

**AN INVESTIGATION OF FACTORS INFLUENCING THE
ACCEPTANCE OF OPEN ACCESS PUBLISHING AMONG
MEDICAL RESEARCHERS IN IRAN**

**THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

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ABSTRACT

Open access publishing provides unlimited free access to peer-reviewed articles published in open access journals. It is a way of sharing scientific knowledge and provides equal access to researchers from all over the world, especially for those unable to afford paid subscriptions. The success of this scholarly communication media depends a great deal on its acceptance by researchers. Several studies have previously investigated open access from the perspective of researchers in developed countries. However, because of diverse cultural, educational, economic and technological factors in the world, there is no “one-size-fits-all” solution. It is well known that developing countries lag behind in open access practices. As a developing country, Iran has not been the subject of much research and the opinions of Iranian researchers regarding open access have not been investigated well. The aim of this study was to determine the current status of open access among Iranian medical researchers, and the factors influencing acceptance of open access publishing among them. This study used a survey design and a questionnaire as data collection instrument. The theoretical framework for the study was based on dimensions of the UTAUT model. The sample comprised 367 clinical/basic science academic staff of medical schools at public medical universities in Iran, selected using proportionate stratified sampling. The findings of study indicate that there is low familiarity with terms, initiatives and services of open access. Researchers use six open access services (open access journals, Iranian open access journals, DOAJ, BMC, PLoS and PubMed Central) more as readers than as authors. About half (47.7%) of the researchers had not submitted any manuscripts to open access journals. The researchers had low self-archiving experience (pre-print 4.4%, post-print 16.7%), but a majority of them (71%) were keen to archive if their universities were to set up an institutional repository. Based on mean scores, seven factors -- facilitating conditions,

effort expectancy, performance expectancy, attitudes, concerns with author-pay, social influence, and anxiety -- influenced acceptance of open access publishing. Results of hierarchical multiple regression indicate that out of the 14 predictors of intention to use open access journals, only experience, attitude, facilitating conditions and type of university were significant. Also, results of regression show that out of 14 predictors of the use of open access journals, only intention, social influence, attitude, academic ranking, facilitating conditions, type of university and familiarity were significant key predictors. The results also suggest that researchers in top universities used open access journals more than researchers in lower ranked universities, but those from lower ranked universities had greater intentions to use these journals in future. The influence of concerns with author-pays on intention to use open access journals among researchers in Type One universities was higher than researchers in Type Two and Three universities. Also the influence of concerns with author-pays on use of open access journals among female researchers was higher than male ones. Eight constructs and six demographic factors together explain 22.3% of the variance in the use of open access journals. Seven constructs and seven demographic factors together explain 24.1% of the variance in intention to use open access journals. This study is significant in that, it provided a description of the current status of open access among Iranian medical researchers. It also investigated the acceptance of open access among researchers based on a theoretical framework derived from the UTAUT model, as well as inclusion of attitudes and anxiety as dimensions influencing acceptance.

ABSTRAK

Penerbitan capaian terbuka (*open access*) menyediakan capaian percuma ke rencana rakan setara yang diterbitkan di jurnal percapaian terbuka. Ia merupakan satu cara untuk berkongsi hasil ilmu sains dan menyediakan pencapaian yang sama rata bagi para penyelidik di seluruh dunia, terutama bagi mereka yang tidak mampu membayar yuran langganan. Kejayaan media komunikasi ilmiah ini bergantung kepada penerimaannya oleh para penyelidik. Beberapa kajian lepas telah mengkaji pandangan para penyelidik di negara-negara membangun mengenai penerbitan capaian terbuka, tetapi di sebabkan ketidaksamaan faktor budaya, pendidikan, ekonomi dan teknologi di setiap negara, tiada penyelesaian “satu-saiz-untuk-semua”. Adalah diketahui bahawa negara-negara membangun agak ketinggalan dalam amalan pencapaian terbuka. Sebagai sebuah negara membangun, Iran ketinggalan dari segi sasaran kajian, dan penyelidikan mengenai pandangan terhadap penerbitan capaian terbuka tidak banyak dikaji. Kajian ini bertujuan mengkaji status capaian terbuka dikalangan para penyelidik perubatan di Iran, dan juga faktor-faktor yang mempengaruhi penerimaan penerbitan tersebut di kalangan mereka. Kajian ini menggunakan rekabentuk tinjauan dan soal selidik sebagai peralatan untuk mengutip data. Rangka teori kajian ini adalah berdasarkan dimensi-dimensi model UTAUT. Sampel kajian ini adalah seramai 367 kakitangan akademik dalam bidang klinikal/asasi sains di sekolah perubatan di universiti-universiti perubatan awam di Iran, yang dipilih berdasarkan persampelan lapisan seimbang. Hasil kajian ini menunjukkan bahawa terdapat kebiasaan rendah dengan istilah, inisiatif dan perkhidmatan capaian terbuka. Para penyelidik menggunakan enam perkhidmatan capaian terbuka (iaitu, jurnal pencapaian terbuka, jurnal pencapaian terbuka Iran, DOAJ, BMC, PLoS and Pusat PubMed) lebih sebagai pembaca dari sebagai pengarang. Hampir separuh (47.7%) dari para penyelidik tidak

