Chapter 3

Value of Electronic Journals: A Literature Review
3.1. Introduction

While electronic journals are relative newcomers to the scientific community and they are part of a tradition of scientific society publishing that goes back several centuries and forms the backbone of contemporary scientific research. They are also part of an emerging interactive communications and publishing environment: the Internet. The tensions between the established, procedural world of scholarly publishing and the organic, dynamic world of the Internet frame the context for usage, evaluation, and finally, development of electronic journals.

Generally, scientists turn to electronic journals for the same content they receive from print journals. At the same time, the electronic journals format fully realizes its value only within the context of the Internet, where scientists have different expectations about the kinds of information available. Therefore, the characteristics, legacies, and user expectations of both paper and electronic domains would shape electronic journal usage.

3.2. User and Usage Studies: A Literature Review

The user and usage studies appear in literature in late 1990s when the larger number of electronic journals has become widely available (Diedrichs, 2001). These studies were mostly carried out among the academic staff of institutes and colleges who are the most frequent users of scholarly journals.

In the usage studies different methods are used. One of them, mostly used by publishers and libraries is the log file analysis. Some of the disadvantages of this method are the inability to include all the searches; journals can be found on different servers while the access is counted only on one of them; searches are saved in computer cache memory for several days and that kind of access is not measurable. Another problem is that it is not always clear what is being counted: the number of searches or the number of the full text downloads (Bauer, 2000). Survey (poll, questionnaire, interview) is another method (Sercar, et. al., 2001).

The research carried out among users of Princeton University (Holmquist, 1997) showed that 56% of respondents do not use electronic journals. The main reason given
for not using electronic journals was that users prefer to read articles printed on paper. The second reason is the lack of time to study and learn about electronic journals.

In 1995, The University of Tilburg introduced electronic journals in the library collection and started monitoring this service using the log file analysis. This study revealed a lack of information about the use of electronic journals and a lack of information about the use of print journals as well. Therefore in 1996, using diverse methods, a research was conducted about journals usage in general. The study showed that most of the respondents used journals daily and that print and electronic journals are used equally. Most of the requests were covered by a small core of journals while majority remained unused. Some of the reasons traced about why researchers do not use electronic journals are: technical problems when printing articles, preference for actually handling the print journal, lack of sufficient titles on their own research subject; and the incompetence on the part of the researchers in using electronic journals. Generally taken, researchers do not have a negative attitude about electronic journals and they are aware of their advantages (The use of paper and electronic journals by researches, 1999).

During 1996 and 1997 a research was carried out among the Great Britain academic staff and it covered five faculties. The purpose was to determine a possible difference in use of electronic journals among academics belonging to different scientific fields, different academic status and different age groups. The results showed that 72% of respondents did not use electronic journals at all. Among scientific fields, researchers from Business, Science and Engineering use electronic journals more frequently than researchers from social science. However, the study admits that one of the reasons for this is certainly the fact that at the time of the research social sciences were not well represented. In addition, electronic journals were used by 56% of respondents under the age of 40 and only 14% were those over 40 years of age. The use varied according to the academic status: only 12% of professors used electronic journals.

Most of the respondents prefer to read the print copy instead of reading directly from the screen (57%). As far as the biggest advantage of electronic form, they point out the accessibility and possibility to read the article from their own desktop. At the same
time the biggest disadvantage is considered to be the impression that the electronic publication is not a real one and that it would be easy to change its contents - which is actually a concern for the copyright.

Regarding subscription to electronic version only, the study revealed that respondents are still not prepared to give up the print version. As one of the reasons why they do not use electronic journals is lack of time to learn how to use them. They do not reject the new medium completely; as much as 80% of them responded that they could start using electronic journals in future. Indeed, most of them consider the development of the electronic publishing inevitable; it is only a question of how fast it will happen (Tomney and Burton, 1998).

During 1996 within the Café Jus project (Woodward, et al., 1998) a survey was under taken among the postgraduate students and the academic staff of the Loughborough University. Before the main research, a pilot research conducted on a smaller sample showed that the majority of respondents (60%) think that there are not enough relevant electronic journals. In the main research only 20% of respondents maintained this opinion because in the meantime commercial publishers offered a larger quantity of journals available in electronic form.

