriptions due to continuous price hikes (Dyer, 2004). Therefore, in the current emphasis of e-journals package, libraries are required to investigate how accurate is their collection investments in relation to their users need and benefits.

In Ethiopia, a rapid proliferation of higher academic institutions has been observed over the last few years, which currently numbered to thirty one public universities (Ministry of Education, 2013). However, available library facilities have not kept in pace with the “massification” of study programs and increased enrollment of students each year (Mohamedbhai, 2008). To address the challenges of accessing scientific literatures, Ethiopian universities have been subscribed to different e-journals package of vendors under the INASP’s PERI program, since 2003. PERI (Program for the Enhancement of Research Information) has four major components, to build the capacity of academic libraries regarding e-journals management. These included e-journals procurement, internet training, journal online program, and journal management workshops (INASP, 2013). Through PERI, e-journals package was purchased under a country-wide license. Thus, all member Ethiopian universities of the program would have access to the same resources. According to the INASP-PERI Coordination Office in Ethiopia, the current budget for annual subscription fee reached \$678,815 (Pers. comm., Solomon, 2013). However, Ethiopian university libraries role in assessing the value of e-journals package subscribed as part of the big deal agreements seem to be limited. Furthermore, there have been no studies conducted yet to assess how well the e-journals collections are serving the needs of users. Therefore, this study attempted to analyze the use pattern of Emerald e-journals package by Addis Ababa University users, to provide clear directions for collection development plans.

1.2. Statement of the Problem

Academic libraries sign license agreements with publishers for “big deals”, to subscribe bundled or package of e-journals offered by publishers as part of their collection development plans (Frazier, 2001). Under the big deal agreements, libraries purchase/subscribe a bundle or package of e-journals offered by publishers for a single license fee, as opposed to subscription on title-by-title basis. This approach was embraced readily by libraries in the early days, considering how much accessed is expanded to users for relatively “fair” prices, as compared to the purchase of individual titles separately (Rowse, 2003). However, many studies have been criticized the big deal agreements as a “bad deals” for academic libraries, because of monopoly, price hikes, and the inclusion of journals that may not be at the top of the priority lists of libraries (Ball, 2004; Johnson, 2004; Frazier, 2001).

Frazier (2001) argued that packages of e-journals offered by publishers “bundle the strongest with the weakest publisher titles, the essential with the non-essential”. He warns that these packages “weaken our collection with journals we neither need nor want”. It appears that package of e-journals made available by publishers often include numerous titles which make little sense for the curriculum and research priorities of a particular university and are of marginal interest to users’ need at the university. Thus, their contents may adapted poorly to meet the true needs of academic libraries with respect to their local constituents (McGinnis, 2000). In addition, empirical studies on usage of e-journals package have also shown that a large number of journal titles provided in the big deal agreements are not necessarily the most frequently used ones by users (Davis, 2002a; Singh and Murthy, 2005; Tonta and Unal, 2008). Hence, paying license fees for unused or little used e-journals embedded within package of e-journals offered by publishers is a great deal of wastage, for libraries which already have limited budget (Davis, 2002b).

Therefore, libraries are favoring a more balanced approach to providing the content needed by their users, rather than signing for big deals packages (Duranceau, 2004). Davis (2002b) argued that librarians need to be discriminating selectors, focusing e-journal money on titles that are considered core to the collection. Others suggested that it may be more economical for a library to pay-per-view rather than sign a big deal agreement, especially if the use is not that great (Hunter, 2000; Haar, 2000; Ball, 2004). Respectively, the big deal publishers also seem to soften their stand on “all or nothing” approach and some of them allow libraries to pick the titles they want out of a big deal package (Tonta and Unal, 2008).

However, Ethiopian university libraries role in assessing the value of e-journals packages offered by publishers seem to be limited. It’s partly due to lack of available information on the use of their subscribed e-journals collection. In addition, there has been no study conducted yet to assess how well the e-journals collections are serving the needs of users. It thus lacks sufficient evidence to see how effective and efficient are the e-journal collections in meeting the purposes for which they are intended. Yet e-journals packages are too expensive to spend money on resources that are unused or underutilized, especially for academic libraries in developing countries like Ethiopia. Therefore, libraries are required to assess the value of their e-journals collection to their users, to better meet users need and make every cent count.

There are several methods for determining the usefulness of e-journals for a user community such as questionnaires, interviews, citation analysis, transactional log analysis, and vendor reports analysis, specifically COUNTER-compliant (Moghaddam and Moballeghi, 2008; Tenopir, 2009). Admittedly, there is no perfect method that gives a complete picture of what e-journals are necessary or important to patrons or patrons' usage behavior (Davis, 2002b; De Groote and Dorsch, 2003; Harter, 1996; Herring, 2002; Parker and Bauer, 2003; Tomney and Burton, 1998). However, when e-journal usage statistics are available, it can provide useful information about usage patterns of the journals. Usage is an implicit measure of the value of the library e-journal collections and services (Tenopir, 2009). Users use the library's e-journal collections because these collections are of value to them. Libraries assessments on usage patterns of e-journals can be used to guide development of collections and services to support their missions (Hults, 2008). The COUNTER-based use data of e-journals supplied by publishers plays an important role in demonstrating the implied value of e-journals collection (Tenopir, 2009; Tonta and Unal, 2008). It's the de-facto standard among many vendors to report e-journals usage statistics for their subscribers or libraries (Shim and McClure, 2002). Since the usage data provides necessary information for library managers to establish the usefulness of e-journals, it can be taken as an authentic support for renewing or cancelling e-journals subscription (Suseela, 2011).

The usage data for e-journals can assist collection development by revealing which journal titles are most often used and which are not or rarely or never used (Tonta and Unal, 2008). And journal titles used most often would then become prime candidates for subscription in the following years. Moreover, libraries assessments on its collection use can help to determine the intensity of use of entire journal collection (Davis, 200a; Urbano et al, 2004; Evans and Peters, 2005). It typically examines how the collection as a whole meets the needs or wants of the body of users in general. Not every title may be of equal value or experience equal amounts of use, but it is the total picture that matters (Hiller and Self, 2004). Focusing on value of entire journals is important for collection development decisions, such as adding or deleting a title (Nisonger, 2004).

Furthermore, libraries also need to know the reliability of journals use data (Davis, 2002a; Tonta and Unal, 2008), to estimate whether journals fulfilling high use in a given year tends to do so in the following years as well. Consequently, collection managers can be informed of which journals of the collection are to be used by users over time and again. Looking at the stability of journal

ranks over multiyear use data is one way to verify the reliability of the data (Davis, 2002a). In addition, libraries devised all sorts of methods to predict which journals will be most useful to their patrons, besides to evaluate the worth of a particular title. In this case, making correlations between in-house use of journals and their impact factors can be considered (Tsay, 1998; Wulff and Nixon, 2004). The journal impact factor is one measure of the importance or quality of a journal, computed and published by the Thomson Reuters each year (Archambault and Larivière, 2009). It's the ratio of the number of citations which a journal receives in the course of a given year to the number of articles published by that journal within the two preceding calendar years (Rousseau, 1988). For collection managers, establishing relationships between journals use and their IF is of a great interest to perform collection management more effectively.

This study therefore, attempted to analyze the use pattern of Emerald e-journals package by Addis Ababa University users, to provide clear directions for collection development plans. To this end, to do the collection development, it needs one to know and answer the following questions were required:

1. Users request their articles published in scientific journals covered a large portion of the journals in the collection or download their articles contained in a relatively small number of core journals?
2. Are the use patterns of journals generalizable from year to year, or are the data so variable that meaningful statements can be made only about the current year?
3. Is there a relationship between the usage of journals and their impact factors, to say that journals with high impact factors are being used more often than the rest?

1.3. Objectives

1.3.1. General Objective

- To analyze the use pattern of Emerald e-journals package by Addis Ababa University users from January 2012 to May 2013, to provide clear directions for collection development plans, and thereby improve the service to better meet users need.

1.3.2. Specific Objectives

- To identify the most frequently used or core e-journals to the collection.
- To determine the intensity of use of entire e-journal collection as a whole.
- To determine the stability of rank orders of e-journal based on use between 2012 and 2013.
- To determine the relationship between frequency of use and e-journal impact factors.

1.4. Significance of the Study

Use studies of e-journals collection empower library managements to develop better collection management plans and devise negotiation strategies that can be exercised with publishers (Suseela, 2011). In this regard, the current study provides a basis for application of usage data by the university library for assessing the value of e-journals collection to users need. This supports the library administrators in decision-marking to determine which journals in the collection should be kept or which ones are for the removal in which years during e-journals acquisition in the future. Thus, it allows the university library reasonably tailored its e-journal collections to meet users' information need in their curricular and research activities. Moreover, the results from this study can be used to devise a more robust and profitable license agreements with publishers, which realize efficient and effective utilization of the limited library's budgets. Furthermore, it serves as an input to create awareness regarding e-journals collection development and management issues for the initiation of further studies.

1.5. Scope and Limitation

The scope of this study was limited to analyze the use patterns of Emerald e-journals package by Addis Ababa University users, which reflects the use activity of entire university community. It's mainly based on analyzing the COUNTER-based use data of e-journals from January 2012 to May 2013. It was initially attempted to consider the use of other publisher's packages as well as the use of current package under investigation among other universities. However, as to the knowledge of researcher, none of the universities have started yet collecting usage data of their subscribed e-journals collection at the study period. Institutions with similar setting, in terms of their size of study programs and academic disciplines, have similar patterns of e-journals usage (Davis, 2002a). Thus, the use patterns of Emerald e-journals package from this study can be generalizable to other

universities which have similar setting like AAU. This study also limited to the analysis of use data of e-journals and does not involve information that may go into purchasing a journal package.

1.6. Organization of Thesis

This study is organized into five chapters. The first chapter provides a brief introduction about the context which gave rise to conduct the current study, i.e. the limitations with subscription of bundled or package of e-journals. It also describes the problem statement, objectives, significance, and scope and limitations of the study. The second chapter focuses on reviewing relevant literatures about methods of measuring e-journals usage, standards in e-journals usage statistics, assessment of usage of e-journals package, and statistical analysis of use patterns of e-journals. The third chapter describes the research methodology followed to achieve the very objectives of the study. It contains description of the study design, study population (e-journals collection), procedures for data collection and analysis, and consideration of research ethics. The fourth chapter presents the results of analyzing the usage data of e-journals using tables and graphs. In addition, the key findings are also discussed in comparison with results of related studies. Finally, the fifth chapter sums up the key findings and draws concluding remarks. It also contains recommendation made to the university libraries, future line of works, and vendors.

CHAPTER TWO

LITERATURE REVIEW

2.1. Overview of Electronic Journals

Scientific journals play a significant role in the scholarly communications. In early days, they are accessible only in-print copies. In 1990s, with the advance of ICTs, scholarly journals are also emerged in electronic forms, which by the turn of the century numbered over 8,000 (Okerson, 2000). By 2004, the number of e-journals was estimated at 30,000 titles (Cole, 2004). These figures showed that how extensively they are proliferating within few years of time. Many studies also indicated e-journals are getting growing acceptance and have formed indispensable resources for academic and research community (Rusch-Feja and Siebeky, 1999).

E-journals have been defined in different ways by different authors. An early definition by McMillan (1991) described e-journals as "any serials produced, published, and distributed via electronic networks such as Bitnet and the Internet". Ashcroft and Langdon (1999) stated that a journal, including indexing and abstracting services, provided by any electronic means, e.g. Internet, CD-ROM is called as e-journal. These journals are generally accessible electronically via web. Subsequently, Smith (2003) gave a clear definition of e-journals as "any journal that is available online, including both electronic-only journals and journals that are available both electronically and in print". Hence, E-journal is a term used to describe a periodical publication that is published in digital form to be displayed on a computer screen.

Initially, e-journals are published as electronic equivalents of their print counterparts, but recently there is an increase in number of scholarly journals which are being published only electronically. Most discussions of e-journals conflate a number of different formats into one overarching, and sometimes misleading, category of e-journals. Much of the enthusiasm for e-journals in the early 1990s was based on specific assumptions: They would be electronic only, they could be peer reviewed, and there would be no charges to their authors and readers (Kling and Covi, 1995). Today, the major scientific, technical, and medical (STM) publishers that offer electronic versions of their paper journals rely on a subscription model in which they allow electronic access to individual subscribers or to members of organizations that purchase more expensive institutional (library) subscriptions. Observations about the early "pure" e-journals do not necessarily apply to

paper-based journals with established reputations and readerships that also provide parallel electronic editions. The distinction between an e-journal without a paper version and a paper journal with an electronic version matters when trying to address such issues as the legitimacy of e-journals or their costs.

According to Kling and McKim (1997), there are at least four kinds of e-journals:

1. Pure electronic-journals are originally distributed only in digital form. Examples include the Electronic Journal of Communication, the Journal of Digital Information.
2. Electronic-print-journals are primarily distributed electronically, but may have very limited distribution in paper form. Examples include the Journal of Artificial Intelligence Research and the Electronic Transactions on Artificial Intelligence.
3. Print-electronic-journals are primarily distributed in paper form, but are also distributed electronically. Examples include Science, Physical Review, and thousands of other scientific journals.
4. Print plus electronic-journals are initiated with parallel paper and electronic editions that may be widely distributed. The American Chemical Society's Organic Letters is an example.

E-journals have many advantages and provide additional capabilities and features, as compared with their print counterparts. These include publication speed, cost of producing e-Journals, pricing of e-Journals, accessibility, and interactivity.

I. Publication Speed

Numerous publications echo the speed and efficiency benefits of publishing and distributing journals electronically (Hickey, 1995; Lancaster, 1995). The printing and mailing processes are eliminated while authoring and publishing systems can be integrated easily by computer-read-able text. Once manuscripts are accepted, they can be rapidly posted on an e-journal's Web site (after typesetting). Thus, e-journals could significantly decrease publication delays. However, the actual practices of posting on the Web vary from journal to journal. For example, the Astrophysical Journal posts the titles, authors, and texts of articles soon after they are accepted for publication. The American Chemical Society (ACS) also posts individual electronic manuscripts on its journal Web site soon after they are accepted for publication, a format that the ACS calls "As Soon As

Publishable (ASAP).” This can lead to electronic access being 11 weeks faster than the print publication (Wilkinson, 1998).