pernah menyerahkan sebarang manuskrip kepada jurnal pencapaian terbuka. Para penyelidik juga mempunyai tahap pengalaman pengarkiban sendiri (*self-archiving*) yang rendah (4.4% sebelum, dan 16.7% selepas penerbitan). Faktor-faktor utama dalam penerimaan penerbitan pencapaian terbuka, berdasarkan perhitungan min, adalah syarat-syarat permudahan, pengharapan dalam usaha, pengharapan dalam prestasi, sikap, prihatin terhadap pembayaran oleh pengarang, pengaruh sosial dan kegelisahan. Hasil keputusan susunan berbilang regresi menunjukkan bahawa dari 14 ramalan jangkaan penggunaan jurnal pencapaian terbuka, hanya pengalaman, sikap, syarat-syarat permudahan dan jenis universiti adalah penting. Hasil regresi juga menunjukkan bahawa daripada 14 ramalan penggunaan jurnal pencapaian terbuka, niat, pengaruh sosial, sikap, kedudukan akademik, syarat-syarat permudahan, jenis universiti dan kebiasaan adalah faktor-faktor yang sangat penting. Hasil kajian menunjukkan bahawa para penyelidik di universiti-universiti terkemuka lebih kerap menggunakan jurnal pencapaian terbuka daripada para penyelidik di universiti-universiti yang rendah kedudukannya, tetapi mereka lebih berminat untuk menggunakan jurnal tersebut pada masa hadapan. Mengenai kebimbangan pembayaran pengarang ke atas tujuan penggunaan jurnal akses terbuka untuk penyelidik-penyelidik di Universiti Jenis Satu lebih tinggi dari penyelidik di Universiti Jenis Dua dan Tiga. Kebimbangan pembayaran pengarang ke atas tujuan penggunaan jurnal akses terbuka untuk penyelidik wanita adalah lebih tinggi daripada penyelidik lelaki. Sejumlah lapan konstruk dan enam faktor demografi menghuraikan 22.3% perbezaan dalam penggunaan jurnal pencapaian terbuka. Sejumlah enam konstruk dan enam faktor demografi menghuraikan 24.1% perbezaan dalam niat penggunaan jurnal pencapaian terbuka. Kajian ini adalah penting dari segi ia telah memberi gambaran status terkini penggunaan pencapaian terbuka di kalangan para penyelidik perubatan di Iran. Ia juga

telah mengkaji penerimaan pencapaian terbuka berdasarkan rangka teori yang berdasarkan model UTAUT, serta penambahan faktor sikap dan kegelisahan sebagai dimensi yang mempengaruhi penerimaan.

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ABBRIATIONS

BMC	Bio Med Central
BOAI	Budapest Open Access Initiatives
DOAJ	Directory of Open Access Journals
ETDs	Electronic Thesis and Dissertation
ICT	Information and Communication Technology
IV/DV	Independent Variable/Dependent Variable
ISI	Institute for Scientific Information
NIH	National Institute of Health
NDLTD	Networked Digital Library of Theses and Dissertations
OAI	Open Access Initiatives
PLS	Partial Least Square
PLoS	Public Library of Science
SCI	Science Citation Index
SEM	Structural Equation Model
STM	Science, Technical, and Medical
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1

INTRODUCTION

1.1 Background to Study

Aggregation and advancement of knowledge takes place through the collective efforts of researchers around the world. The generation of knowledge is only one part of the research process; for knowledge to be useful, it should be communicated and shared with others in appropriate formats (Arunachalam, 2003). The word “publish” has special meaning in the scientific community (Walker, 1998); publishing is one way to disseminate new findings for otherwise these findings will perish stillborn. Knowledge must be communicated to the next generation. However, in the first instance it should be communicated to one’s fellow-researchers and one’s peers so that they can apply, test, and build upon it (Harnad, 1999). The research literature is the most effective research tool to educate, provoke, and inspire researchers (Prosser, 2003). Knowledge generation and diffusion is also at the heart of long-term economic growth. Hence, scholarly communication, and more specifically scholarly publication, is an important manifestation of knowledge generation and diffusion (Beer, 2005).

To produce new knowledge, scholars need to have access to scholarly literature but access is sometimes limited by serials’ prices and permission crisis. While high prices of serials limit access, in permission crisis although libraries pay, access is restricted by licensing terms and software locks, and library users do not use electronic journals in the same full and free way that they may use print journals. Due to the serials crisis, not only libraries must deal with canceling subscriptions and cutting into their other budgets, but also researchers must do research with no access to some of the critical journals (Suber, 2003).

Obviously the serials crisis represents a gap between the proportion of the literature that libraries can access and the information that researchers need to be effective. This gap has widened over the last few decades as the annual rise in average subscription prices for Science, Technical, and Medical (STM) journals has outstripped the increase in library budgets around the world (Prosser, 2003). In general, higher speed of publications, higher citation rates and a wider dissemination of research results currently impact the closed access model (Hess et al., 2007). Consequently, with limited access to scholarly literature, it is not easy for scholars to fully contribute to the knowledge canon and the advancement of a domain (Beer, 2005).

1.1.1 Open Access as a Solution for Serials Crises

In order to address price and permission issues a meeting was organized in Budapest in December 2001 (Prosser, 2003). The purpose of the meeting was to accelerate progress in international efforts to make research articles in all academic fields freely available on the Internet. At this meeting, participants explored effective and affordable strategies for serving the interests of research, researchers, and the institutions/societies that support research (Budapest Open Access Initiative). It was at this meeting, that open access was suggested to solve the serials crises.

“Open access is an immediate, permanent, toll-free online access to the full-texts of peer-reviewed research journal articles” (Harnad, 2007). The goal of open access is to grant anyone, anywhere and anytime free access to the results of scientific research (Mele, 2009, citing Max-Planck, n.d.). It should be noted that open access is not self-publishing or bypass peer-review or even a kind of second-class, cut-price publishing route. It is a means by which to make the peer-reviewed literature freely available online to the whole research community (Swan, 2008). Both price and permission crises can be solved by open access.

Open access literature has two fundamental properties. The first one is that open access is free of charge to everyone; this feature solves the pricing crisis. The second property is that the copyright holder acknowledges in advance to unlimited reading, downloading, copying, sharing, storing, printing, searching, linking, and crawling which solves the permission crisis (Suber, 2003).

The Budapest Open Access Initiatives (BOAI) identified two parallel and complementary strategies for open access, self-archiving and open access journals (Prosser, 2003). “Open access journals are scholarly journals that are available online to the reader without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself”. “Self-archiving involves depositing a free copy of a digital document on the World Wide Web in order to provide open access to it” (definition adapted from <http://en.wikipedia.org/wiki>).

Open access or free online availability of scientific literature offers substantial benefits to science and society. In order to maximize impact, minimize redundancy and speed scientific progress, authors and publishers should aim to make research easy to access (Lawrence, 2001b). In open access literature, usage would not be limited by passwords, IP address, usage hours, institutional affiliation, physical location, a cap on simultaneous users, or ability to pay. There is no need to authenticate users or administer proxy servers (Suber, 2003). In summary, open access enhances and accelerates the research cycle such as a publishing process of reading, citing, and then building upon it by other researchers. Open access can advance science and will do so more and more effectively, as more scientists make their work freely available (Swan, 2007).