The respondents listed several disadvantages. These includ: problems in accessing the material, slow download, necessity of fore knowledge (incompetence on the part of the user), required additional software (e.g. Acrobat Reader), inability to access back issues. However, excellent searching capabilities and availability at any time were listed as great advantages. Further more the research showed that users dislike reading the text from the screen, and 59% of respondents consider the print journal easier to handle. Also, the survey stressed the necessity of users education, finding out that diverse interfaces and seeking methods often create confusion.

The results of the survey carried out on ETH in Zürich during 1998 are curious because 52% of respondents were willing to renounce printed versions when the access to the electronic one is provided. A comparison to the research conducted in 1996 showed
the decreased number of those who do not use electronic journals (from 59% down to 25%) (Keller and Neubauer, 1999).

In 1999, a research was carried out in the Max Planck Society in Germany. The results of this survey showed a significantly high acceptance of electronic journals and an unwillingness to return to print versions only. Elsevier journals were used most, but the number of Elsevier electronic journals is also the highest (i.e. 1100 journals, as opposed to 412 from Springer, 174 from Academic Press and 33 from IOP).

The researchers also rated the advantages and disadvantages of electronic journals relating to various aspects.

The advantages include: the direct accessibility from the researchers’ desktop, the possibilities of downloading (or printing out), the currency and up to date information that the electronic journals provide over print versions, and full text retrieval possibilities. In addition, the greatest advantage of electronic journals is the direct accessibility from the researcher’s desktop (78%) and their prompt availability.

The disadvantages include: lack of long term access and incomplete volumes, network dependency, reading from monitor, loss of certain attributes of the paper version, graphic quality, lack of citation status, and standards. The greatest disadvantages were seen in the lack of long term access and incomplete volumes (Rusch-Feja, et al., 1999).

In December 1999, a survey carried out at Stanford University. The results showed that 1,169 searches were performed in Journal of Biological Chemistry (JBC). This suggests that users are using electronic resources rather than going to site to obtain a specific citation. Many users mentioned that they prefer PDF, but most JBC users chose HTML format over PDF.

Brown (1999) reported that less than 50% of the faculty in science fields at the University of Oklahoma obtained journal articles electronically, and 62-65% preferred print versions. Between 23% and 31% of respondents favored an electronic version (depending on their field). Those who wanted to have access to both versions wanted to be able to print copied articles from the electronic version.
The other study by Lenares among Research Institutions in 1999 revealed that the number of faculty using electronic journals has increased in all disciplines. The frequency of electronic journal usage has remained steady over the one year period. The increase in electronic journal usage is accompanied by a decrease in the frequent use of print journals. Moreover, the result provided evidence of the rapidly growing acceptance of electronic journals within the scholarly community (Lenares, 1999).

In the Super Journal project the study covered academic staff from thirteen universities in Great Britain. A research on use of electronic journals as well as print one was carried out during a two-year period (1997-1999). The respondents sorted out several advantages of electronic journals: easy to access, access from their own desktop, simultaneous use. As disadvantages, they pointed out: scarce representation of certain scientific fields, insufficient number of available back issues and slow download. On the other side, disadvantages of print journals are: user has to pay the visit to the library, look for the journal and very often find out that journal has been already in use, lost or misfiled. Generally, respondents see electronic journals as a new library service, as well as supplement to the print journals, not a replacement for it (Baldwin and Pullinger, 2000).

In the survey carried out in the year 2000 at the Library and Learning Centre, University of Bath, the respondents point out the importance of an existing electronic journal archive in case subscription is cancelled (53%). Nineteen percent of respondents absolutely do not want to cancel the print subscription. The other way round, more than a half of respondents (56%) want the library to provide even more electronic journals. (Electronic journals survey, 2000).

Another study was undertaken in the Norris Medical Library at the University of Southern California setting to compare the usage of a matched set of biomedical literature available to users both in print and on the web (Morse and Clintworth, 2000). During the six-month study period, there were approximately 28,000 electronic viewings of full-text articles from the study subset, compared to only 1,800 uses of the corresponding print volumes. The results further revealed a remarkably similar usage
curve in the print and electronic data, with just 20% of titles accounting for nearly 60% of usage in both studies set.