II. Cost of Producing E-Journals

Variations in the design and maintenance of e-journals can cause their production costs to differ. Harnad (1995) claims that electronic publishing may be 70 to 90 percent less costly than paper because pure electronic publishing incurs only the costs associated with peer review and copyediting. However, the cost of an e-journal may depend on the type of document coding used. Formatting manuscripts in ASCII or HTML is relatively inexpensive, while SGML tagging can be much more costly (Holoviak and Seitter, 1997). Many e-journals distribute their articles in multiple formats to ensure that potential readers have access to a format that their computers can support or that they prefer.

The inclusion of additional features such as multimedia presentations or lengthy data sets can readily increase an e-journal's cost. Whisler and Rosenblatt (1997) estimate that an electronic version of a journal may be about 20 percent less costly, but that those savings will be outstripped by the costs of new features. Bot et al. (1998) calculated the costs of the pure e-journal *Electronic Journal of Comparative Law* (EJCL) and compared these calculations to their cost estimates for printed law journals. They based their cost estimates on each journal's subscription price minus a hypothetical 30 percent profit margin. They concluded that the cost of the e-journal was considerably less than the cost of producing p-journals.

III. Pricing of E-Journals

The price of journals is closely related to their production costs. Okerson (1991) expected that the savings in printing and mailing costs of e-journals would “eventually relieve the ‘serials crisis.’” However, some commercial publishers seem to add a substantial profit element when setting subscription prices. Journals with annual institutional subscription costs that exceed \$5,000 (such as *Tetrahedron Letters* and *Brain Research*) have been highly visible targets. Walker (1998) advocated that establishing pure e-journals sponsored by scientific societies, which could be published very inexpensively and helps to solve the serials cost crisis.

In the case of printed journals, the subscriber pays for a copy of an issue, receives it, and can store it, lend it, and read the articles for an unlimited period of time. In the case of e-journals, subscribers are paying for access; after their subscriptions expire, their access to the original articles is lost unless they print copies of articles or download and archive them. Libraries may be precluded from printing and/or archiving articles from pure e-journals by their license agreements. Rather, they may simply facilitate access to these journals for their patrons by linking to their Web sites or offering Internet services.

Various licensing configurations and pricing schemes are available; publishers may allow access to e-journals only through a limited number of computers, or limit the number of library patrons simultaneously accessing the site. Each arrangement may be priced differently. In addition, publishers of p-e-journals may offer the electronic version only to those who subscribe to the printed version, offer a special price or combined price for both versions, or price each of them separately. Publishers may also apply different pricing policies to different groups of subscribers, such as individuals and libraries. In addition, scholarly societies usually sell journal subscriptions at lower prices to their members and to students.

IV. Accessibility

Readers' easy access to articles is perceived to be one of the major advantages of e-journals (Okerson, 1991; Tomney and Burton, 1998). The survey conducted by Rusch-Feja and Siebeky (1999), among researchers of Max Planck Society (MPS) showed that 77 per cent of the respondents considered e-journals advantageous due to the ease of access from desktops around the clock, ease of downloading, citing and currency of content. Besides the traditional plain text, tables, figures, and graphics, other innovative ways of presenting research results can be supported by electronic page layout. Interactive three-dimensional models, motion video and sound are a few possibilities.

V. Interactivity

Another potential advantage of e-journals over p-journals is their ability to include active hyperlinks to bibliographic citations. Moreover, one can easily download citations into citation management programs, such as EndNote or ProCite. However, this function is not yet routine since the Web environment is somewhat unstable and the location of files can be changed over time. In addition, pure e-journals, as well as the electronic editions of printed journals, may disappear. For example, out of 35 publicly accessible pure e-journals Harter (1996) studied, five did not appear in the locations provided in his article in the summer of 2001.

On the other hand, e-journals provide an interactive environment for authors and readers to communicate. In e-journals, comments can be submitted and posted more rapidly after the article is published and attached directly to the online version of the article, and/or can appear in discussion lists made available by the publisher. P-journals vary in the extent to which they include “letters to the editor.” Traditional p-journals may print comments about an article in the next issue. E-journals vary in their practices for publishing readers’ comments on their articles. For example, D-Lib Magazine (a pure e-journal) does not publish comments. First Monday (a pure e-journal) publishes comments as “letters to the editor” in the next issue.

2.2. The Serials Crisis

What has come to be known as the “serials crisis” in academic libraries has been written about extensively in the library literature. Academic libraries have been struggling for decades now to pay rapidly rising journal costs. In the process, they have been forced to cancel large numbers of serials as well as monographs. Over the last ten years, prices for journals have risen about 7-10% annually (VanOrsdel and Born, 2003). The bulk of the increases are for scientific, technical, and medical (STM) journals. The cost of subscribing to an average STM journal rose 471% between 1970 and 1995 (Buckholtz et al., 2003). Publishers have taken advantage of the fact that librarians have little choice but to continue subscribing to many journals as faculty need to publish and access the literature of their disciplines (Open Society Institute, 2003).

Many have noted how the disproportionate costs of STM journals are hurting disciplines such as the humanities, which depend on monographs for their research, as STM serials consume increasing portions of library budgets (Deyrup, 2003). Various theories as to the cause of the crisis have been advanced. Derk Haank of Elsevier, a Dutch STM publisher, attributes skyrocketing prices to increasing publication of research due to greater post-World War II funding for science while library budgets remained static in comparison (Poynder, 2002). Alison Buckholtz of the Scholarly Publication and Academic Resources Coalition (SPARC), an alliance working to reform scholarly communication and make it more accessible, cites research that “argues that publisher mergers and consolidations are directly correlated to journal price rises” (Buckholtz, 2001). Publishers raise prices in response to decreased circulation which in turn causes more libraries to cancel subscriptions in response to the higher prices and, frequently for state institutions these days, also due to budget cuts (King and Tenopir, 1999; Van Orsdel and Born, 2003).

2.3. Pros and Cons of Bundling of E-journals

Publishers began offering packages of electronic journals in the late ‘90s. The packages were eagerly embraced by academic libraries that were happy to give their users access to a broad array of e-journals. Kenneth Frazier was the first to refer to the practice of consortial purchases of bundled electronic journals as the “Big Deal” in his influential 2001 article in which he cautioned librarians against signing up for it (Frazier, 2001). A number of other authors subsequently adopted his phrase to describe the practice in their criticisms of it. Bundled electronic journal packages are not without their advantages. They eliminate some of the work involved with dealing with individual titles for both publisher and library. Libraries are able to offer access to a wider range of journal titles for not that much more money, considering how much access is expanded (Rowse, 2003). Users, who presumably want access to as many titles as possible, are often pleased by the large numbers of journals available to them.

On the other hand, many publishers require libraries and consortia to accept all of the titles in the package, often their entire list, or not be able to buy it at all (Rowse, 2003). Additionally, many packages include non-cancellation clauses to ensure that libraries continued to subscribe to their “lowuse/high cost niche journals” (Davis, 2003). These issues are central among complaints lodged against the bundled journal packages. Libraries’ decreased ability to decide which titles are added to or removed from their collections would seem to be contrary to their mission of managing

collections with the university's research and curricular needs in mind in order to provide an optimal collection to users (McGinnis, 2000). In response to those complaints, Thomas Peters questioned whether the model of collection development in which collections are built title by title carefully considering the needs of users is no longer feasible or desirable and that perhaps another model would be more appropriate in the current environment, although he offers little detail as to what that might be (Peters, 2001).

Other disadvantages of the "Big Deal" model relate to how the cost limits the purchasing power of libraries. Expensive electronic journal packages leave little money to purchase monographs, especially important to scholars in the humanities. Also, libraries are less able to subscribe to titles "from smaller or society publishers (who, for the most part, are not participating in consortial sales)" (Rowse, 2003).

For the number of titles to which libraries gain access, publisher packages can seem like quite a bargain on a per title basis. Margaret Landesman cautions librarians to keep in mind that "sometimes it is just a temptation to spend more money than you really planned to on something that you would not have otherwise bought" (Landesman, 2002). It is understandable that publishers would want to ensure that they keep making money in the new world of electronic journals where one site license gives access to an entire campus and individual subscriptions are decreasing every year. However, as Philip Davis notes, their response has been to "exploit... the academic library by pricing journals on what the market can bear" (Davis, 2003).

2.4. Patterns of E-journals Usage in Academic Libraries

Library users have embraced electronic journals enthusiastically (Rusch-Feja and Siebeky, 1999). Rogers's (2001) surveys at Ohio State University indicated dramatic increases in the numbers of faculty and students who used electronic journals over three years, 1998 through 2000. Several factors appeared to be at work: a growing awareness of the potential for reaching journals online, direct links from citation databases to full text, and growth in the "critical mass" of electronic collections. Re-shelving studies at the Library of the Health Sciences–Peoria, University of Illinois at Chicago, by De Groote and Dorsch (2001) indicated that, as electronic collections grew, use of journals in paper formats decreased, both for journals held only in paper and journals held also in electronic form. Another study of the authors employing survey data has confirmed their users'

preferences for electronic access to journals (De Groote and Dorsch, 2003). Sathe et al. (2002) at Vanderbilt University provided a substantial review of work on user preferences for electronic formats and a persuasive agenda for future studies on patterns of use that will help librarians draw conclusions to guide development of collections and services to support their missions.

Other studies have investigated usage patterns on e-journals focused on individual users (Eason et al., 2000; Davis and Solla, 2003; Nicholas et al., 2005). Davis and Solla (2003) analyzed the use patterns of American Chemical Society electronic journal downloads at Cornell University by individual IP addresses. They found that the majority of users (IPs) limited themselves to a small number of both journals and article downloads. The majority of articles users downloaded were in PDF format. Articles downloaded in HTML format accounted only for less than 10% of the total use. Similarly, in their study of e-journals usage of Blackwell's Synergy database, Nicholas et al. (2005) found that two thirds of the articles were downloaded in PDF and one third in HTML. Post-hoc interview and web questionnaire surveys from the *Super Journal* illustrated that users prefer HTML format when they read on the screen and PDF format when they print. The authors speculated that a comparison of the two might provide an indication of the browsing versus printing behavior of patrons (Eason et al., 2000).

Many studies have been carried out on the usage patterns of e-journals package/collection offered by publishers focused on the use of individual titles or entire journal collection (Davis, 200a; Singh and Murthy, 2005; Tonta and Unal, 2008; Stempe and Janice, 2004). In their study, they have been addressed whether libraries could fulfill users' needs by selecting e-journals on a title-by-title basis or whether usage patterns indicated that big deal packages were preferable. These studies have shown that majority of articles downloaded by users are satisfied by a small number of journals whereas an overwhelming majority of journals were rarely used while some were never used at all. In summary, they have drawn a conclusion that would tend to support subscription of e-journals focused on title-by-title basis. Their respective analysis and results have been discussed here under.

Tonta and Ünal (2008) analyzed the usage of Elsevier's ScienceDirect (SD) e-journals package among Turkish Universities between 2000 and 2007. The volume of data enabled them to identify the core journals as well as to determine their stability over the years. The usage data provided by the publisher was available in COUNTER-Compliance format (Shepherd, 2003), which was analyzed on annual basis as well as over the entire seven years. They took advantage of the

Bradford's Law (1934) to identify the most frequently used or core journals (Hamaker, 2003; Ke et al., 2002). Accordingly, reported that 105 core journals, constituting only 5% of all SD journal titles, satisfied one third of all download requests. Moreover, ranks of core journals based on their number of downloads between two consecutive years were quite stable. They suggested that Turkish academic users tend to use certain journal titles time and again to satisfy their information needs.

Davis (2002a) analyzed the usage data of Academic Press's IDEAL e-journals package by North East Research Library consortium between 2000 and 2001. It was indicated Academic Press's IDEAL e-journal package contained a collection of more than two hundred titles in sciences and social sciences fields. The 80/20 rule (Diado, 1998) used as a framework to determine the intensity of use of entire e-journal collection (Evans and Peter, 2005; Urbano et al., 2004). He found that the top 50 journals (24.3% of the collection) satisfied 80 percent downloads. Further analysis looked at titles stability over the years. The title rankings based on number of downloads showed high congruence between 2000 and 2001. The stability of journal may show the consensus of journal popularity among users was suggested.

Singh and Murthy (2005) analyzed the usage statistics of Elsevier's ScienceDirect e-journals package by Indian Institute of Technology Roorkee for the year 2003. They found that 785 titles (51% of the collection) only accounted for 1.99% of the total use. There were 251 titles (16.89%) received no request at all while 145 titles (9.76%) received single download request. They suggested that renegotiation with the publishers is necessary as no mutually agreed contract can be successful if it is not equally balanced. And gave their support for an alternate model of subscription that fixed fee access only be made to the limited set of journals which are frequently used and pay for use for the journals which are less frequently used (Ball, 2004).

Furthermore, in making selection decisions, librarians have used a variety of methods to predict which journals will be most useful to their patrons. Citation data have long been used in libraries as one quantitative indicator of utility (Smith, 1985; Deurenberg, 1993). "Citation counts are a formal acknowledgement of intellectual debt to...previously-published scientific research papers" (Liu and Rousseau, 2013). Kelland and Young (1994) reviewed a number of studies that examined whether the frequency with which a journal's articles are cited could serve as an objective measure of the journal's usefulness to library clients. While these studies demonstrate that the relationship

between citations and literature use is very complex and certainly multi-factorial, citation data have been shown to be a valuable factor in collection management decisions and a modest predictor of library use.