1.1.2 Open Access and Main Stakeholders

Of all the groups that have a role in open access to scholarly literature, only authors are in a position to deliver it. Authors are the ones who decide whether to submit their work to open access journals, to deposit their work in open access archives, or to transfer copyright. So even though readers, libraries, universities, foundations, and governments have their own perspectives on open access those that support the concept can guide help or push authors, but in this sense authors are dominant in the campaign for open access (Suber, 2004). Scholars comprise the main body of authors and readers of scholarly literature. Therefore, they are the core of open access, and their understandings and views of open access determine the destiny of this movement. Only with authors' support and submissions, can the open access movement be meaningful and successful (Wang & Su, 2006). Furthermore, big changes are taking place in the journal publishing business and there is considerable disagreement amongst authors, publishers, librarians and funding bodies about the best way forward (Rowland & Nicholas, 2005). Any scholarly publisher can confirm that launching a new publication today is a risky proposition. The biggest challenge may be attracting authors and readers (Johnson, 2000). Also in transforming from traditional publication model to open access, authors play a critical role in the success of the transition.

Open access publishing is a scholarly communication media and is regarded as an innovation that is impossible without technology, especially the Internet and computers. As such dimensions of technology acceptance theories can be appropriate in determining the reasons that influence the use of this new publishing channel. The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model which consists of four dimensions (performance expectancy, effort expectancy, social influence and facilitating conditions). A number of studies (Dulle & Minish-Majanja, 2011; Dulle,

Minish-Majanja & Cloete, 2010; Hedlund, 2008; Mann et al., 2008; Hess et al., 2007) have used some or all dimensions of this model to examine the adaptation of open access by scholars. Most of these studies (Dulle, Minish-Majanja & Cloete, 2010; Hedlund, 2008; Hess et al., 2007) mainly focused on descriptive results rather than testing a theoretical framework. Several studies (Dulle, Minish-Majanja & Cloete, 2010; Mann et al., 2008; Hess et al., 2007; Warlick & Vaughan, 2007; Ghane, 2006; Schroter, Tite, & Smith, 2005; Rowlands, Nicholas & Huntingdon, 2004) showed positive attitudes of authors towards open access. A number of other studies (Schonfeld & Housewright, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Park and Qin, 2007; Warlick & Vaughan, 2007; Barbour & Patterson, 2006; Nicholas, Jamali & Rowlands, 2006; Beer, 2005; Schroter, Tite & Smith, 2005; Wang & Su, 2006; Anderson, 2004; Swan & Brown, 2004; Bjork, 2004) showed concerns of authors regarding open access. Beside the four mentioned dimensions of the UTAUT model, attitude and anxiety may be appropriate to apply in open access context. Table 2.1 in the next chapter, presents a list of concerns extracted from these studies.

1.1.3 Research Context

Sharing knowledge is a fundamental process in order to improve the health care delivery system. The open access movement is an opportunity to rethink the equal distribution of all research knowledge. The development of open access provides better chances for researchers to exchange and collaborate, so that knowledge could be translated into usable forms by frontline health workers. The role of open access for scholarly outputs is well understood when a phenomenon such as communicable diseases is taken into account. Such diseases do not recognize national boundaries; therefore, sharing of research findings across borders and the building of a global knowledge base was increasingly

important for solving problems that were faced in this regard (Chan, Kirsop & Arunachalam, 2011).

Based on a 10/90 gap, 90% of diseases arose in the poorest regions of the world in which publicly funded health care information and medical research findings were locked to them (Swan, 2008 citing Kirsop). Although there were some free access projects for poor countries, they were not country-wide and were only available for the researchers who worked in the registered institutions (Chan, Kirsop & Arunachalam, 2011).

Accessing up to date research findings is critical for health researchers all over the world. According to a report submitted by the National Institute of Health (NIH), the increase in the prices of established journals had adversely affected the ability of academic and health sciences libraries in terms of supporting the needs of the research and health care provider communities in terms of accessing biomedical literature (Zerhouni, 2004). A faster pace for the diffusion of research findings through Internet and free access for researchers in open access system could improve research cycles in health domain globally. However, according to a report presented by Hess (2008), the global knowledge commons that was facilitated by open access is still poorly understood due to its infancy and required more study in terms of its governance and sustainability.

The research context of the present study is comprised of open access in the health domain and researchers in medical schools of public medical universities of Iran. Generally, the public medical universities of Iran are under the Ministry of Health and Medical Education which is different from the Ministry of Science, Research, and Information Technology. The body of researchers in these universities is mainly comprised of academic staff (educational and research) that had to publish papers for their career benefits beside their interests. The demographic profiles of academic staff consisted of personal traits (gender and age), academic origins (field of study and academic rank) and

prestige of academic employers (type of university). Field of study of academic staff comprised of clinical and basic science domains. Their academic rank comprised of full Professors, Associate Professors, Assistant Professors and Lecturers. As for the type of university, the Ministry of Health and Medical Education categorized medical universities into three types (Type One, Type Two, and Type Three). The ranking of universities was based on several factors such as publishing articles in local/international journals, publishing books, indexing of journals in popular databases and innovations. For further information regarding the types of universities refer to section 3.4.1 on population.

Based on previous searches on 19 March 2010 in a Directory of Open Access Journal (DOAJ) www.doaj.org, 55 Iranian open access journals were found. Out of these, 41 journals were in the health domain of Iran. Furthermore, based on the latest search on DOAJ on 15 July 2011, under the query “Iran” 90 open access journals were found. Out of these, 59 were in the health sector. Out of 59 open access journals in the health sector, 44 were written in English language, 11 in Persian and 4 both in English and Persian languages. Also out of these journals, 44 were published by public medical universities of Iran. The publication years for these journals were from 1998 until 2010. It should be noted that most of these journals started as non-open access journals and were later converted to the open access model. Almost all of the Iranian open access journals (except one) were free of charge for both accessing and publishing. However, the cost was mainly covered by the respective university/institutions. (See the list of Iranian open access journals based on the latest search on 15 July 2011 at www.doaj.org, in Appendix E).

The Iranian Journal of Pharmacology and Therapeutics (IJPT), published by the Iran University of Medical Sciences and Health Services (IUMS) was the first Iranian online-only peer-reviewed open access journal (based on data online on 18 June 2008 at <http://ijpt.iums.ac.ir>). Also a total number of 5206 open access articles for Iranian

biomedical researchers were archived in PubMed Central which is an open access archive in biomedical area (based on data available online on 26 April 2011 at www.ncbi.nlm.nih.gov/pmc). However, due to the rise in the trend of publishing in open access journals or transition to this system in the health domain of Iran, it was important to investigate the view of Iranian medical researchers on open access.