In May-June 2000 Defense Science and Technology Organisation (DSTO) Research Library in Australia conducted a “Client survey on electronic journals” (Hayton, 2001). The main results are listed bellow:

- Forty-seven percent of respondents currently used electronic journals.
- Library staff felt that this figure may be inflated due to confusion between the terms ‘database’ and ‘electronic journal’.
- The most valued aspects of electronic journal usage were reliable access and comprehensiveness, followed by the ability to download and concurrent searching across a range of years.
- Respondents preferred to use hard copy for browsing and reading, and electronic journals to search for information.
- Respondents expressed a high level of concern about technical problems - connections dropping out, slow downloading etc. Users wanted assurance about connectivity.
- Fifty-eight per cent said they were willing to forgo hard copies but of these only fifteen per cent gave unqualified support. There were many issues to be resolved first. Common concerns were the accessibility of electronic journals and the need to download and print. The research gave no clear endorsement for the discontinuation of hard copies.
- Sixty-two per cent were concerned about possible lack of archival access when converting to electronic journals
- Clients identified on-line tutorials as the most useful type of training in electronic products; and
• Client confusion about table of contents services abounded; they were also unclear about the distinction between databases and electronic journals.

During 1998 the consortium of Ohio's college and university libraries and the State library of Ohio (OhioLINK) carried out two year research on accessing electronic journals using the log file analysis (Diedrichs, 2001). OhioLINK Electronic Journal Center stored locally on its server wide range of journals subscribed from different publishers. That way its users had a uniform interface and access itself became easier to analyze. A special attention was paid to usage of titles that the library did not hold in print. It was revealed that 77% of downloads are from journals not held in print by libraries. It was concluded that users benefit from the offer and that print subscription not necessarily correspond to users' needs. Since the degree of utilization turned out to be high the decision to subscribe to electronic journals was correct.

The librarians Clajus and Maier from the University and State Library in Köln carried out survey among the academic staff and found out that under no circumstances 16% of respondents did not want to renounce the print version of the journals. As the biggest advantages of the new service they pointed out the possibility of full-text access from their own desktop (49%), and the fact that the electronic journal is available before the print one. Besides the full text access, other facilities like the table of contents and the summary are also often consulted. As well as the researches of the University of Bath and the one of the Max Planck Institute this one also reveals that the respondents insist on the importance of electronic journal archives (Clajus and Maier, 2001).

Another usage study was conducted at the Stanford University in 2001 by interview method. A two-year Stanford University Libraries project funded by the Andrew W. Mellon Foundation, was conducted from November 2000 to March 2001 by researchers at the Institute for the Future. The study was intended to explore and describe the emerging logic and explanatory frameworks of e-journal usage in scientific scholarly practice among users of biomedical literature. The methodology was based on in-depth ethnographic interviews.
The result showed that the most significant current source of value from e-journals is in the scholars’ ability to search them and online searching emphasizes the article as a relevant container of knowledge rather than the journal itself. E-journals features got blurred with the features of the broader search-and-retrieval environment. E-journals appeared as constellations of networked information in a larger informational galaxy. In addition, there was no single pattern of usage predominate for e-journals and scholars used them based on convenience while two overlooked technologies key to e-journal adoption and usage were the computer itself and the printer. E-journals also offered different types of value for searching, reading, and publishing and scholars evaluated them differently depending on whether they were searching, reading, or publishing in a journal. Moreover, e-journals improved the efficiency of scientific scholarship and facilitated new forms of scholarly practice through new relationships to information, knowledge, and peers (Stanford University Study, 2002).

Tenopir and King have conducted a series of studies in 2000 and 2001 to track reading habits of scientists in all disciplines. The results have shown that reading of scholarly articles has increased to approximately 120-130 articles per person per year, with engineers reading fewer journal articles on the average and medical faculty reading more. Most scientists in a discipline were using electronic journals at least part of the time, with considerable variation among disciplines. Although the scholarly journals system has changed dramatically in the past few decades, it is evident that the value scientists place on the information in scholarly journal articles, whether electronic or print, remains high (Tenopir and King, 2002).

In 2002, another user study was carried out between scientists at the Rudjer Boskovic Institute (RBI) in Zagreb. The results showed high acceptance and use of electronic journals. The RBI respondents stressed the availability of the electronic journals before the print version as the most important advantage, and slow download as the most important disadvantage. Very few respondents think that electronic journals have no disadvantages at all (10 in the first and 3 in the second survey). Most of the respondents preferred print version in the situation where both versions were available, there were lots of those who used both versions equally (32% and 33%). Like other
similar studies this one also proved the fact that respondents prefer reading the article printed out instead reading from screen. (73% and 79%) (Pazur, 2002).