Thomson Reuters (formerly ISI) facilitates the use of citation data by publishing impact factors for the journals it selects for analysis (Thomson Reuters, 2013). The impact factor (IF) of a given journal is defined as “the ratio of the number of citations which a journal receives in the course of a given year to the number of articles published by that journal within the two preceding calendar years” (Rousseau, 1988). Garfield (1994) notes that “the impact factor is useful in clarifying the significance of absolute (or total) citation frequencies. It eliminates some of the bias of such counts which favor large journals over small ones, or frequently issued journals over less frequently issued ones, and of older journals over newer ones”. Since the early 1990s, as citation data became electronically available, interest and use of the IF has increased, and scholarly articles on the IF have increased exponentially (Archambault and Larivière, 2009). The implication of journals IF was that journals with a higher IF, in other words, those cited more frequently by authors, have more impact on a field, more prestige in a field, and were also utilized more by library users too.

Tsay (1998) investigated the relationship between journals use as measured by re-shelving data and both total citation counts and IF for journals in clinical medicine and life sciences. The data on citation frequency and impact factors of journals were obtained from JCR 1993 edition. Twenty one journals in JCR without impact factors were subtracted from analysis. Both the Spearman rank and Pearson correlation tests was made for all titles as well as grouped by subject categories. The study demonstrated a significant correlation between frequency of use and citation frequency, and impact factor for all titles including for journals in subject categories that publish either clinical medicine or life science articles, or both. Deurenberg (1993) also discussed use of IF as one criterion for de-selection of journals in an academic medical library.

With the emergence of e-journals, there are some studies which have been examined the relationship between use of e-journals as measured by number of full-text articles downloaded and journal impact factor (IF) (Tonta and Unal, 2008; Ünal and Tonta, 2009; Wulff and Nixon, 2004; Duy and Vaughan, 2006; Cooper and McGregor, 1994). Kurtz et al. (2003) pointed the need for further research in this new area of e-journal use. Few studies report the existence of such a statistically significant relationship between the use based on citation data (IF) and that of

download data (Wulff and Nixon, 2004; Cooper and McGregor, 1994; Tonta and Unal, 2008; Ünal and Tonta, 2009) while others do not (Duy and Vaughan, 2006).

Wulff and Nixon (2004) examined the correlation between print and electronic use of journals in an academic health sciences library, and their impact factors in 2001. Print use for each title held in print was derived from circulation records while the electronic use for the same titles was provided by three vendors, Ovid, ScienceDirect (Elsevier), and Ideal (Academic Press). The study demonstrated a significant relationship between the frequency of journals use and their impact factors, in both print and electronic formats for all three vendors ($P < 0.01$). The use of journals from the Ovid collection correlates modestly to IF for both print and electronic use, but little, though positive, correlation exists between IF and use of SD or Ideal titles, either in print or electronic (Pearson's $r = 0.58$; 0.21 ; 0.34 , between electronic use and IF). They concluded that impact factors can be a predictor of high use journals both in paper and electronic forms, whereby collection development practices can be applied based on IF. On the other hand, Tonta and Unal (2008) concluded that the correlation between the impact factors (IFs) of core journal titles and the number of downloads was rather low (Pearson's $r = 0.368$).

Cooper and McGregor (1994) studied more than 48,000 journal article photocopy requests submitted to the information services unit of a biotechnology firm by local users between 1987 and 1989. They investigated the relationship between use and citation data that are regularly published in JCR of the ISI. They found that there was a negative random agreement between impact factors and the rankings based on use data for 1987 and 1988 (Spearman's $\rho = -0.489$; -0.507 , respectively). It means that some journals with higher impact factors scored lower rankings on the basis of the number of photocopy requests. The researchers advised that impact factor cannot be used as reliable indicators to predict the frequency of local use of journal titles.

Duy and Vaughan (2006) examined the relationship between journals use and their impact factor among e-journals package of three vendors (ACS, Elsevier, and Wiley) subscribed by Concordia University Libraries. For all vendors, the use data collected were the total number of HTML and PDF full-text articles requested. They found correlation between journal impact factors and electronic usage data are not significant for these three vendors. Chrzastowski (1991) argues that impact factors tell nothing about the local use of journals. In essence, they report the citation

patterns of hundreds of thousands of articles published annually by the entire scientific community.

2.5. Methods of Assessment of E-journals Usage

The issue of quantifying journal usage in libraries has been problematic since the days when only print journals were available. Unlike print books, which can be checked out and leave a record of use in the form of circulation data, print journals generally do not circulate, and their usage must therefore be measured indirectly. Methods traditionally employed to determine how much print journals are being used include re-shelving studies, citation analysis, survey research, and in-depth interviews of users; all of them have their drawbacks. Re-shelving studies make the assumption that journals removed from shelves have been used by patrons. They have a tendency to underestimate usage as they depend upon user compliance in not re-shelving journals. Citation analysis based on the premise that works cited by authors in published articles are important and useful to them, measures journal use by examining what authors choose to cite. One drawback to this approach is that it may overlook works that authors consulted but chose not to cite. Another is that less than relevant citations may be included for reasons unrelated to the actual research such as increasing the number of citations to one's own work or that of friends. It also ignores uses not for purposes of publication. Finally, questionnaires and interviews are not the most objective methods. Creation of questionnaires and interviews can be very subjective, and the results can be affected by the memories and biases of subjects (Davis and Solla, 2003; Eason et al., 2000; Sylvia, 1998).

With the advent of electronic journals, studies assessing their usage continued to employ methods of assessment from the print world such as citation analysis, surveys, and interviews. The drawbacks are similar to those found in the print world. Additionally, for titles available both in print and electronically, often the case with the journals included in publisher packages, citation analysis gives no indication as to which version was accessed (Davis, 2002b; De Groote and Dorsch, 2003; Harter, 1996; Herring, 2002; Parker and Bauer, 2003; Tomney and Burton, 1998).

Electronic journals offer tantalizing possibilities of being able to assess usage more accurately, directly, and objectively and track users' behavior electronically by means of publishers' transaction logs (Eason et al., 2000). For the most part, these statistics represent how often patrons are accessing a vendors' electronic resources and might include "a count of sessions in a specific

database, the time per session in a specific database, the time per session in a specific database, the count of searches in a specific database, and the count of full-text downloads per time period per database” (Shim and McClure, 2002).

Using vendor-provided electronic journal usage statistics is an imperfect method. Much of what is problematic is due to the current lack of standardization between electronic journal usage statistics for products from different vendors. The plethora of ways that vendors count usage statistics makes comparisons within a subject area, between databases, or across the larger collection difficult (Davis and Solla, 2003). For instance, some statistics may be based on the number of search sessions whereas another publisher might count the number of log-ins to their website (Bauer, 2001).

Reporting varies widely as well. Statistics might be summarized and supplied on a monthly, quarterly, or annual basis or accessible on an as-needed basis from a publisher website (Davis and Solla, 2003; Galbraith, 2002). The reports might represent the number of full-text articles accessed for each title in each format (e.g., PDF (portable document format) and the total or one figure could combine the number of accesses to tables of contents, articles, and searches for each title combined. Some vendors report the number of articles accessed by IP (internet protocol) address rather than title (Galbraith, 2003). Comparisons are made more difficult because statistics are reported in a wide variety of formats and because vendors are not always forthcoming about their methods of data collection and the terminology they use (e.g., What constitutes “full-text”?). Many libraries are unwilling to invest staff time in organizing the statistics in a uniform manner (Shim and McClure, 2002).

Another aspect of electronic journal usage statistics with which librarians take issue is what the statistics actually reveal. They do not address user behavior as much as libraries would prefer nor do they say anything about what articles were actually downloaded or why they might have been downloaded (Davis and Solla, 2003; Shim and McClure, 2002). Also, it is not clear from the data that who was logging in or initiating a session or why they were doing so (Davis, 2002a). Sessions could have been initiated by a librarian trying to determine why a patron was having access problems.

Admittedly, there is no perfect method that gives a complete picture of what e-journals are necessary or important to patrons or patrons’ usage behavior. However, when electronic journal

usage statistics are available, they can provide some useful information about usage patterns of the journals in general.

2.6. Standards in E-Journals Usage Statistics

The current shortcomings of electronic journal usage statistics described in the previous section highlight the need for publishers to adopt standards for their data collection and reporting. Usable statistics that can be compared with confidence are crucial for libraries because such large portions of library budgets are being devoted to electronic resources, and, in the current model, libraries are leasing rather than purchasing content (Hahn and Faulkner, 2002). Libraries must be able to justify the expenditures, especially if they are part of state-funded institutions. Standardized electronic resource usage statistics will also allow libraries to make comparisons with similar libraries around the country, also known as benchmarking (Goldberg et al., 2003). Two sets of standards for electronic journal usage statistics have been vying for adoption as the standard of choice, the ICOLC (International Coalition of Library Consortia) Guidelines and the COUNTER (Counting Online Usage of NeTworked Electronic Resources) Code of Practice, developed by Project COUNTER (ICOLC, 2001; Project COUNTER, 2002).

ICOLC began developing their standards in the mid '90s. The most recent guidelines were released in 2001. For librarians, the ICOLC standards have the advantage of having been developed by librarians and other people who know what kinds of information is most useful to libraries. Definitions of the types of statistics to be collected such as number of sessions, queries, and "full-content" units are the chief focus of the guidelines as well as statements on confidentiality and access (ICOLC, 2001). Unfortunately, the ICOLC guidelines do not currently include information or standards for external validation of the reports (Shim and McClure, 2002).

Project COUNTER was begun by publishers. Experts and organizations from throughout the publishing and library communities were involved with creation of the COUNTER Code of Practice, first released in 2002 (Peter, 2004). Definitions for types of statistics used in the Code of Practice are essentially the same as those put forth by the International Organization for Standardization (ISO) and the National Information Standards Organization (NISO). Participants adhering to the Code of Practice must have their usage reports audited by a third party for purposes of validation. One concern raised by John Carlo Bertot is the possibility that comparing

COUNTER statistics from similar libraries will be like “apples and oranges” because of how data collection by vendors will be affected by differences in libraries’ systems and applications. He suggests that in order to be able to engage in benchmarking, libraries “will likely have to consider systems and application configuration compliance” (Bertot, 2003).

In an article on the Association for Research Libraries (ARL) E-Metrics study on vendor-reported electronic resource usage statistics, the authors doubted that “comprehensive standardization of usage statistics and data delivery methods” could be achieved quickly (Shim and McClure, 2002). As a result, they cautioned against comparing data from different vendors unless it is certain that the data has been “collected, defined, and reported similarly”. Davis and Price (2006) examined how usage statistics are affected by electronic journal design, making cross comparisons of different journals and publishers difficult. Blecic et al. (2007) similarly showed that the evolution of both interface and search methodologies is differentially changing the detailed meaning of usage statistics, again making cross comparisons difficult.

2.7. Statistical Analysis of Use Patterns

Various techniques and methods can be used in use-based studies of collection analysis, which ranges from using bibliometric laws to statistical methods. However, the decision to use which particular law/technique or method is mainly depend on the very objective of the study. The “80/20” rule and Bradford’s Law of Scattering (1934) were among the most important bibliometric laws (Erar, 2002), which widely used in use studies.

The “80/20” rule analysis of the collection as a whole can be used as a fair measure for the relative level or intensity of use of an entire journal collection (Urbano et al., 2004; Evans and Peters, 2005; Lamothe, 2008). This analysis typically examines how the journal collection as a whole meets the needs of users in general. The “80/20” rule states that approximately 20% of a collection will satisfy 80% of the users’ requests for information (Diodato, 1994). In “80/20” rule analysis, journals are ranked in decreasing order of usage and then cumulative percentage of usage is compared with cumulative percentage of titles. Thus, what percentage of titles used (required) to satisfy 80% of entire collection usage is determined.

The Bradford’s (1934) Law of Scattering can be used as a functional tool for identifying or defining the most frequently used or “core” journals of a collection, and which are not (Nisonger,

1998; Evans, 2000). The basic assumption of the advocates of the received view is that Bradford's law function as a completely neutral and objective method (Nicolaisen and Hjørland, 2007). Bradford's (1934) law states that the publications in periodicals on a particular subject can be divided into three zones of scattering, where the first, second, and third zones cover periodicals respectively of the most, larger and lesser productivity to the subject. There are two most widely recognized formulations of the Bradford's law for its application in empirical studies; the *verbal* and *graphical* formulations (Brookes, 1969a). In fact, Bradford did not give a mathematical model for his law, but several studies have suggested many different models of Bradford's law (Brookes, 1969b; Leimkuhler, 1980; Egghe, 1990). Although several formulations, models, and syntheses of previous statements related to Bradford's Law have been put forth, but very little agreement exists about which model is the best to use. For instance, Wilkinson (1972) noticed that the formulae provided by Leimkuhler and Brookes of Bradford's law did not really describe the same phenomenon.

The verbal formulation is derived from the verbal statement of Bradford's conclusion, and the graphical formulation is an empirical expression derived from the graphical survey of a distribution of periodicals (Brookes, 1969a). Many use studies have used the verbal formulation in their Bradford's analysis due to its convenience and easy to use for (Borrego and Urbano, 2007; Tonta and Ünal, 2008). In the Bradford analysis, the journals are ranked in descending order of usage. While retaining the order of journals, the list is divided into three groups; such that the number of article downloads produced by each group of journals is approximately equal (Diodato, 1994). In other words, each group of journals covered one third (1/3) of the total download requests, approximately. Empirical studies generally begin with creating a rank-frequency table. Typically, such a table lists number of journals, number of articles they produced, cumulative frequency of journals (rank), cumulative frequency of articles, cumulative perc.(%) of journals, and cumulative perc.(%) of articles (Sudhier, 2010).

Spearman's correlation can be used to measure the association or "similarity" between journals ranking based on their relative level of use in two years (Davis, 2002a; Tonta and Unal, 2008). This analysis provides with whether the use pattern of journals is varying or rather remains stable from year to year. The benefit of using Spearman's correlation is that it uses journal rank (i.e., 1, 2, 3, etc.) instead of the skewed raw usage data. The strength or degree of similarity between journals rank in two years is measured by Spearman's correlation coefficient (ρ). The correlation

coefficient value ranges from -1 to +1, with -1 illustrating complete dis-similarity, 0 representing no relationship, and +1 representing an identical (or perfect) relationship.