1.2 Statement of Problems

Open access journals are a relatively new media to access and disseminate scholarly outlets. They are powerful tools that could enhance the sharing of knowledge between authors and readers. In open access studies, an important area of research is the acceptance of this channel by researchers. The existence of open access publishing depends on the use of this media by researchers. Despite obvious advantages of open access, such as higher citations (Swan, 2007; Brody, 2006; Harnad & Brody, 2004; Lawrence, 2001b), larger readership (Mann et al., 2008; Hess et al., 2007; Lawrence, 2001b), wide dissemination (Mann et al., 2008; Hess et al., 2007; Ouya & Smart, 2005) and other advantages for authors, this media is still not accepted by authors as a common channel to disseminate their scholarly output. Kingsley (2008) believes that regardless of the apparent benefits of open access like, the uptake has been limited. Several prior studies (Dulle, Minish-Majanja & Cloete, 2010; Tarrago & Molina, 2008; Nicholas, Jamali & Rowlands, 2006; Schroter & Tite, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2005, Rowlands, Nicholas & Huntingdon, 2004) have showed low use of open access journals among researchers.

Only 5% of journals are open access (Harnad et al., 2004) and out of more than 300,000 periodicals that were listed in ULRICH's periodical directory, only 1,120 granted open access (Mann et al., 2008). Harnad (2011) reported that 2.5 million articles are

published in 25,000 peer-reviewed journals and conference proceedings across all scientific disciplines annually. This literature was written by specialists in order to be used, applied and built upon by fellow professionals in respective fields. Furthermore, citing (Gargouri et al., 2010; Bjork et al., 2009) he added that only about 15% of this special literature was freely accessible.

Bjork (2004 citing Wells, 1999; Gustafsson, 2002) indicated that in a few years, hundreds of scientific journals adhering to the open access principles were launched, but roughly half of these have already disappeared and many only publish a few articles per year. Even with widespread agreement among academics that open access would be the optimal distribution mode for publicly financed research results, such channels still constitute only a marginal phenomenon in the global scholarly communication system.

All mentioned evidence could be a sign of low acceptance of this media as a publishing channel. Given the opportunities afforded by the Internet, and the social and scientific advantages of open access, it is reasonable to ask why open access has not been more readily adopted (Barbour & Patterson, 2006). It gives the impression that some hindrance exists behind the low use of this technology based media. Identifying the factors that influence the acceptance of open access journals is important to understand the reasons promote use of these journals and the factors that are hindrance. Although Park & Qin (2007) identified some factors that increase or decrease scholars' willingness to use open access journals, more comprehensive studies are needed to better understand the factors in acceptance of open access.

Several previous studies (Bjork et al. 2010; Vlachaki & Urquhart, 2010; Tarrago & Molina, 2008; Hess et al., 2007; Ghane, 2006; Schroter & Tite, 2006; Wang & Su, 2006; Beer, 2005; Ouya & Smart, 2005; Schroter, Tite & Smith, 2005; Pelizzari, 2003) reported low familiarity with open access in some way. Familiarity with open access is important,

because it can serve as a base for making decisions to use these journals. According to Suber (2004) the single largest obstacle to open access is author inertia or omission, but this factor is not necessarily a sign of opposition; it is usually a sign of ignorance or inattention. A number of other studies (Rajashekar & Jayakanth, 2004; Swan & Brown, 2004; Schroter, Tite, & Smith, 2005; Tarrago & Molina, 2008) reported that the reasons why respondents did not submit to open access journals were lack of awareness about these journals.

Attitudes of researchers towards open access journals may influence them to use the system. According to Mann et al. (2008) positive attitudes do not bring about a comparable degree of use of open access publishing. Several studies (Tarrago & Molina, 2008; Hess et al., 2007; Warlick & Vaughan, 2007; Beer, 2005; Schroter, Tite, & Smith, 2005) indicated positive attitudes towards open access publishing, but low experience with open access journals. However, it seems the recognition of researchers' contributions to open access journals in performance reviews is not yet well articulated (Ouya & Smart, 2005). A few research studies have been conducted to evaluate various groups of scholars' perceptions regarding open access (Wang & Su, 2006). It gives the impression that it is still unclear if scholars' common perception about open access has any impact on their adaptation of this media.

Open access can be used for both accessing and dissemination of scholarly outputs. It means researchers as readers can access free scholarly literature and as authors can easily distribute their outputs to readers by means of Internet. However, prior studies (Dulle, Minish-Majanja & Cloete, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Nicholas, Jamali & Rowlands, 2006; Beer, 2005; Balaram, 2003) showed that researchers preferred to use open access media mainly for accessing than for publishing.

Although open access is one of hot topics, there are few experimental studies that investigated open access with regard to researchers. Park (2007, citing Bailey, 2005) that out of 1300 articles in the first edition of open access bibliography only 24 articles were identified as research-oriented studies based on the researchers' examination. The majority of articles were review articles, presentation slides and news. He also cited Kling and Callahan, (2003) that only 71 articles out of 1200 are classified as "research" about electronic serials. Furthermore, to the best of our information search only few studies (Mann et al., 2008; Hess et al., 2007; Park, 2007) used factors to test their influence in open access studies in relation to researchers and the remaining majority were simply descriptive studies.

The solution to the scholarly publishing challenge requires a national and even international approach rather than a local one (Chodorow, 2000). Open access is viewed as the mainstream model for the future of knowledge generation and communication. In an open access system developing countries will be able to find the equality to share their own outputs with the rest of the world and being able to share those produced by the rest of the world (Swan, 2008). Open access can be a solution to deal with scholarly publishing challenges globally, if researchers accept it. In recent years, a number of researches have been carried out with regard to the perspectives of researchers about open access. Most of these researches have been conducted in developed countries and less in developing countries, but to recognize participation of as many nations as possible in this movement is vital to provide a broad picture of open access progress. In open access there is no "one-size-fits-all" solution (Mele, 2009); because of diverse cultural, educational, economical, and technological factors in each country, however, it is not rational to generalize findings of a study that was carried out in a developed country to a developing one. Therefore, each

country may have to identify the most efficient factors in the acceptance of open access model.