Two statewide Illinois Interlibrary Loan (ILL) studies were conducted in Illinois in 1995-1996 and 1999-2000. The results from the two studies provided a longitudinal look at borrowing. Based on the findings, the journals with more articles requested per title tended to be available in state and those with a single request per title were more likely to be available out of state. Science, especially medicine and biotechnology derived ILL. Humanities and social science subject areas were moving toward reliance on more out of state rather than within state sources. The out of state requests were growing twice as fast. The full-text electronic access continues to grow, so does ILL (Wiley and Chrzastowski, 2002).

Furthermore, the Academic Press IDEAL aggregate has analyzed the annual electronic journal usage data for the NorthEast Research Library (NERL) consortium for 2000 and 2001 package. Patterns indicated a high degree of skew in use of the journal collection: a small number of journals formed the majority of total use. Each institution illustrated a unique usage pattern, with some institutions using (proportionally) more or less of the collection. No institution used every title, and some titles were used very infrequently by the consortium as a whole. Title ranking showed high congruence between 2000 and 2001. Titles not subscribed to in print received about ten times less use than locally subscribed titles. The results show the old 80/20 rule is alive as well (Davis, 2002).

In 2003, a user survey was conducted on 25 Italian academic institutions. Electronic journals were part of respondents’ weekly reading habits (77.8% use e-journals at least once a week). There were general acceptance and preference for e-journals especially in the STM fields and tendency to use e-journals rather than print journals when they are available. The advantages of e-journals were: quick consultation (23%), article downloading (18%) and storing the article locally (18%). The disadvantages were: Internet connectivity (32%), Incomplete volume collection (27%), Difficulty of reading from a screen (19%) (Gargiulo, 2003).
In UK, a project designed with the primary aim of testing a hypothesis that learning can be enhanced by promoting the use of e-journals. It was run jointly by a member of the library staff and academics within the Business School at University College Worcester (UCW). Analysis of the results indicated that effective collaboration between academic and library staff, the timely embedding of e-journal induction into the learning process and associating it with the assessment process, can significantly enhance the learning of students. The data indicated an encouraging increase in journal usage for assignment research. Inspection of bibliographies indicates that the majority of this enhanced journal usage is of e-journals (Colvin and Keene, 2004).

3.3. Impact Factor

Citation and article counts are important indicators of how frequently current researchers are using individual journals. The impact factor is one of the famous tools for measuring citation. The impact factor will help to evaluate a journal’s relative importance, especially in comparison to other journals in the same field. The Institute for Scientific Information, (ISI; producers of the Science Citation Index and the Social Sciences Citation Index), has been publishing impact factor since 1975 in its Journal Citation Report (JCR).

The impact factor is the ratio of the number of citations by source items in a particular year to the total number of source items published over a fixed period of time in a particular periodical publication such as journal. It is a measure of the frequency with which the “average article” in a journal has been cited in a particular year or period. The annual JCR impact factor is a ratio between citations and recent citable items published. Thus, the impact factor of a journal is calculated by dividing the number of current year citation to the source items published in that journal during the previous two years (Sen, 1999).

\[ A = \text{total citation in 1992} \]
\[ B = \text{1992 citation to articles published in 1990-91 (this is a subset of A)} \]
\[ C = \text{number of articles published in 1990-91} \]
\[ D = B/C = 1992 \text{ impact factor} \]
The features of impact factor are listed below:

- It is a number, and not expressed in terms of any unit;
- It is year specific;
- The value of the impact factor generally lies between 0 and 50. Of course, the upper limit is not fixed and can go even higher;
- Generally review periodicals tend to have greater impact factors than the research periodical;
- The impact factor of a journal in most cases is a reflection of its world standing and to a large extent its quality;

The impact factor for nearly 8,400 journals listed in the ISI Journal Citation Report. Coverage is both multidisciplinary and international, and incorporates journals from over 3,000 publishers in 60 nations. The JCR can show the highest impact journals (impact factor), most frequently used journals, hottest journals, and largest journals (Garfield, 2000).