For a sample of size n , the general formula for computing Spearman's (1904) correlation coefficient (ρ) is:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}. \quad (1)$$

Where $d_i = (X_i - Y_i)$, X_i and Y_i are ranks of each case on X and Y, respectively.

To compute Spearman's ρ , first the journals are ranked from descending order based on their relative level of use in each year's, and then the ranks (not the actual scores of downloads) are manipulated to produce the final measure. To rank the journals, first find the highest download of each year's and assign it rank 1. If any journals have the same download on a year, they are assigned the average of the ranks they would have used up if they had not been tied. A perfect positive association ($\rho = +1.00$) would exist if there are no disagreements in ranks between the two years (if journals are ranked in exactly the same order on both years). A perfect negative relationship ($\rho = -1.00$) would exist if the ranks are in perfect disagreement (if the journal ranked highest on one year is lowest on the other year, and so forth).

Pearson's correlation can be used to measure the association between frequency of use of journals and their impact factor, in a given year (Cooper and McGregor, 1994; Tsay, 1998; Wulff and Nixon, 2004; Duy and Vaughan, 2006). This provides with whether journals' impact factor can be used reliably as indicator for predicting the frequency of use of journals in the library. The Pearson's correlation coefficient (r) is used to measure the strength of association between journals use and their impact factor.

The general formula for computing Pearson's (1896) correlation coefficient (r) is:

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{[\sum(X - \bar{X})^2][\sum(Y - \bar{Y})^2]}} \quad (2)$$

Where, \bar{X} and \bar{Y} are mean of scores in variable X and Y, respectively.

Like Spearman's ρ , Pearson's r varies from 0.00 to ± 1.00 , with 0.00 indicating no association and +1.00 and -1.00 indicating perfect positive and perfect negative relationships, respectively. The sign of the Pearson's r indicates the direction of association between X and Y. If Y tends to increase when X increases, the Pearson's r is positive. If Y tends to decrease when X increases, the Pearson's r is negative. A Pearson's r of zero indicates that there is no tendency for Y to either increase or decrease when X increases.

Pearson's correlation manipulates the actual scores of each variable when measuring association between two variables (Egghe and Rousseau, 1990), unlike Spearman's correlation. Thus, like other parametric tests, it assumes that the data for both variables are normally distributed. If the data violates normality assumption, it can yield results which are artifactual in nature or false positive. Thus, before applying the correlation analysis, the goodness-of-fit of a data set to normal distribution should be tested first. When the data is found to be significantly deviated from normality, then it required to normalize the data using the appropriate data transformation techniques. In fact, many studies have indicated that the use data of library materials never exhibits normal distribution (Davis, 2002a; Tonta and Unal, 2008). Thus, it's not uncommon to use data transformation techniques for normalizing usage data when working with correlation analysis.

Various studies have concluded that *Shapiro-Wilk's* (1965) test is the most powerful for testing normality, followed closely by Anderson-Darling test, as compared to other normality tests such as Kolmogorov-Smirnov and Lilliefors tests (Stephens, 1974; Razali and Yap, 2011). In Shapiro-Wilk's test, the sample data are tested against the null hypothesis that "data is normally distributed". Thus, it measures how significantly the distribution of sample data deviates (far) from the theoretical normal distribution. The decision either to accept or reject the null hypothesis is based on the *p-value*, which is a measure of statistical significance. If the *p-value* is less than 0.05 ($p\text{-value} < 0.05$), the null hypothesis is rejected, and then it's conclude that the data are significantly deviated from normal distribution. On the other hand, If the *p-value* is greater than 0.05 ($p\text{-value} > 0.05$), the null hypothesis is accepted, and then we conclude that the data are not significantly deviated from normal distribution.

When in case of variables found violating the assumption of normality, the decision to use for a particular data transformation technique is depend on the direction of skew (Tukey, 1977). Tukey's ladder of transformations gives several common transformations to correct skew in each direction,

for positive (right) and negative (left) skew. Accordingly, Logarithmic transformation (Log_{10}) was recommended for normalizing data which display a positive or right skew (Tabachnick and Fidell, 2007). Davis (2002a) also used the same technique for normalizing usage data of e-journals in similar occasion. In Log transformation, the Log_{10} of each observation is used in the correlation analysis. However, if the data have contained zeros or negative numbers, a constant should be added to each number to make them positive and non-zero.

2.8. Addis Ababa University Library System

Addis Ababa University is one of the leading and the oldest universities of Ethiopia, established in 1958 G.C. Currently, it run about 65 undergraduate and 220 graduate programs (of which 69 were Ph.D. programs) offered in its 14 campuses. The university library system serves as a backbone of the institution to sustain its excellence in academic and research endeavors. Addis Ababa University Library (AAUL) serves and promotes the teaching, learning and research environment, providing users' access to enrich information resources. The university library system has one main library and eight branch libraries attached to different faculties. The main library, which is also known as *John F.Kennedy Memorial Library*, renders centralized technical processing services (such as acquisitions of information resources, cataloguing and ICT related services) to all branch libraries (AAU, 2013).

The department of Computer and Information Retrieval Center delivers electronic information services for users able to search scientific literatures from databases and online public access catalogue (OPAC). AAUL system subscribed to more than 15,000 full text, scientific journals and scholarly databases from different publishers and suppliers (AAU, 2013). The AAUL conducts workshops and training session on information literacy skills and also holds consultative meetings with other university libraries in the country. Most of the programs were carried out with the cooperation of Program for the Enhancement of Research Information (PERI) in Ethiopia. PERI is a UK-based program that supports capacity building in the area of research in developing and transitional countries by helping in the production, access and negotiation with publishers of journals, in effect, facilitating easy access to information and knowledge. PERI was founded by International Network for the Availability of Scientific Publications (INASP) in cooperation with partners in Africa, Asia, Latin America, and also with research partners and librarians in the New Independent States. Effective usage of information and communication technologies in libraries,

universities and research institutions in developing world is one of the most important objectives of the PERI programs (INASP, 2013). AAUL negotiated the entry to this program in 2002 and has been the coordinating institution in Ethiopia since then.

CHAPTER THREE

METHODOLOGY

3.1. Study Design

A descriptive survey study design was used to analyze the use pattern of Emerald e-journals package subscribed by Addis Ababa University in 2012 and 2013. The usage data of e-journals collection included in the study covered the period from January, 2012 to May, 2013. The usage data for the e-journals was supplied by Emerald Publishing Group, which was in the format of COUNTER-complaint reports for the usage of e-journals referred as “Journal Report 1” (JR1) (Project COUNTER, 2002). According to JR1, a single full-text article download (in both PDF and HTML formats) was regarded as measure of a given journal use. The whole usage data collected was divided into two files and analyzed separately, while one containing one year’s worth of data (Jan-Dec 2012) and the other five months data (Jan-May 2013). The impact factor values of Emerald’s e-journals subscribed by AAU in 2012 were collected from the “Journal Citation Report” (JCR), which was published by Thomson Reuters, on June 20, 2013 (Thomson Reuters, 2013).

The distribution of full-text articles downloaded to individual journals in the collection was analyzed using bibliometric laws. The most frequently used journals in the collection were identified by means of applying Bradford’s Law of Scattering. The intensity of use of an entire journal collection was determined through the “80/20” rule analysis of the collection as a whole. The stability of journals rank based on their relative level of use in 2012 and 2013 was determined by Spearman’s correlation coefficient. Finally, the association between frequency of use of journals and their impact factors in 2012 was measured by Pearson’s correlation coefficient.

3.2. Study Population

The study population of this study was Emerald’s e-journals package subscribed by Addis Ababa University of the academic years 2012 and 2013. A total of 158 e-journals collection subscribed in 2012 and 214 e-journals in 2013 were analyzed. The researcher only managed to collect usage data from January to May for e-journals collection subscribed in 2013. All of the e-journals collection analyzed in this study was only accessed online via the publisher’s website. They also published in

wide range of management and library & information studies journals, as well as a strong specialist range of engineering, education, health services & care, and tourism & hospitality (Emerald Insight, 2013a). Thus, due to its wide range of subject coverage, the use patterns of the entire collection would be representative of the diverse users of Addis Ababa University from various academic disciplines. All of which were peer-reviewed and fully searchable full-text journals plus reviews from the world's top 300 management journals. They published full-text articles in English language and appeared for downloads both in PDF and HTML formats. When clicking the link for PDF format of an article, it allows users to download a PDF file (.pdf), which contains the full-text of the articles, into their local machine. Yet, in HTML format, rather the full-text of an article appears in a new tab or window of the Web browser. Thus, users accessing articles in PDF format could have access to the full-text of the articles without being connected to the publisher web site, but not in the case of HTML.

Addis Ababa University subscribed to Emerald's e-journals package under the INASP-PERi program, which was purchased under a country-wide license since 2003 (INASP, 2013). Thus, Emerald's e-journals collection which was accessible in Addis Ababa University was also accessible in other Ethiopian Universities participating in the program. Hence, considering the use of Emerald's e-journals package of Addis Ababa University would provide us a chance to anticipate what patterns of use the e-journals would also likely exhibit within other universities, which have similar settings with that of AAU. Moreover, Addis Ababa University is one of the leading and the oldest universities of Ethiopia established in 1958 G.C. Currently, it run about 65 undergraduate and 220 graduate programs (of which 69 were Ph.D. programs) offered in its 14 campuses (AAU, 2013). Hence, it was believed that such factors would positively contribute for ensuring the best utilization of the collection which in turn helped remarking better use patterns.

3.3. Data Collection

Quantitative data was collected from two different sources, the one supplied by Emerald Publishing Group and Thomson Reuters. The format of e-journals use data collected from Emerald's Insight database was according to the Project COUNTER Code of Practices Release 3 (Emerald Insight, 2013b). The second source was citation data of Emerald's e-journals collected using the "Journal Citation Report" (JCR) published by Thomson Reuters. Emerald also provided citation data of its e-journals collection each year on the date of its release by Thomson Reuters. In

addition, Emerald's products portfolio document was consulted to get details of journals such as journals publication frequency and subject category (Emerald Insight, 2013c).

3.3.1. Data Collection Instruments

The COUNTER-based reporting form for the use of e-journals, Journal Report 1, was used in collecting the use data of Emerald's e-journals. Journal Report 1 (JR1) reported the number of successful full-text article requests by month and journal (Project COUNTER, 2002). Accordingly, a single full-text article download (in both PDF and HTML formats) was regarded as a measure of journals use. The data set collected using JR1 had 9 attributes to report the use of a given journal. It included information about journals title, publisher name, platform, print ISSN, electronic ISSN) and reported journals use by month, and total download in the year, by HTML and PDF (Appendix A). Individual journals were identified using a combination of its title and print ISSN.

Furthermore, Journal Citation Report (JCR) of Thomson Reuters was used in collecting the impact factor values of Emerald's e-journals. The data set collected using JCR had 8 attributes, providing information on citation patterns of a given journal worldwide (Appendix B). It included information about journals title, ISSN, total citation, impact factor, 5-year impact factor, immediacy index, total articles, and cited half-life. However, the impact factor values of Emerald's e-journals were only used, in respect to the objectives of this very study. Individual journals were identified using a combination of its title and ISSN.

3.3.2. Data Collection Procedures

Users of Addis Ababa University accessed online contents of Emerald's e-journals collection through the Emerald's Insight website. These users were authenticated by the university proxy server IP addresses dedicated for this purpose. Hence, the use data would only be representative of the use of Addis Ababa University users who were accessed Emerald's e-journals collection from inside the university campuses.

The usage data of e-journals was collected from Emerald's Insight databases. It was retrieved remotely using a password-controlled user account and logged via the publisher website. It took about two months, from April 20 to June 25 of 2013, to finish collecting the usage data. To the knowledge of the researcher, no one university of Ethiopia including Addis Ababa University have started yet collecting usage data of their subscribed e-journals from any of the vendors till this

study. To this end, the researcher has managed communicating both the university library and the publisher in order to create administrative accounts for the university librarians. Thus, it would be possible to collect the usage data through remote login.

Two assistant librarians of Addis Ababa University library, who were working at the Technical Processing department, were recruited for the data collection. Prior to actual data collection process, the data collectors were given two days trainings regarding the purpose of the study and the type of usage data required. Moreover, they were also trained how to navigate through the publisher's system for retrieving the data. A total of one year and five months (from January 2012 to May 2013) worth of usage data was collected; for a collection of 158 e-journals subscribed in 2012 and 214 e-journals in 2013. Emerald provided the usage data of e-journals monthly and it took two weeks after an end of a given month to release its use data. Thus, it was only managed to collect the usage data up to the month of May for e-journals subscribed in 2013. The usage data collected was in CSV (Comma Separated Values) file format. Finally, citation data of Emerald's e-journals collection was collected using JCR 2012, which was published by Thomson Reuters on June 20, 2013 (Thomson Reuters, 2013).

3.4. Data Analysis

The usage data collected in CSV file format was converted into Microsoft Excel format for data cleaning purpose. The necessary corrections were performed on misspelled journals title. Later, the usage data was transformed into SPSS V.17 for analysis. The usage data from each year's of subscriptions was analyzed separately. The use of a particular e-journal was referred to an aggregate use of the journal during the entire months of the year. But for e-journals subscribed in 2013, it would be an aggregate use of journals over five months (January -May).

The use of the entire collection of journals subscribed each year's was expressed using descriptive statistics such as highest score, mean, median, standard deviation of journals use. Users' preference of articles format for requesting downloads was determined by comparing the total number of full-text articles downloaded in both HTML and PDF formats for each year's. Thus, the number of full-text articles downloaded in both HTML and PDF formats from each journal of each year's was summed up, respectively. Moreover, to see how usage of journals was distributed among various subject collections, the use of journals by their subject category was compared.

Accordingly, individual journals were assigned subject headings based on Emerald's classification of its journals into subject categories (Emerald Insight, 2013c).