According to Wang & Su (2006) developing countries are far lag behind in open access practices. An evidence for the low involvement of developing countries in open access is their low number of articles that were archived in PubMed Central comparison with developed countries. Table 1.1 below indicates the participation of five developed and five developing countries in PubMed Central (based on data available online on 26 April 2011 at www.ncbi.nlm.nih.gov/pmc).

Table 1.1: Open Access Articles in PubMed Central

Country	Number of articles	Percent
United States	326330	16.32%
Germany	174051	8.70%
Canada	158480	7.92%
United Kingdom	123813	6.19%
Japan	119512	5.97%
China	47050	2.35%
South Africa	24939	1.25%
Tanzania	5323	0.26%
Malaysia	5289	0.26%
Iran	5206	0.26%

As a developing country, Iran has participated in open access movement with 55 open access journals based on search conducted on 19 March 2010 in Directory of Open Access Journals (DOAJ). Regardless of taking part in open access via publishing these journals, few studies (Ghane, 2006) to date have explored open access from the opinion of researchers. Additionally, although open access publishing is accepted as a scholarly communication method by medical scholars (Coonin & Younce, 2010), but there is limited research available regarding the opinions of the Iranian medical researchers in this regard; while the medical domain of Iran with 41 open access journals out of 55 is one of the most active areas in open access (based on data available on 19 March 2010 at www.doag.org). The familiarity, experience and perspectives of Iranian health researchers with regard to

open access are not known. There is a need to know their current status of familiarity and experience with open access and desire to determine the factors influencing acceptance of open access publishing. Therefore, this study surveyed and examined the researchers' use and intention to use open access journals in Iran as a sample of a developing country.

1.3 Objectives of Study

The objectives of study were:

1. To determine the current status of familiarity and experience with open access among medical researchers in Iran.

The first objective consists of sub-objectives:

- a. To examine the current status of familiarity with terms, initiatives and services of open access
 - b. To determine the manner of knowing about these terms, initiatives and services of open access
 - c. To examine the current status of experience with open access journals
 - d. To determine the source fund used to publish in open access journals
 - e. To learn about the current status of archiving in pre /post-print
 - f. To determine the willingness of researchers to archive
 - g. To determine the prospects of researchers regarding voluntariness or mandatoriness of publishing in open access journals and archiving in institutional repository.
2. To identify the factors influencing acceptance of open access publishing among medical researchers in Iran.

The second objective includes the sub-objectives:

- a. To determine primacy of proposed factors in the acceptance of open access journals

- b. To determine influence of the independent variables on the dependent variables
- c. To test moderating role of demographic variables between constructs and outcomes

1.4 Research Questions

In order to achieve the above objectives the following key research questions were used to guide the study:

1. What is the current status of familiarity and experience with open access among researchers?

The first research questions consist of seven sub-questions:

- a. What is current status of familiarity with terms, initiatives and services of open access?
- b. How do researchers know about these initiatives and services of open access?
- c. What is the current status of open access journals' experience among researchers?
- d. What resource funds do researchers use to publish in these journals?
- e. What is the current status of archiving practice regarding pre/post-print?
- f. What is the current status of willingness to archive in institutional repository?
- g. What is the current status of researchers' attitudes regarding voluntariness or mandatoriness of publishing in open access journals and archiving in an institutional repository?

2. What factors influence acceptance of open access publishing among researchers?

Second research question includes four sub-questions:

- a. What is the primacy of proposed factors (performance expectancy, effort expectancy, social influence, facilitating conditions, anxiety, concerns with author-pays and attitude) on acceptance of open access publishing?

- b. Do the constructs (performance expectancy, effort expectancy, social influence, facilitating conditions, anxiety, concerns with author-pays and attitude) and demographic variables (gender, age, field of study, type of university, experience, academic rank, and familiarity) have significant influence on intention to use open access journals?
- c. Do the constructs (performance expectancy, effort expectancy, social influence, facilitating conditions, anxiety, concerns with author-pays, attitude and intention) and demographic variables (gender, age, field of study, type of university, academic rank, and familiarity) have significant influence on self-reported use of open access journals?
- d. Do the demographic variables have a moderating role between constructs and outcome variables?

1.5 Research Framework

Based on the literature review, several concepts about open access were derived and categorized according to similarity with the conceptual framework. The categories of conceptual framework were matched with the dimensions of the UTAUT model, with the addition of attitude, anxiety and concerns with author-pays. These proposed factors were utilized to test their influence on the acceptance of open access publishing. Figure 1.1. presents a theoretical framework of study which consists of seven constructs, seven demographic and two outcome variables. The red arrows indicate the independent variables of intention and the blue arrows point to independent variables of use of open access publishing.