JCR Web is available annually in two editions:

- The Science Edition contains data from roughly 5,000 journals in the areas of science and engineering.
- The Social Sciences Edition contains data from roughly 1,500 journals in the social sciences.

The JCR provides quantitative tools for ranking, evaluating, categorizing, and comparing journals. The impact factor is one of these tools. It is a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period. The annual JCR factor is a ratio between citation and recent citable items published (Garfield, 1999).
The impact factor is useful in clarifying the significance of absolute (or total) citation frequencies. It eliminates some of the biases 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. Particularly in the latter case such journals have a larger citable body of literature than smaller or younger journals. All things being equal, the larger the number of previously published articles, the more often a journal will be cited.

3.4. Citations to Electronic Journals

Based on literature, a few researchers have used citation analysis to determine the scholarly impact of electronic journals. Harter (1996) examined citations to articles in 39 peer-reviewed pure-electronic and paper-electronic journals. His results suggest that the majority of scholarly, peer-reviewed pure-electronic journals had negligible influence on scholarly communication in their respective fields in the mid-1990s. Only eight of the 28 pure-electronic journals had been cited ten or more times over the course of their lifetimes. However, the most cited (and now defunct) pure-electronic journal, The Public-Access Computer Systems Review, was highly cited relative to other journals in the library and information sciences.

A similar study of electronic journals in the library and information sciences by Yin Zhang (1998) found that during the years 1994-1996, the impact of e-journals increased, though not to a statistically significant extent.

One of the most interesting examples of differences among print journals, paper-electronic journals and pure electronic journals can be seen from the case of the journal Pediatrics (Anderson, Sack, Krauss, and O'Keefe, 2001). This journal has been published in print since 1948. In January 1997 the editors added an online-only section, named Pediatrics electronic pages. Articles published in those pages were chosen by an editor from accepted papers, with preference given to those of broader international interest. Abstracts of those articles were published in the printed version of the journal. In July 1998 the editors started publishing the print content online (by subscription), while still maintaining the Pediatrics electronic pages free of charge.
Anderson et al. studied articles published in 1997 through 1999 in order to determine how successful articles published online are. They examined WWW usage statistics, citations within the biomedical literature and author perceptions. Interviews with the authors revealed that they perceive online-only publications as second-tier publishing compared to print, and felt that they are not perceived equally by P&T (Promotion and Tenure) committees and the academic community.

Authors’ fear that articles published in pure e-journals will be devalued is consistent with findings from other studies (for example Schauder, 1994). In contrast with this perception are the results of Andersen et al.’s citation analysis and P&T committees’ opinions. Sixteen per cent of the Pediatrics survey respondents (44) reported that they had applied for tenure since their articles were published in Pediatrics electronic pages and that they included those articles in their portfolio. In all cases, these articles were accepted by their institutions. All of these authors included their Pediatrics electronic pages articles on their resumes, even if they considered these articles inferior to their publications in p-journals. Articles in Pediatrics electronic pages were cited in a manner similar to articles in Pediatrics, the print journal, and there were no differences in how quickly the articles were cited after publication. The articles that were published in Pediatrics electronic pages were accessed four times as often as the Pediatrics print edition articles on the WWW site. This difference may be due to the fact that the Pediatrics electronic pages are free of charge. One caveat to be mentioned is that only 21% of the readership of Pediatrics are actively engaged in research, and the other readers are primarily practicing pediatricians.
3.5. Summary

Electronic journals are part of both traditional scientific society publishing and an emerging communications and publishing environment namely Internet. So, lots of factors may affect use of electronic journals. The literature study reveals that acceptance and use of e-journals is increasing. The studies have shown both advantages and disadvantages of electronic journals.

The following are some advantages: the direct accessibility from the researchers’ desktop, prompt availability, the possibilities of downloading (or printing out), the currency and up to date information electronic journals provide over print versions, and full text retrieval possibilities.

The disadvantages include: the lack of long term access and incomplete volumes, network dependency, reading from monitor, loss of certain attributes of the paper version, graphic quality, lack of citation status, and standards.

The impact factor, as a quantitative tool, helps to evaluate a journal’s relative importance especially in comparison to other journals in the same field. A few researchers have used impact factor and citation analysis to determine the scholarly impact of electronic journals.