The distribution of full-text articles downloaded to all journals of the entire collection was analyzed using bibliometric laws. The intensity of use of the entire collection of journals was measured through the lens of the "80/20" rule. Thus, journals were ranked in decreasing order of usage and then cumulative percentage of usage was compared with cumulative percentage of titles. The ratio of the respective result is compared with reference to the classic "80/20" rule's, to determine how less or more the collection is used, proportionally. The Bradford's Law of Scattering was used to identify the most frequently used journals in the collection. In the Bradford analysis, the verbal formulation of Bradford's law was to identify the three "zones" or groups of journals. Hence, the entire collection of journals was divided into three regions of journals use; groups of the most frequently used journals, moderately, and rarely used journals. The most frequently used journals satisfying download requests in the first group were defined as "core" journals, to the collection (Bradford, 1934).

The degree of similarity between journals rank based on their relative use in 2012 and 2013 was measured by Spearman's correlation coefficient (ρ). In this analysis, only journals that appeared in both 2012 and 2013 lists of e-journals collection were considered. The higher the correlation was the more similar was the journal's rank in the two years' journals rank order lists. Spearman's ρ ranged from -1 to +1, with -1 illustrating complete dis-similarity, 0 representing no relationship, and +1 representing an identical (or perfect) relationship.

The strength of association between the frequency of use of journals and their impact factor received in 2012 was measured by Pearson's correlation coefficient (r). The data for both usage and impact factor of journals were tested for normality using Shapiro-Wilk's test. Since the data for both variables were found significantly deviated from normal distribution (Shapiro-Wilk's test; $p < 0.05$), the Log_{10} transformation was applied to both variables data. After transformation, similar normality test was run with the transformed data. This time, it was noticed that the transformed data for both variables were found to be normal distributed (Shapiro-Wilk test; $p > 0.05$). The null hypothesis that "data is normally distributed" is also accepted. Eventually, the correlation analysis was run using the transformed data. In this analysis, of all journals collection subscribed in 2012, only journals for which JCR provides their impact factors in 2012 were considered. Pearson's r

varies from 0.00 to ± 1.00 , with 0.00 indicating no association and +1.00 and -1.00 indicating perfect positive and perfect negative relationships, respectively.

Furthermore, for both correlation analyses, correlation coefficients below 0.35 were considered as low to weak correlation, 0.36-0.67 modest or moderate, 0.68-1.0 strong or high correlations, and anything over 0.90 as very high correlation (Taylor, 1990). The statistical significance of correlation coefficients was declared at $p < 0.05$.

3.5. Ethical Considerations

Ethical approval for the study protocol was obtained from College of Natural Science, Jimma University, Ethiopia ethical committee. No personal information of users accessing the e-journals was included in the usage data collected, nor have attempted to identify individual users by IP address or department they had accessed. In addition, the usage data was used for no other purposes than only this very study.

CHAPTER FOUR

RESULT AND DISCUSSION

In this chapter, results from the analysis of the use data of e-journals were presented using tables and graphs. It was divided into five sections, where each section provides description of the objectives intended to achieve and the methods used, respectively. The e-journals collection subscribed in 2012 and 2013 were analyzed separately (Section 4.1). The analysis of usage for various subject categories was based on e-journals collection subscribed in 2012 (Section 4.1.2), since the use data covered entire months (12) of the year. The key findings towards the research questions were discussed with results of related studies (Section 4.6).

4.1. Overall Usage Trends of Entire Collection

The use of entire collection of e-journals subscribed in 2012 and 2013 were analyzed separately. In 2012, AAU subscribed 158 e-journals of Emerald e-journal package. Of which AAU users downloaded a total of 12, 529 full-text articles during the year (Jan-Dec). While 156 journals used at least once, 2 journals remained totally unused or received zero download. Moreover, 41 journals (25.95% of the collection) provided only article downloads between 1 and 20. Likewise, of the 214 e-journals subscribed in 2013, a total of 4576 full-text articles downloaded within a period of five months (Jan-May). Eventually, this figure was reduced by 2670 articles when compared with the number of downloads (7246 articles) in 2012 for the same period of time (n=158 journals). The difference in the actual beginning of class for 2012 and 2013 academic calendars can be explained the decrease in the number of downloads. The use patterns of journals followed academic calendars, whereby it became high during months of examination and declined at the beginning, during term breaks, and end of academic calendar. Thus, if class is not started at the same times in 2012 and 2013, apparently the months would have received different usage patterns. In fact, sometimes class may not be started on time or delayed due to various reasons such as faculty or students given. Of all journals (n=214 journals), 175 journals (81.78% of the collection) received downloads at least once while 39 journals (18.22%) remained totally unused. In addition, 79 journals (36.92% of the collection) provided only article downloads between 1 and 10 within the five months (Jan-May).

When ranked by usage, the highest download in 2012 was for *Journal of Manufacturing Technology Management* (707 articles), followed by *Journal of Knowledge Management* (496 articles), and *International Journal of Manpower* (377 articles). Table 4.1 provides the top ten most-used journal titles with their publication frequency and subject category. The rate of e-journals use was 6.61 articles download per title per month (n=12 months). Fig. 4.1 shows the usage of all Emerald titles ranked by usage. The number of downloads drop-off quickly after the first few journals and the remaining majority received relatively little use.

Table 4.1. Top ten most-used journal titles of Emerald e-journals package (n=158), AAU data, 2012

Journal Titles	Publication Freq*.	Subject Category	Use	
			Rank	Freq.
Journal of Manufacturing Technology Mangt*.	8	Operations and Logistics Mangt.	1	707
Journal of Knowledge Mangt.	6	Information and Knowledge Mangt.	2	496
International Journal of Manpower	8	Economics	3	377
Employee Relations	6	Human Resource Mangt.	4	318
International Journal of Operations & Production Mangt.	12	Operations and Logistics Mangt.	5	305
Managerial Auditing Journal	9	Accounting and Finance	6	291
International Journal of Quality & Reliability Mangt.	9	Managing Quality	7	287
European Journal of Marketing	12	Marketing	8	268
Journal of Services Marketing	7	Marketing	9	258
Journal of Business & Industrial Marketing	8	Marketing	10	240

* Mangt.= Management; Freq.= Frequency

As shown in Fig. 4.1, the distribution of use of journals was highly skewed, in which the top journals were used more times by AAU users as compared to a handful of times for the least-used titles. When ordered by cumulative use, the top 6 journals (3.80% of the collection) satisfied 19.91% (2494 articles) downloads and the top 27 journals (12.09% of the collection) satisfied 51.86% (6497 articles) downloads in 2012 (Fig. 4.4). It appears that a small number of journals contributed the majority of total use while many journal titles used very little or rarely. With the data being heavily skewed, it makes little sense to talk about *average* use of journal (which was 79.30). In comparison, the *median* use per journal was 44.50 (SD=95.963) article downloads.

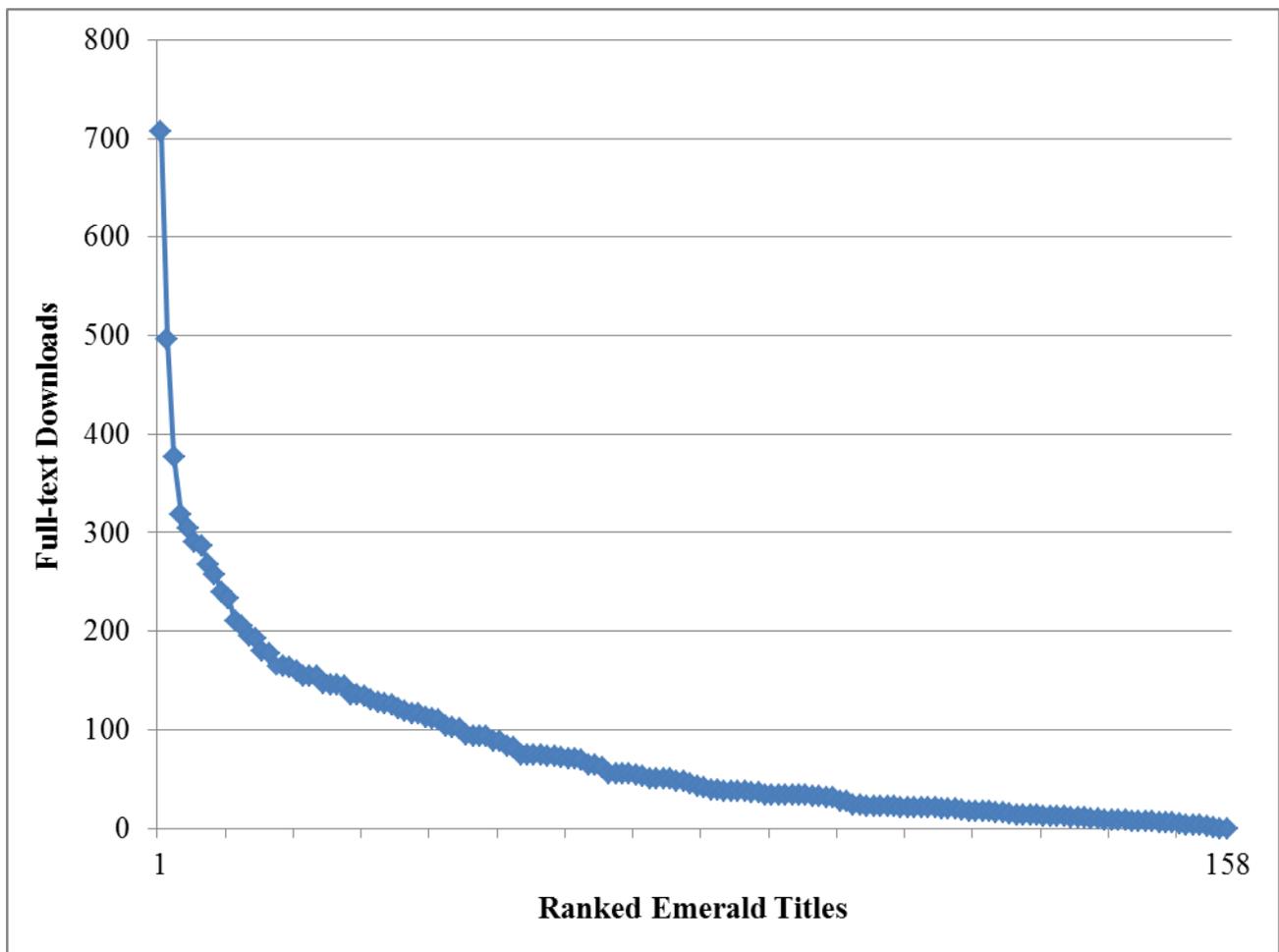


Fig. 4.1. Total AAU downloads per title, 2012

4.1.1. Preference of Article Format

Emerald's e-journals published full-text articles in both PDF and HTML formats to meet users' preference of article format. The total number of articles downloaded from the entire collection of e-journals in both HTML and PDF formats was compared to determine users' preference of article format. Fig. 4.2 shows the comparison of full-text articles downloaded in PDF and HTML formats. Of the total 12, 529 full-text articles downloaded in 2012, AAU users downloaded 10,695 articles (85.36%) in PDF and 1834 articles (14.64%) in HTML formats. The number of full-text articles requested in PDF format was five times more than that of HTML. Of the total 4576 full-text articles downloaded in 2013, 4003 articles (87.48%) requested in PDF while the rest 573 articles (12.52%) in HTML. It appears that PDF remained the most widely used article format among AAU users.

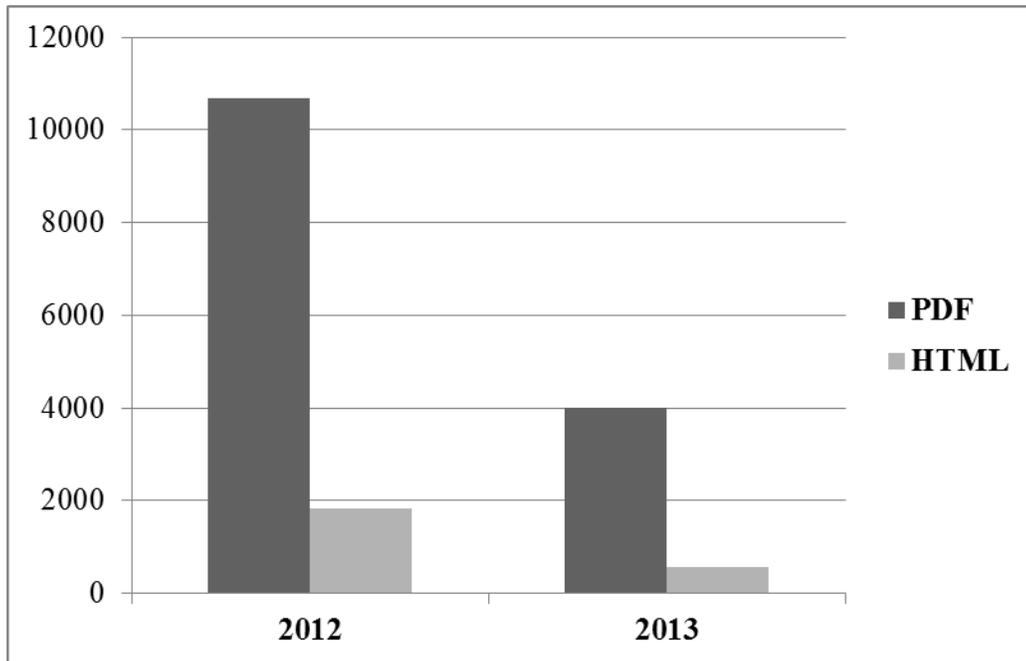


Fig. 4.2. Comparison of full-text articles downloaded in PDF and HTML formats

4.1.2. Usage of Journals by Subject Categories

The usage of journals by subject categories was analyzed to observe how usage of journals is distributed among various subject categories. Emerald’s classification of its e-journals into subject categories was used to assign a specific subject heading to journal titles in the collection. Accordingly, all journal titles of the entire collection were grouped into one of 13 subject categories. The cumulative number of full-text articles downloaded was tallied for titles in each subject categories. Fig. 4.3 shows the percentage of journals cumulative use in each categories accounted for the total use. Moreover, the most used or most important journal titles in each category was identified (Table 4.2).