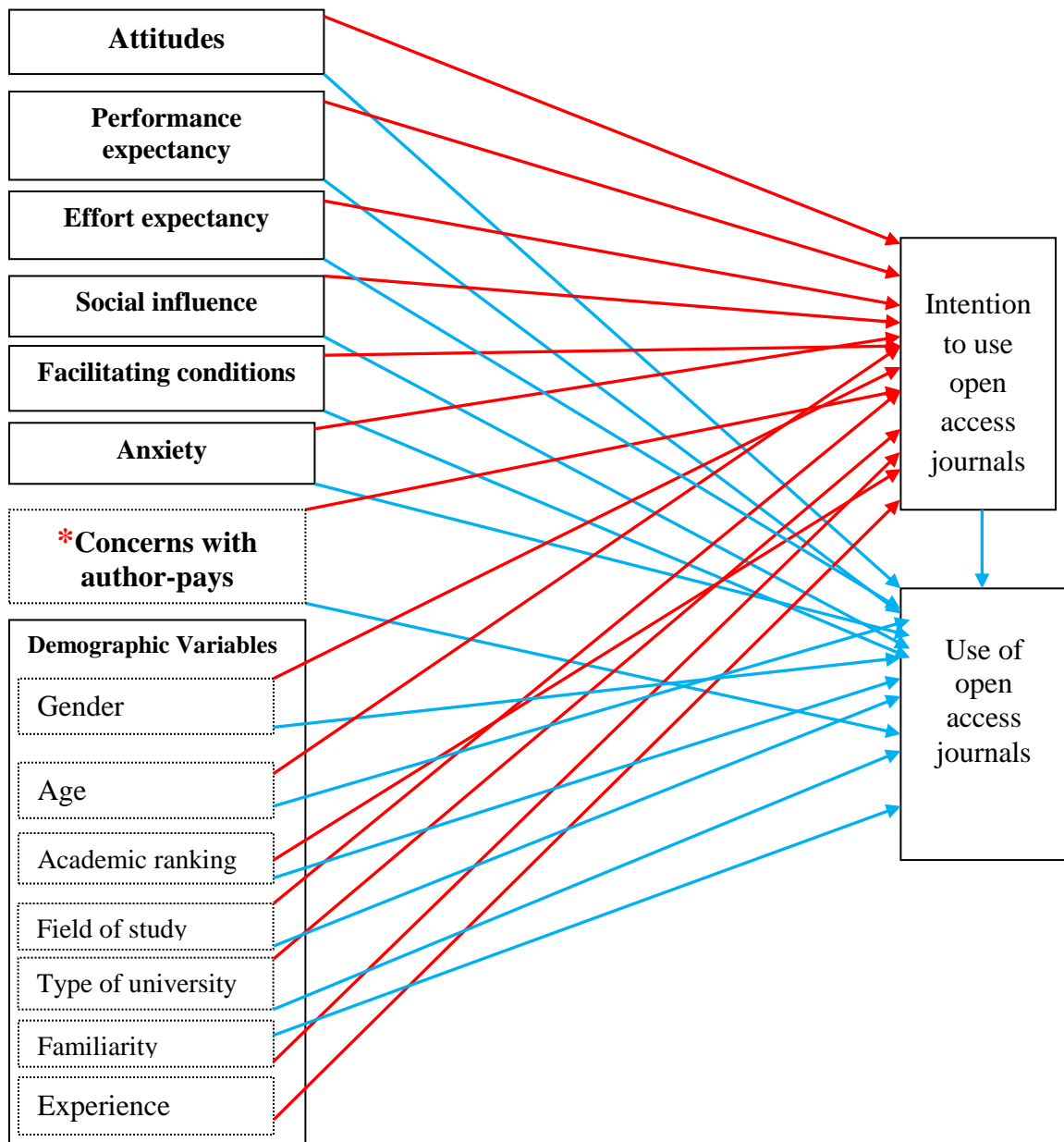


Figure 1.1: Theoretical Framework of Study (*Added after Factor Analysis)

1.6 Significance of Study

This study aims to determine the factors influencing the acceptance of open access publishing by proposing a theoretical framework. The framework is mainly based on propositions of Unified Theory of Acceptance and Use of Technology (UTAUT) that will demonstrate intention to use and use of open access publishing. Kripanont (2007, citing Davis, 1989) explained that practitioners evaluate systems for two purposes, one is to

predict acceptability, the other is to diagnose the reasons resulting in lack of acceptance and to take proper measures to improve user acceptance. Consequently, the final research model will be able to explain and predict the factors that influence researchers' intentions to use open access publishing in medical field of Iran. Therefore, this systematic understanding of the phenomenon may help investigators to analyze the reasons for resistance in using this media.

The findings from this study lead to several other contributions to the current literature. First, the current findings add to a growing body of literature on open access area as well as electronic journals from a research-based study.

Second, this study is the first of its kind that identifies the factors influencing intention to use and use of open access journals among medical researchers of public medical universities of Iran. As mentioned by Park (2007) exploring scientists' adoption of open access journals in this early developmental stage is important because user adoption is critical in determining the feasibility and successful implementation of a new technology-based communication channel.

Third, the study provides a standard document of current status of familiarity with open access among Iranian medical researchers, their involvement and future intention to use this system. This study provides baseline data that could encourage further studies targeting scholars in the medical area or scholars in other disciplines.

Fourth, although a vast majority of researches have studied open access from perspective of researchers, most of them have been descriptive in nature. This study investigates the acceptance of open access publishing based on dimensions that match with theories in the technology acceptance area.

Fifth, findings of this study will be useful at four levels, e.g. academies, organization, national and international levels. The concept of open access is new for

researchers particularly in Iran and the findings of this study can help them to find out how researchers in medical science see open access publishing and also make unfamiliar researchers think about it. Understanding the factors that influence the acceptance of open access will help policy makers of scholarly publishing at organizational and national levels to make better decisions. For instance, the findings of the study about institutional repository may help decision makers of universities in their strategic planning. At the international level, several publishers are considering moving to open access or initiating new open access journals; therefore, understanding authors' perceptions and concerns about this media can be beneficial for them. Furthermore, this study contributes to the global understanding of open access acceptance from the viewpoint of researchers.

1.7 Scope of Study

The study focuses on researchers' intention to use and reported use of open access publishing. The reasons to use both intention and use as dependent variables are first, intention shows future purpose to the use of open access journals while use indicates current self-reported use of open access journals. Furthermore a number of previous studies (Ajzen 1991; Mathieson 1991; Sheppard, Harwick & Warshaw 1988; Taylor & Todd 1995; Venkatesh & Morris 2000) cited in Schaper & Pervan (2004) found that the link between intention to use a technology and actual usage is well-established and therefore both variables may be used to measure technology acceptance. Due to a lack of institutional repositories in Iran at the time of conducting this research, the study examined influential factors focused on open access publishing. Therefore, identifying the factors that influence intention to use and reported use of open access journals, dealing with institutional repository is only at the descriptive level. This study has explored familiarity of researchers, only in terms of their familiarity with terms, initiatives, and services around

open access. Furthermore, study does not include general database with no attachment to a specific journal title.

The target sample in this study was researchers in the medical field, because new and updated information relate to life and death in this area. Subjects are from Iran due to lack of studies in open access in this country. Researchers are chosen from public universities because there are few medical schools (including medical field) in private universities that are not comparable with public sector. Researchers are academic staff, because for their career benefits they have to publish articles. In the view of the aim of study regarding determining future intention of researchers in publishing through open access journals, both researchers who already published in these journals and those who did not are samples of this study. The present study, as an explanatory study attempted to determine the factors influencing the use of open access publishing based on the four dimensions of UTAUT model as well as three other dimensions. It did not, however, test the UTAUT model.

1.8 Variables

The variables of study comprise of dependent variable and independent variables which includes the demographic variables. The Dependent Variable refers to intention to use open access publishing and use of open access journals. Independent variables refer to performance expectancy, effort expectancy, social influence, facilitating conditions, anxiety, concerns with author-pays and attitude. Additionally, demographic variables refer to gender, age, field of study, type of university, experience, academic rank, and familiarity. The predictors of the dependent and independent variables are defined in the next section.