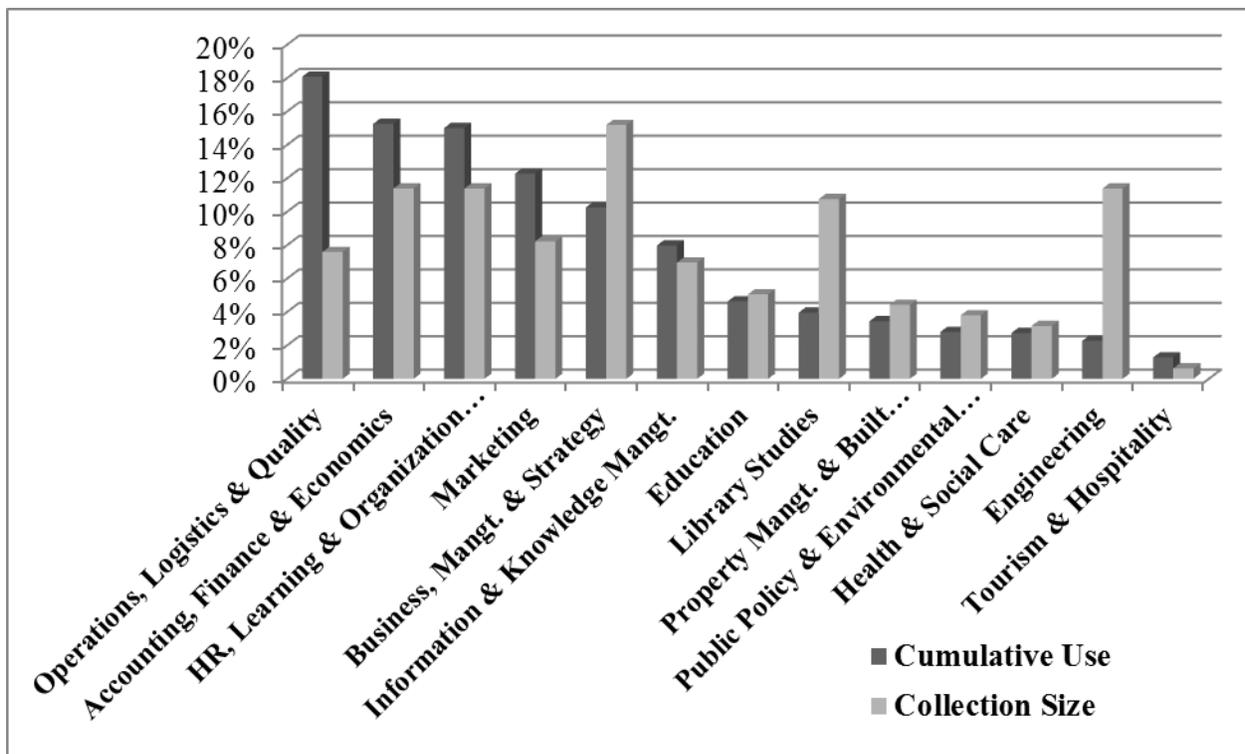


Fig. 4.3. Journals use by subject category, 2012

Looking at Fig. 4.3, e-journals in *Operations, Logistics and Quality* accounted for the largest percentage (18.09%) of the total use in 2012, while *Tourism and Hospitality* accounted for the lowest percentage (1.28%). The difference for usage of journals among subject categories can be explained by the size of journals in the collection. As shown in the figure, the number of journals in each subject category is different. For instance, *Tourism and Hospitality*, accounted for the lowest percentage of the total use, has contained just a single journal title. When ordered by

proportional use¹, the most heavily used subject category was *Operations, Logistics & Quality* (188 articles), followed by *Tourism & Hospitality* (160 articles). This may show the high interest of users to use journals in *Tourism & Hospitality*. Thus, future collection development plans can give priority for increasing its collection size. In contrast, *Business, Mangt & Strategy* was ranked tenth (53 articles), which had twice larger collection size than *Operations, Logistics & Quality*. Although they have the same collection size, *HR, Learning & Organization Studies* (106 articles), *Accounting, Finance & Economics* (104 articles), and *Engineering* (15 articles) subject categories were ranked fourth, fifth, and thirteenth, respectively. Thus, it appears that there exists a clear difference for usage of journals among the subject categories.

Table 4.2. Most-used journal titles of Emerald e-journal package in different subject categories, AAU data, 2012

Subject Categories	Journal Titles	Cum. Use (%)
Accounting, Finance & Economics	International Journal of Manpower	19.72
Business, Mangt & Strategy	Management Decision	16.34
HR, Learning & Organization Studies	Employee Relations	16.91
Information & Knowledge Mangt.	Journal of Knowledge Management	49.6
Marketing	European Journal of Marketing	17.43
Operations, Logistics & Quality	Journal of Manufacturing Technology Management	31.2
Property Mangt. & Built Environment	Journal of Property Investment & Finance	38.19
Public Policy & Environmental Mangt.	International Journal of Public Sector Management	33.24
Tourism & Hospitality	International Journal of Contemporary Hospitality Management	100
Education	International Journal of Educational Management	30.64
Engineering	Assembly Automation	15.14
Health & Social Care	International Journal of Health Care	39.65

¹ When cumulative use of the collection divided by its number of journals

	Quality Assurance	
Library Studies	Journal of Documentation	16.94

4.2. Intensity of Use of Entire E-Journal Collection

The intensity of use of the entire e-journal collection was evaluated through the lens of the “80/20” rule, which states that 80% of all article download requests came from 20% journals of the collection. Fig. 4.4 shows the dispersal of use of articles for entire e-journal collection subscribed in 2012 and 2013, separately. The journals were ranked in decreasing order of usage and then cumulative percentage of usage was compared with cumulative percentage of titles.

It was observed that 39.24% (61 journals) of all journals subscribed in 2012 satisfied 80.21% (10049 articles) of the total download requests (n=158 journals). In 2013, 27.57% (59 journals) of all journals satisfied 80.02% (3670 articles) of the total download requests (n=214 journals). The remaining less than 20% of use was scattered across 60.79% and 72.43% of the remaining journals in the collections, respectively. The portion of the entire e-journal collection that accounted for 80% of the use of the collections far exceeded the expected 20%, in both years. Thus, AAU users tend to consult for considerably more journals of the collections to satisfy their information need.

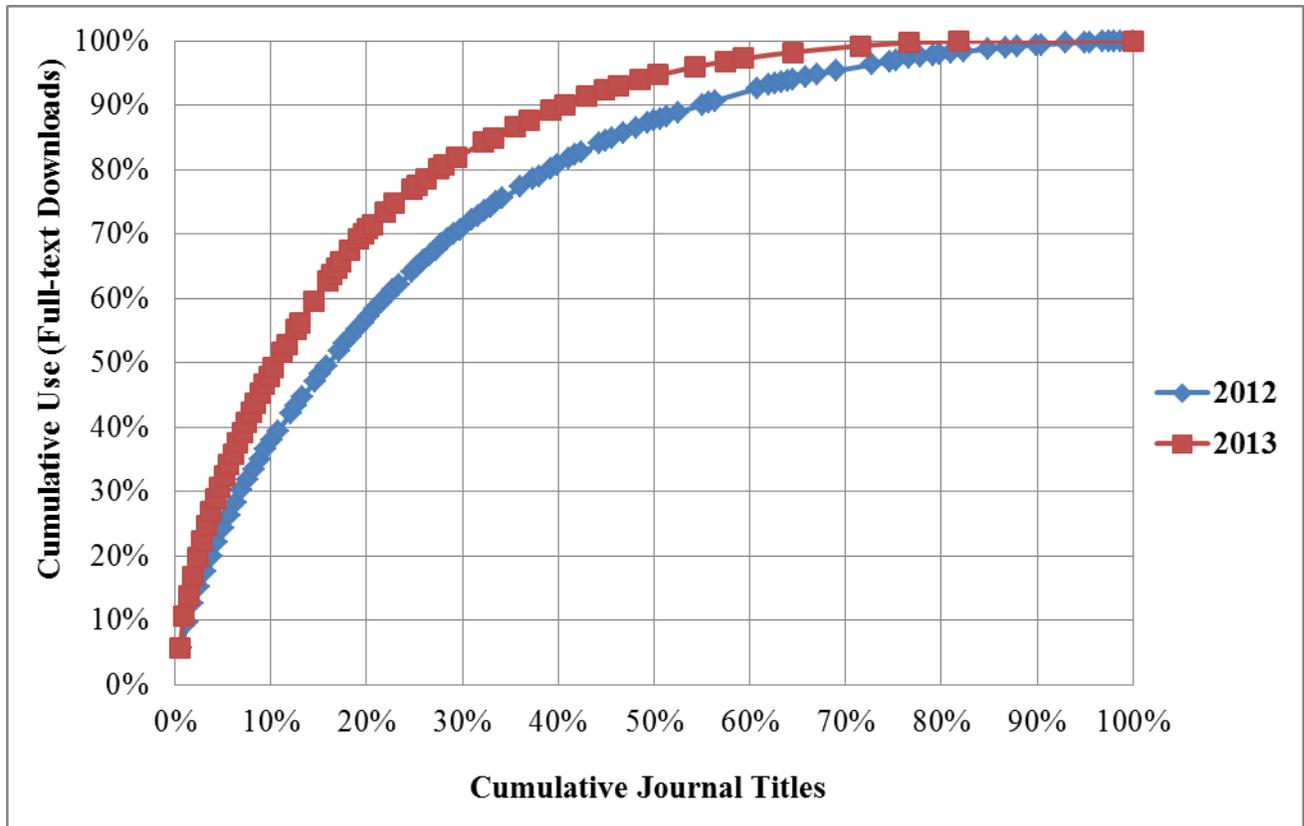


Fig. 4.4. AAU cumulative use, 2012 & 2013

4.3. Patterns of Individual E-journal Use

The most frequently used journals from each year's of e-journals subscriptions were identified by applying the Bradford's Law of Scattering. Accordingly, the entire collection of journals was divided into three regions of journals use; such that the number of article downloads produced by each group of journals was approximately equal. In other words, each group of journals covered one third (1/3) of the total download requests, approximately. Table 4.3 shows the frequencies and percentages journal titles satisfying one third, two third, and all download requests on an annual basis. These journals satisfying article download requests in the first group were defined as "core" journals, to the collection. Likewise, journals in the second and third groups were recognized as "moderately" and "rarely" used journals, respectively. The core journals were the most frequently used journals of the collection.

Table 4.4 shows the list of core journal titles identified among e-journals collection subscribed in 2012. The Bradford analysis only considered these journals in the collection which was downloaded at least one article during the study period. Of the 158 e-journals subscribed in 2012, 156 journals were used at least once per annum while 2 journals remained totally unused. Likewise, 175 journals were used at least once, out of 214 e-journals collection subscribed in 2013. The rest 39 journals were left totally unused during the period of five months (Jan-May).

Table 4.3. Distribution of journals and requests satisfied by regions² among Emerald e-journals package, AAU data, 2012 & 2013

	2012				2013			
	No. of Journals		No. of Requests		No. of Journals		No. of Requests	
Region	N	%	N	%	N	%	N	%
1	13	8.33	4195	33.48	12	6.86	1564	34.18
2	30	19.23	4275	34.12	29	16.57	1602	35.01
3	113	72.44	4059	32.40	134	76.57	1410	30.81
Total	156	100	12529	100	175	100	4576	100

Each group has very different number of journals. Few core journals, in the first region, 13 (8.33%) journals in 2012 and 12 (6.86%) in 2013, was satisfied the majority of all download requests. Moreover, the number of core journals did not change much over the years. Except for core journals of 2012, journals of other groups from both years did not exactly accounted for one third (1/3) of total downloads as proved by Bradford's Law. In 2012, the core journals was accounted for 33.48% (4195 articles) of total download requests, which was relatively close to the frequencies (4176 articles) expected according to Bradford's Law. According to the law, each group of journals was expected to satisfy for one third (1/3) of the total download requests. For instance, in 2012, each group of journals should have satisfied 4195 articles download, which

² represent the three groups identified in Bradford's analysis

accounted for one third of the total download requests (12425 articles). Moderately used journals, in the second groups, were used more (34.12% and 35.01%) over the years, while rarely used journals were used less than 33.33% downloads in the third groups. Rarely used journals covered for an overwhelming majority of all Emerald’s e-journals collection subscribed, 72.44% in 2012 and 76.52% in 2013. Thus, the majority of journals were used rarely and a small number of core journals satisfied a significant proportion of the usage of e-journals in AAU.

Table 4.4. Core journal titles and their cumulative use among Emerald e-journals package, AAU data, 2012

S.No.	Core Journal Titles	Cumulative Use
1	Journal of Manufacturing Technology Management	707
2	Journal of Knowledge Management	496
3	International Journal of Manpower	377
4	Employee Relations	318
5	International Journal of Operations & Production Management	305
6	Managerial Auditing Journal	291
7	International Journal of Quality & Reliability Management	287
8	European Journal of Marketing	268
9	Journal of Services Marketing	258
10	Journal of Business & Industrial Marketing	240
11	International Journal of Productivity & Performance Management	233
12	Management Decision	210
13	Industrial Management & Data Systems	205

Moreover, core journal titles satisfying one third of all download requests further exhibited interesting use patterns. Not only their numbers are quite stable, but also the same journal titles appeared in the core journal’s list of both years to some extent. The most frequently used core journals, which appeared in both 2012 and 2013 core journal’s lists, were identified (Table 4.5). Some 6 journals appeared in both 2012 and 2013 core journal title lists. These journal titles belonged to the *Human Resource Management, Operations and Logistics Management, Managing Quality, Marketing, and Management Science* subject categories.