1.9 Operational Definition of Key Terms

Researcher: In this study researcher refers to clinical/basic science academic staff members who work in medical schools of public medical universities in Iran.

Open Access Publishing (OAP): Open access publishing refers to publishing in journals which do not charge subscription or access fees, but instead rely on other methods for covering their publishing expenses (Chan, 2004).

Acceptance: Acceptance in this study refers to both intention to use and actual use of open access journals. According to Schaper and Pervan (2004), the link between intention to use a technology and actual usage is well-established and therefore both variables may be used to measure acceptance of technology.

Intention to Use Open Access Journals: Intention refers to the plan of researcher to utilize open access in future. Intention was assessed on three items using a seven-point Likert scale regarding Iranian medical researchers' intent to publish in open access journals. The measures (intend to use [publish] in next 6 months, intend to publish in next 12 months and intend to publish in next 18 months) was adapted from Davis et al. (1989) and extensively used in much of the previous individual acceptance research (Venkatesh et al., 2003). Additionally, intention was used to predict self-reported use of open access journals.

Use of Open Access Journals: Use of open access journals in this study refers to self-reporting of the act of manuscript submission to open access journals by researchers. This dependent variable will be measured using the querying of how many times a researcher

has submitted a manuscript to open access journals. Although using a logs system is the preferred method to measure use behavior in UTAUT model and information systems research (Venkatesh et al., 2003), a self-report measure to assess use behavior is used as an alternative where usage logs were not available (Kripanont, 2007 citing Davis et al., 1989).

Performance Expectancy: Performance expectancy is defined as the degree to which an individual believes that using the open access journals will help him/ her to improve in job performance (Venkatesh et al., 2003). Performance expectancy is measured with seven items using Likert scale statements (more citation, higher h-index, obtains copyright, larger readership, visibility, fast and wide dissemination and indexing in search engines).

Effort Expectancy: Effort expectancy is defined as the degree of ease associated with the use of open access journals. Effort expectancy is measured with six items using Likert scale statement (free availability, ease of use, ease of access for developing countries, ease of recognition an open access journals, ease of electronic submission and ease of learning how to publish in open access journals).

Attitude: Attitude toward using technology is defined as an individual's overall perception about open access publishing. Attitude is assessed using seven Likert scale statements regarding researchers' opinion about open access "proper peer-review", "visibility of work", "impact of work", increase of readership", "valuable use of time", "good idea", "like to work with open access".

Social Influence: Social influence is defined as the degree to which an individual perceives that important others have on him/her in using open access journals. This factor

is measured by eight Likert scale statements (recommendation of peers, superiors, important ones, grant-awarding bodies and co-publishing colleagues peer's article in open access journals, superiors 's article in open access journals, top editorial boards).

Facilitating Conditions: Facilitating conditions are defined as the degree to which an individual believes that requirements such as organizational and technical infrastructure influence him/her in using open access publishing. Facilitating conditions is measured by ten Likert scale statements (necessity knowledge, sufficient ICT skills, existence of supporting staff/s, publicizing open access and its advantages, institutional membership, existence of enough high quality open access journals, consider for career benefits, support by evaluation committee of periodicals and to provide high speed Internet).

Anxiety: Anxiety in this study is defined as the degree of concerns that may hinder the acceptance of open access journals. The intent is to assess the negative end of this dimension; therefore, subscales are composed of negatively worded items (Cartwright & Cooper, 2009). Anxiety is measured by seven Likert scale statements (plagiarism, low indexing in ISI, inferior peer-review, negative effect on career benefits, vanity publishing, low prestige and lack of guaranty for sustainability). The negative end of this factor was assessed.

Concerns with Author-pays: Concerns with author-pay is defined as the degree to which an individual feels worried regarding publishing fee of open access journals. This factor was added to the proposed model after factor analysis. Aim is to evaluate the negative end of this factor. "Concerns with author-pays" is measured by using three Likert scale items

(charge of author, misunderstanding by colleagues due to publishing fee and commercial vision of journals). The negative end of this factor was assessed.

Gender: Gender refers to be male/female which is used to investigate its influence on intention to use and use of open access journals.

Age: Age refers to the how old were the researchers which are used to investigate its influence on intention to use and use of open access journals. The researchers' age was determined by asking them to check the relevant age group from the multiple choices (of age groups) provided.

Field of Study: Field of study refers to clinical/basic science background of researchers that is used as an independent variable of intention to use and use of open access journals.

Academic Rank: Academic rank refers to professional position of researchers which are, full Professor, Associate Professor, Assistant Professor and Lecturer.

Type of University: Type of university refers to the ranking in public medical universities of Iran at three levels. Researchers were asked to write name of the university, then the investigator classified it based on three types of universities. (See appendix C for name and type of universities)

Familiarity: Familiarity refers to acquaintance of researchers with open access journals. Familiarity is measured as a predictor of intention to use and use of open access journals with a dummy query, familiar or unfamiliar with open access journals.

Experience: Experience refers to submitting a manuscript to open access journals or not; to find out whether previous experience of researcher with the open access have influence on their intention to use open access journals in the future. Experience was determined by asking one ratio statements on manuscript submission to open access journal which was coded as a dummy variable (submitted/ not-submitted).

1.10 Organization of Thesis

This thesis is organized into five chapters. Chapter 1 includes a background on the topic, problem statement, objectives, research questions and significance of study, scope of study, definitions of key terms and variables of study. Evidence from previous studies indicate that researchers have a key role in the success of open access publishing, therefore understanding the factors that influence them to use this media for scholarly communication is important. Chapter 2 provides a review of literature relevant to the history and definition of open access, terms and initiatives of open access, open access in medical area, open access in Iran, and the factors that influence acceptance of open access from the perspective of researchers. Furthermore this chapter includes literature relevant to studies on acceptance of technology chiefly based on the UTAUT model and also presents the theoretical framework of study. Chapter 3 presents the research design and methodology that covers the research philosophy, population, sampling, variables, data collection instrument and assessment of data quality in terms of reliability, validity and normality. Chapter 4 presents an analysis of primary data and findings to answer the research questions. It also discusses the finding of study in relation to the findings of previous studies. Chapter 5 provides a summary of the findings, conclusions of study, limitations, recommendations and concluding statement.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

The aim of the review of literature is to provide background information need to understand the study. It provides a conceptual framework, justifies the choice of research questions, and establishes the importance of the topic. It also establishes the study at hand on one link in a chain that is developing knowledge in the field.