Table 4.5. Most frequent core journal titles commonly appeared in 2012 and 2013 among Emerald e-journals package, AAU data

S. No.	Core Journal Titles	Cumulative Use	
		2012	2013
1	Employee Relations	318	88
2	International Journal of Operations & Production Management	305	136
3	International Journal of Quality & Reliability Management	287	238
4	European Journal of Marketing	268	232
5	Journal of Services Marketing	258	145
6	Management Decision	210	98

4.4. Stability of Journals Rank over the Years

It was checked if journals fulfilling high use in current year also tends to do the same in the following year as well. In other words, are the use patterns of journals generalizable from year to year, or are the data so variable that meaningful statements can be made only about the current year? To provide answer to this question, the stability of journals rank based on their relative use in 2012 and 2013 was analyzed by applying the Spearman's rank order correlation.

The correlation analysis looked at the similarities between journals rank based on their relative use in 2012 and 2013, respectively. The higher the correlation is the more similar ranking of journals over the years. Thus, a journal title should appear in the lists of e-journals collection subscribed in 2012 and 2013, in order to apply the Spearman's rank order correlation between journals rank from both years. However, journals subscribed in 2012 may or may not be subscribed in 2013. Accordingly, an overlap study was carried out to identify journal titles that appeared in the lists of e-journals collection subscribed both 2012 and 2013. A total of 156 journal titles satisfied all download requests (12529 articles) in 2012, while 175 titles (4576 articles) in 2013 (Table 4.3). As all requests for both 2012 and 2013 were met by a total of 203 unique journal titles, it appears that 128 journal titles were commonly used to satisfy requests in both years. This represents a 63.05% overlap between the two lists of journal titles.

The 128 journal titles that appeared in both 2012 and 2013 lists were ranked based on their cumulative number of downloads during each year, and the similarity between their corresponding ranks over the years was compared using the Spearman's rank order correlation. The Spearman's rank order coefficient (p) was 0.774 ($p < 0.01$), indicating a positive strong degree of similarity between journals rank in 2012 and 2013 ($n=128$ journals). This showed that there exists a statistically significant relationship between journals rank in 2012 and 2013. The null hypothesis that "no relationship exists between titles rank in 2012 and 2013" is thus rejected. This reinforced that journal titles fulfilling high use in 2012 also tend to be used highly in 2013 as well, without considering the effect of those journal titles which was not appeared in both years' lists of e-journals collection. The stability in journals rank over the years may represent a consensus of journal popularity among users.

4.5. Association between Use of Journals and their Impact Factor

It was checked if there is any relationship between frequency of use of journals in AAU libraries and their impact factor received worldwide as a result of citation patterns. Thus, it was determined whether journal's impact factor could serve as a predictor of in-house use of journals. Pearson's product momentum correlation was used for determining whether the two variables were correlated, *i.e.*, journals use measured by number of full-text articles downloads and values of their impact factors received during that year. Accordingly, the correlation analysis was conducted between the use of journals and their corresponding impact factor values in 2012. The impact factor values of Emerald's e-journals collection subscribed by AAU in 2012 were obtained from *Journal Citation Report (JCR) 2012*, which was published by Thomson Reuters (Thomson Reuters, 2013).

A total of 10,853 journal titles were indexed in *JCR 2012*, which were publishing around the globe in 232 different disciplines of *Science* and *Social Science*. Of the total 291 journals published by *Emerald's Publishing Groups* in 2012, only 54 journal titles were indexed in the *JCR 2012*. They all published full-text articles in English language. In the case of AAU, of the total 158 e-journals subscribed in 2012, 156 journals accounted for a total download requests of 12, 529 articles. Among the 156 e-journals, only 49 journals have received impact factors in 2012 and indexed in the *JCR 2012*.

Table 4.6 shows top ten most-used journal titles with their rank order based on values of their impact factor in 2012. Of the total 49 journals analyzed, the number of downloads ranged between 496 (*Journal of Knowledge Management*) and 1 (*Anti-Corrosion Methods and Materials*) (mean=92.12, median=43.00, SD=107.952). The journals' IF values ranged between 1.864 (*Journal of Services Marketing*) and 0.231 (*Interlending & Document Supply*) (mean=0.84935, median=0.77800, SD=0.431104). As shown in Table 6, *Journal of Knowledge Management* (496) was ranked *first* when ordered by cumulative use, which also ranked *thirteen* in terms of journal's impact factor (1.138). In contrast, *Journal of Services Marketing* (1.864) was ranked *first* when ordered by journal's impact factor, which also ranked *fifth* in terms of cumulative use (258). Of the top ten journals in the impact factor list, 5 journals were appeared in the top ten most-used journal's list.

The Pearson's correlation coefficient (r) was 0.550 ($p < 0.01$), indicating a moderate positive correlation between frequency of use of journals and their impact factor ($n=49$ journals). It appears that there is a statistically significant relationship between frequency of use of journals and their impact factors. Therefore, the null hypothesis that "no relationship exists between the frequency of use of journal titles and their journal impact factors" is rejected. The result indicated that journals with high impact factors were used slightly more often by the AAU users.

Table 4.6. Top ten most-used journal titles and their corresponding impact factor among Emerald e-journals package (n=49), AAU data, 2012

Journal Titles	Use		Impact Factor	
	Rank	Frequency	Rank	Frequency
Journal of Knowledge Management	1	496	13	1.138
International Journal of Manpower	2	377	7	1.463
Inter. Journal of Operations & Production Management	3	305	14	1.093
European Journal of Marketing	4	268	24	0.781
Journal of Services Marketing	5	258	1	1.864
Journal of Business & Industrial Marketing	6	240	5	1.5
Industrial Management & Data Systems	7	205	4	1.674

Supply Chain Management: An International Journal	8	195	23	0.816
Inter. Journal of Physical Distribution & Logistics Management	9	180	9	1.252
Accounting, Auditing & Accountability Journal	10	163	20	0.835

4.6. Discussion

In this section, key findings from the results of analyzing the use patterns of Emerald’s e-journals by AAU users were discussed. The entire collection of e-journals from each year’s of subscriptions was analyzed separately. The analysis from the dispersal of use of journal collection was used as a fair measure for evaluating the institutional gain, subscribing to package e-journals. The dispersal of use of journal collection was analyzed using the Bradford’s Law of Scattering and the “80/20” rule.

There was a great variation in the uses of journals in the collection. The top ten most-used journals received downloads over hundred times by AAU users (Fig. 4.1), compared to a handful of times for the least-used journals. The most frequently used are well established and popular journals that publication quarterly or eight times in the year. The journal of Knowledge Management was among the most used Emerald e-journals (Evans and Peter, 2005). In 2012, the top 10 journals (6.33% of the collection) satisfied 28.31% (3547 articles) downloads, and the top 27 journals (12.09% of the collection) satisfied half of the total downloads (6497 articles). Similarly, previous studies have been reported for high degree of skew in journal use among e-journals package (Davis, 2002a; Tonta and Ünal, 2008). The study analyzed the usage of Academic Press’s IDEAL e-journals package by North East Research Library consortium between 2000 and 2001, reported the top 10 journals (4.9% of the collection) satisfied 44 percent downloads. And the top 14 journals (6.8% of the collection) satisfied 50 percent downloads.

A large portion of journals in the collection used very little or infrequently while some journals never used at all. In 2012, 41 journals (25.95% of the collection) provided only article downloads between 1 and 20 during the year (Jan-Dec). Likewise, 79 journals (36.92% of the collection) provided only article downloads between 1 and 10 within five months in 2013 (Jan-May). Moreover, the utilization rate of the majority of journals included in the collection was very low.

The use rate of e-journals collection subscribed in 2012 was 6.61 articles download per title per month (n=12 months). In addition, a considerable amount of journals remained totally unused or received zero download. For instance, some 39 journals (18.22% of the collection) were left unused in 2013 (Jan-May). These results are found in line with that of Singh and Murthy (2005), which analyzed the usage of Elsevier's ScienceDirect e-journals package by Indian Institute of Technology Roorkee for year 2003. It was found that there were 251 titles which received no request at all which constitute about 16.89% of the total titles (n=1486) available online during 2003. There were 145 titles (9.76%) which received single or one download requests each. Hence, they suggested that renegotiation with the publishers is necessary as no mutually agreed contract can be successful if it is not equally balanced.

The majority of article download requests made by AAU users were in PDF format as compared to HTML (Fig 4.2). In both years, HTML accounted for less than 15% of the total downloads. The same result has been obtained in several other studies, which looked at users' preference of article format in their study of e-journals use patterns (Davis and Solla, 2003; Nicholas et al., 2005). In the study analyzed the use of American Chemical Society (ACS) e-journals at Cornell University reported that articles downloaded in HTML format accounted for less than 10% of the total use (Davis and Solla, 2003). Similarly, in their study of e-journals usage of Blackwell's Synergy database, Nicholas et al. (2005) found that two thirds (2/3) of the articles were downloaded in PDF and one third (1/3) in HTML. Jamali et al. (2005) reviewed the conclusions of over ten works that have used log analysis to study the use and users of electronic journals. In general, these studies have shown users preference for the PDF format rather than HTML. They suggested that users' preference for PDF format is apparently because it is friendlier for printing and saving the files. Interviews and questionnaires following the *SuperJournal* project indicated that users preferred reading HTML from the screen, but PDF format when they print. Ken Eason reported that only a small minority of users would read articles from the screen (Eason et al., 2000).

With regards to the Bradford analysis, few core journals satisfied a significant portion of the total download requests, and a vast majority of journals were used rarely or infrequently. Only 13 core journals (8.33% of the collection) met one third of the total download requests in 2012, and 12 journals (6.86% of the collection) in 2013 (Table 4.3). To some extent, the same set of core journal titles consistently satisfy a significant percentage of total download requests in both years. Some 6 journal titles appeared in both 2012 (n=13 journals) and 2013 (n=12 journals) lists of core journals

(Table 4.5). This suggested that the use of journals was concentrated in a relatively small number of core journals in the collection, focused on certain journal titles. Rarely used journals covered for an overwhelming majority of all Emerald's e-journals collection subscribed, 72.44% in 2012 and 76.52% in 2013. This finding coincides with results from previous studies which applied the Bradford's Law while analyzing the scatter of use of e-journals package (Hamaker, 2003; Ke et al., 2002; Tonta and Ünal, 2008). Let alone in AAU of Ethiopia, but also in other major universities of Europe which have a high utilization rate, these studies have also reported that e-journals package licensed under the big deal agreements had a relatively low utilization rates.

Tonta and Ünal (2008) analyzed the usage of e-journals package of Elsevier's ScienceDirect (SD) between 2000 and 2007 among Turkish Universities. They applied Bradford's Law for determining the scatter of journals use in a collection of 2097 e-journals. It was observed that 105 core journals (5% of the collection) satisfied one third of all download requests (some 8.4 million articles). The second one third was satisfied by 273 (12.9% of the collection) moderately used journals and the last one third of requests was satisfied by 1719 (82.1% of the collection) rarely used journals. The lists of core journal titles seem to be quite persistent, for they do not change much on an annual basis. Moreover, a large number of journal titles were rarely used while some were never used at all. Similarly, Borrego and Urbano (2007) examined the data supplied by the publisher on the use of 31 journals of the American Chemical Society (ACS) at the University of Barcelona in 2003. The Bradford analysis for the distribution by journals observed in the consumption of articles showed with a core of 2 journals from which 21,986 articles were downloaded (36.31% of the total of 60,547 full-text download requests), 5 journals from which 19,243 articles were downloaded (31.78%) and 26 journals from which 19,243 articles were downloaded (31.78%).

With regards to the "80/20" rule, the evaluation of an aggregate use of entire the collection of e-journals was more scattered than the classic "80/20 rule" distribution (Fig. 4.4), for both 2012 and 2013. It is thus observed that with an average of 32.26% of the journals one achieves just 80% of downloads of articles. In this sense, there was still a considerable concentration of use in certain titles, where the core consumption was just satisfied by 32.26% of the journals. AAU users have consulted considerably more journals of the collections to satisfy their information need. This reinforces the idea that a freer, more exploratory and often accidental consumption of the

collection by users (Nicholas et al., 2003), in which the participation of students can lead to a considerable dispersal of use. Many empirical studies with regards to the use of library materials have used the “80/20” rule to posit a core library collection, including both print and electronic journals collections (Trueswell, 1969; Chrzastowski and Olesko, 1997; Davis, 2002a; Evans and Peters, 2005; Urbano et al, 2004). While some of the studies reported for slight variation with the “80/20” rule, others have found significant deviation, as similar to the one reported in this study. The result from this study was consistent with results from some of the studies (Blecic et al., 2001; Evans and Peters, 2005).

In 1969, Richard L. Trueswell illustrated the same skewed distribution with library circulation data and found that approximately 80% of the total number of circulation transactions accounted for only 20% of the collection (Trueswell, 1969). Chrzastowski’s study of the print chemistry collection at the University of Illinois at Urbana-Champaign reported that 80% of the usage was satisfied by 26% of the collection (Chrzastowski and Olesko, 1997). The study analyzed the usage of Academic Press’s IDEAL e-journals package by North East Research Libraries from 2000-2001 reported that 24.3% of all journals in the collection accounted for 80% of total use (Davis, 2002a). Blecic, Fiscella, and Wiberley found that 28% of titles in the American Chemical Society (ACS) electronic journal collection accounted for 80% of use (Blecic et al., 2001). Evans and Peters (2005) analyzed the aggregated use of more than 100 business and management journals included in the Emerald Management Xtra (EMX) collection and tested if the dispersal of some 6.4 million articles downloaded in 2004 fitted the “80/20 rule”. They found that the most frequently used 15 journals satisfied 36.7% of all download requests and the download data did not conform to the “80/20 rule”, with 47.4% of journals satisfied the 80% of download requests. Aggregated use of the members of the Consortium of University Libraries of Catalonia (CBUC) of, among others, EMX collection (formerly MCB) between 2001 and 2003 displayed a similar trend: 46.2% journals satisfied 80% of more than 200 thousand download requests (Urbano et al, 2004).

The dispersal in use of journals collection, in both scenarios, clearly shows that a small number of most frequently used or core journals meet the substantial amount of articles download requests made by users. Thus, with an average of 67.47% of the titles being subscribed met just 20% of the total use. In this regards, it indicates that there would be much room for maneuver in establishing

priorities for licensing titles in the future. Table 4.3 and Fig. 4.4 provide us with a guideline for where to start, purchase access to the most important journals and move out as budget allows.

The rankings of journal based on use (number of downloads) was quite consistent year on year, with a few journal titles trading small differences in ranks (n= 128 journals, Spearman's $p=0.774$, $p< 0.01$). The stability in journals rank over the years may represent a consensus of journal popularity among AAU users. All requests for both 2012 and 2013 were met by a total of 203 unique journal titles. It appears that 128 journal titles were commonly used to satisfy requests in both years. This represented a 63.05% overlap between the two lists of journal titles Therefore, if a journal has high use in 2012, one can be fairly confident (95%) that it will also be used high in 2013. Thus, statistics from journals use data in 2012 can be used to identify journals that need further evaluation for retention/renewal decisions during subscriptions in the following year. This result confirms the findings of previous studies by Davis (2002a) and Tonta and Unal (2008).

Davis (2002a) analyzed the use of e-journals in Academic Press IDEAL database by members of North East Research Libraries (NERL) Consortium. He ranked the 203 journal titles available to NERL subscribers in 2000, based on the number of full-text articles downloaded, and compared their corresponding ranks to the 206 titles in 2001. There existed a high level of correlation between titles rank in 2000 and 2001 (Spearman's $p= 0.941$, $p<0.01$). In another study, Tonta and Unal (2008) have analyzed seven years' (2001-2007) worth of e-journals use data comprising more than 25 million full-text articles downloaded from Elsevier's ScienceDirect (SD) database. They concluded the lists of core journals were quite stable, consistently satisfying one third of all demand. The *Spearman's rank order* correlation coefficients (ρ) was ranged between 0.402 (2001/2002) and 0.874 (2006/2007) for core journal titles over two consecutive years ($p< 0.01$).

There exists a moderate positive correlation between frequency of use of journals and their impact factor, which is found to be statistically significance (n= 49 journals, Pearson's $r =0.550$, $p< 0.01$). It appears that journals with high impact factors used slightly more often by AAU users. Eventually, the subject area of a journal was related to its impact factors. The top ten highest impact factor journals was belonged to *Economics*. Stankus and Rice (1982) claimed that the use of journals correlates with impact factor only for journals grouped by subject categories. It was because of the fact that journals across different disciplines or subject categories have very different citation patterns (Slyder et al., 2011). The less specialty titles have high impact factors.

However, regardless of this fact, the relationship between the two variables was found to be statistically significant. These collection of journals analyzed in this study represented various subject fields (n=6). This clearly points out that journal's impact can be used as a relatively good indicator to predict the frequency of local use of journal titles for collection development purposes. Thus, collection managers could use journal's impact factor as an objective basis for making decision when selecting the library's journals collection. This result is in parallel with findings obtained by few use studies (Tsay, 1998; Wulff and Nixon, 2004), tested the relationship between frequency of use of journals and their impact factors in a given year.

Tsay (1998) has analyzed the relationship between the frequency of use of 835 journals and their citation frequency, and impact factors published in life sciences and clinical medicine. She reported that there exists a significant correlation between frequency of use of journals and their citation frequency (Spearman's $p=0.55$, Pearson's $r=0.59$, $p<0.05$). A similar correlation was also observed between frequency of use of journals and their impact factors (Spearman's $p=0.35$, Pearson's $r=0.34$, $p<0.05$). In their study of journals usage from three databases, i.e, Ovid, ScienceDirect, and IDEAL databases, Wulff and Nixon (2004) reported there is a significant relationship between the frequency of journals use and their impact factors, in both print and electronic formats. While a modest positive correlation was found for journals subscribed from Ovid (Pearson's $r=0.58$, $N=94$, $p=0.01$) and IDEAL (Pearson's $r=0.34$, $N=60$, $p=0.01$) databases. On the other hand, a relatively low correlation was observed for journals from ScienceDirect database (Pearson's $r=0.21$, $N=165$, $p=0.01$).

In contrast, several studies also reported that the use of journals based on full-text article downloads and that on impact factors are either slightly correlated (Tonta and Unal, 2008) or not at all (Duy and Vaughan, 2006; Tonta and Ünal, 2005). Duy and Vaughan (2006) examined the relationship between journals use and their impact factor received in 2001, among e-journals package of three publishers (American Chemical Society, Elsevier, and Wiley) subscribed by Concordia University Libraries. The correlation between frequency of use of journals and their impact factors were not statistically significant, for packages of these three vendors (Pearson's $r=0.350$, $N=16$, $p=0.184$ for ACS; Spearman's $p=0.131$, $N=77$, $p=0.255$ for Elsevier; Spearman's $p=0.237$, $N=19$, $p=0.328$ for Elsevier). Thus, they concluded that there is no relationship between the use of journals and their impact factor.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This study attempted to analyze the use pattern of Emerald e-journals package by Addis Ababa University users, to provide clear directions for collection development plans of e-journals. The COUNTER-based usage data of the e-journals collection supplied by the publisher was analyzed, which covered a period of use from January, 2012 to May, 2013. Furthermore, impact factor values of the e-journals collected from JCR 2012 were also used to investigate their association with the use of e-journals.

The use patterns indicated a high degree of skew in use of the e-journal collection, whereby a small number of journals formed the majority of total use. A large number of journal titles were rarely used while some were never used at all, even if the dispersal in use of journals across entire e-journal collection seem to be more scattered than the classic “80/20 rule” distribution. To some extent, the same journal titles appeared in the core journal’s list of both years. Thus, it appears that the use of journals was focused on certain journal titles. The rankings of journal based on use were quite consistent year on year, with a few journal titles trading small differences in ranks. In other words, AAU users tend to use certain journal titles time and again to satisfy their information needs. There exists a significant relationship between frequency of journals use and their impact factors. Thus, it appears that journals with high impact factors tend to be used slightly more often by the AAU users. The use and impact factor of e-journals can be used in collection development practices to the selection of e-journals for renewal decisions in subsequent year’s negotiations.

The above findings do not support selecting what e-journal packages to subscribe without concern for what titles are included. At present, the big deal arrangement seems to be in not favor of academic libraries. E-journals packages are too expensive for academic libraries to spend money on resources that are unused or underutilized. Thus, the most frequently used e-journals should be retained while rarely used or never used journals should be excluded from the collection. Eventually, the university library is expected to reasonably tailor the e-journal collections to meet the needs of its local constituents within the frame of available budget. It should be also noted that the big deal publishers seem to soften their stand on “all or nothing” approach and some of them

allow libraries to pick the titles they want out of a big deal package. Obviously, the usage data of e-journals can be appropriately analyzed in all aspects to establish the usefulness of the e-journals, and thus would certainly supports in the complex decision-making activity of e-journals management in university libraries.

5.2. Recommendation

The present study was based on the usage data of e-journals for one year and five months and that was too for one institution and one publisher's package. Thus, it may not be representative of all member universities, but it gives a sufficient insight into the state of affairs and to initiate further studies on this issue. Hence, based on observations made in the course of the study and the resulting findings, the following recommendations are made for Ethiopian university libraries, future line of works, and vendors, respectively.

Currently, there are more than twenty one Ethiopian Universities, which have access to different vendors' packages of e-journals. However, no one university including AAU has started collecting the usage data for their subscribed e-journals collection, till this study is conducted. It appears that the university libraries may have no awareness of its existence and where to get the usage data since it's not stored and retrieved locally in their intuitional servers. Thus, it's highly recommended that each university libraries should collected the usage data of their e-journals collection on a regular basis, thereby to facilitate the use of data in their collection development and management practices and encourage further studies for academic purposes. Furthermore, Ethiopia Universities spend massive amounts of money on e-journals collection, thus it should be in their best interest to encourage patrons to use those resources. The low level of utilization observed for the majority of e-journals in this study may also be linked with users, especially new ones, awareness of their existence. Thus, the university libraries are expected to better marketing of their available e-resources and provide increased instruction how to utilize them.

With regards to e-journals licensing agreements, the university libraries need to favor those packages which allow them to select out unused and rarely used e-journals embedded in the packages. Thus, unused or little used journals need to be identified and excluded from the collection while retaining most frequently used journals for renewal in subsequent years' negotiations. In their study of e-journal usage, Blečić, Fiscella, and Wiberley suggested that

libraries need to determine the level of usage they are willing and able to support when they have the option of selecting titles for e-journal collections. For instance, libraries may set 90% or 80% of usage of the collection they want to meet as its target goal. Once that has been determined, they “can ascertain the least expensive mix of titles that meets its goal and cancel the others” (Blecic et al., 2001). Thus, libraries pay only a single license fee to these limited set of e-journals which are frequently used and pay-per-use for the e-journals which are less frequently used (Ball, 2004). This economic model would eventually make the big deals more cost effective for use in academic libraries.

This study was just about the analysis of use data of e-journals and does not involve information that may go into purchasing a journal package. Its scope was also limited only to one university (AAU) and one publisher’s (Emerald) package of e-journals. Therefore, it is recommended that future line of works should consider individual study of each vendor’s package of e-journals among all member universities, thereby to develop collection management plans and devise negotiation strategies that can be exercised with vendors’ by libraries management committee represented all member universities. Moreover, why e-journals are unused or little-used needs to be investigated. Considering usage of e-journals is only part of the equation of making collection decisions. Thus, it is recommended to use these findings coupled with cost-per-use studies, whereby the combined findings may directly used in the license agreements.

Finally, it is difficult to know why some journals received more use than others without more information on the users, which the current usage data analyzed in this study lacks ultimately. Thus, librarians need to continue to encourage publishers and vendors to provide more information on users in their usage statistics. Standardization is not enough if it does not provide the information libraries need to help them effectively manage their collections. Though statistics for e-journals usage are useful, but the publishers’ reports are not sufficient for full analysis. Thus, the publishers’ statistical reports need to be improved at the detailed level to provide useful information for management decisions, such as: *How many times a specific article has been downloaded; IP addresses from which journals and articles are accessed.*

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APPENDIXES

Appendix A. Journal Report 1: Number of Successful Full-Text Article Requests by Month and Journal

	A	B	C	D	E	F	G	H	I	J	K
1	Journal Report 1 (R3)	Number of Successful Full-Text Article Requests by Month and Journal									
2	ADDIS ABAB UNIVERSITY										
3	Date run :										
4	2013-05-25										
5		Publisher	Platform	Print ISSN	Jan-2012	Feb-2012	Mar-2012	Apr-2012	YTD Total	YTD HTML	YTD PDF
6	Total For All Journals	Emerald	Insight		2524	994	1316	815	13614	2031	11583
7	A Life in the Day	Emerald	Insight	1366-6282	0	0	0	0	0	0	0
8	Accounting Research Journal	Emerald	Insight	1030-9616	3	0	0	0	3	3	0
9	Accounting, Auditing & Accountability Journal	Emerald	Insight	0951-3574	8	4	43	24	163	17	146
10	Advances in Dual Diagnosis	Emerald	Insight	1757-0972	0	0	0	0	0	0	0
11	Campus-Wide Information Systems	Emerald	Insight	1065-0741	3	9	2	0	21	3	18
12	Career Development International	Emerald	Insight	1362-0436	14	4	16	1	74	7	67
13	critical perspectives on international business	Emerald	Insight	1742-2043	3	1	2	1	12	1	11
14	Cross Cultural Management: An International Journal	Emerald	Insight	1352-7606	1	2	3	7	34	9	25
15	Development and Learning in Organizations	Emerald	Insight	1477-7282	1	1	3	0	34	2	32
16	Direct Marketing: An International Journal	Emerald	Insight	1750-5933	0	0	0	0	0	0	0
17	Disaster Prevention and Management	Emerald	Insight	0965-3562	4	0	3	5	21	5	16
18	Drugs and Alcohol Today	Emerald	Insight	1745-9265	0	0	1	0	1	0	1
19	Education + Training	Emerald	Insight	0040-0912	11	9	0	2	82	15	67
20	Education, Business and Society: Contemporary Middle Eastern	Emerald	Insight	1753-7983	0	0	0	0	1	1	0
21	Electronic Resources Review	Emerald	Insight	1364-5137	0	0	0	0	0	0	0

Appendix B. Journal Citation Report published by Thomson Reuters

	A	B	C	D	E	F	G	H	I
1	Rank	Abbreviated Journal Title	ISSN	JCR Data					
2				Total Cites	Impact Factor	5-Year Impact Factor	Immediacy Index	Articles	Cited Half-life
3									
4									
5	1	4OR-Q J OPER RES	1619-4500	270	0.73	1.137	0.03	33	5.4
6	2	AAOHN J	0891-0162	474	0.856	0.977		0	6.8
7	3	AAPG BULL	0149-1423	7081	1.768	2.455	0.413	92	>10.0
8	4	AAPS J	1550-7416	2779	4.386	5.714	0.604	91	4.7
9	5	AAPS PHARMSCITECH	1530-9932	2606	1.584	1.906	0.171	164	5.3
10	6	AATCC REV	1532-8813	205	0.354	0.297	0.067	30	8.3
11	7	ABDOM IMAGING	0942-8925	2345	1.905	1.861	0.304	125	6.6
12	8	ABH MATH SEM HAMBUR	0025-5858	399	0.568	0.461	0	10	>10.0
13	9	ABSTR APPL ANAL	1085-3375	1244	1.102	1.183	0.349	811	2.3
14	10	ACAD EMERG MED	1069-6563	6020	1.757	2.425	0.445	191	6.9
15	11	ACAD MED	1040-2446	8646	3.292	3.284	0.795	200	7.5
16	12	ACAD PEDIATR	1876-2859	569	2.328	3.017	0.46	63	2.9
17	13	ACAD RADIOL	1076-6332	3876	1.914	2.068	0.48	196	5.9
18	14	ACCOUNT RES	0898-9621	159	0.756		0.087	23	6.4
19	15	ACCOUNTS CHEM RES	0001-4842	42112	20.833	24.633	5.295	207	6.5
20	16	ACCREDIT QUAL ASSUR	0949-1775	671	1.132	0.885	0.19	63	6.1