To collect related literature review, several recourses such as online databases(e.g. Emerald Intelligence, Science Direct, JSTOR archive, Nature.com, ePrint, E-LIS, Networked Digital Library of Theses and Dissertations (NDLTD), PubMed Central, Digital Dissertations (UMI), Library Literature & Information Science Full Text, LISA: Library and Information Science Abstracts, Project MUSE, SAGE Journals - Humanities & Social Sciences Collections, Springer Link, Directory of Open Access Journals (DOAJ), EPrints (Repository of Southampton University), Websites (such as Budapest Open Access Initiative, Open Access News and Open Access overview), Google scholar, Google books, University of Malaya Library Web Public Access catalog (Pendeta WebPAC) and University of Malaya Theses and Dissertations were searched.

Several types of resources, such as journal articles, research reports, thesis, conference proceedings, conference papers, books, manuals and Government of Iran documents were used to build upon key concepts. These constitute the conceptual framework underlying the factors influencing acceptance of open access publishing as well as definition, history and key terms, services and initiatives of open access.

The literature review of the present study is presented in two sections; the first section is regarding open access publishing and scholarly communication. In general,

much of the literature on open access publishing consists of descriptive and review studies that were conducted in developed countries; there are very few in developing ones. The second section covers previous research studies in different contexts including open access that have used some or all dimensions of UTAUT model as a proposed model.

2.2 Literature concerning Open Access

This section presents a brief history of scholarly publishing and the link with open access publishing. It then presents definition of open access, followed by a discussion on open access publishing in the medical area. It then discusses the concepts such as familiarity and experience with open access, attitudes towards open access, impact factor/citation, author-pays, visibility, free access to full text, readership, peer-review and ICT are presented.

2.2.1 History of Scholarly Journals

Scientific journals have two main objectives, the diffusion of research results and the public documentation of copyright. The ultimate goal is to increase society's stock of knowledge (Mann et al., 2008). In 1665, the Royal Society of London published the first issue of a scholarly journal. The purpose of journal was to disseminate the results of members' research, allowing scientists to reach a wider audience than they would by exchanging private letters (Walker, 1998).

Scholarly journals have flourished for over 300 years because they successfully address a broad range of authors' needs such as to communicate findings to colleagues, to establish precedence of their work, to gain validation through peer review, to establish their reputation, to know the final version of their work is secure, and to know their work will be accessible by future scholars (Buck, Flagan & Coles, 1999). During these years,

research articles were “gifted” to societies by authors and returned to the community in low-cost journals.

The economic foundation for scholarly communication began a profound shift after World War II. Research funding expanded greatly, and with it, the volume of research to be published exploded. Commercial firms found there was money to be made publishing the overflow of articles that could not be accommodated in society journals. On the other hand, many scholars in need of promotion and tenure were happy with publishing in these commercial journals, and gave their research paper away to journal for free. Meanwhile, commercial publishers discovered that demand for journals was remarkably inelastic. Therefore, to maximize their profits, they raised institutional prices of journals dramatically and relentlessly to exploit the elasticity curve. Institutional subscribers, accounting for the lion’s share of the revenue supporting publication of journals in most fields, paid the price because their users demanded access (Johnson, 2000).

The greatest paradox of printed scholarly journals is that they act more like archival and legitimizing tools and not like communication tools. Print acts as a form of official sanction (Guedon, 1996). The growth of scholarly literature, together with rapidly increasing power and availability of electronic technology, were tremendous pressures for change from print format to electronic format (Odlyzko, 1995). From 1989 to 1995 there has been a growing demand for electronic journals, first from librarians and then from researchers. Journals in this new form were expected to improve the speed of communication of research, to enhance informal discussion/comment between scholars particularly in interdisciplinary fields, and to reduce publishing costs (Fisher, 1996).

In electronic scholarly publishing, bundling of a large number of titles into a single package commonly is known as the “big deal”. Big deal gives “the largest commercial publishers extraordinary power to control terms and conditions of the

information market” (Frazier, 2001). So while the cost of production and distribution of electronic resources continues to decline, the cost of subscription continues to increase. And while library consortia are able to negotiate better prices than individual libraries, access costs to the one price and one size fits all bundles remain exceedingly high (Scigliano, 2002). Therefore, in the commercial system the public goods have been turned into a high price commodity affordable only to those who have the financial resources. However, publicly funded research should be accessible to the public without further barriers (Chan & Costa, 2005). Hence, in electronic publishing, while the delivery technique for scientific publications has changed rapidly, the economic ramifications have hardly changed at all. The concentration of the publishing of journal titles in the hands of a few large players, in combination with electronic delivery, has made the strong players even stronger (Bjork, 2004). Libraries pay high subscription costs on behalf of their readers. The electronic revolution has complicated journal access issues, as subscriptions for institutional electronic access are very expensive (Balaram, 2003). Most of the journals that went online are owned by commercial publishers, who take advantage of technology to widen their market potential. As a result most of scholarly articles that went digital, also went behind the virtual barriers of toll-based access. The scientific community at large could not get any benefits from this move (Scaria, 2003).

The price and permission crises are known as the serial crises in the history of scholarly journals. Prices limit access, and high prices limit access extremely. The permission crisis means that, even when they pay, libraries are restricted by licensing terms and software locks that prevent them from using electronic journals in the same full and free way that they may use print journals (Suber, 2003). Furthermore, the serials crisis has helped to highlight a greater problem in the scholarly communication system that of the research access/impact crisis. Loss of access not only affects the ability of research users to

perform their research but also reduces the impact of authors by denying them potential users, hence potential citations (Brody, 2006). It means that within current system access to the complete body of the literature is impossible (Prosser, 2003). The problem is not only limited access from developing countries to northern journals, at the same time developed countries have little access to the journal literature of the developing nations. Access to information is a need and even a right of all people (Global Forum for Health Research, 2003).

Since the beginning of 1990s, open access journals have emerged as an alternative to traditional subscription-based journals (Hedlund & Roos, 2006). In 1998, one of the first open access journals in medicine, the Journal of Medical Internet Research (JMIR) was created, publishing its first issue in 1999 (Library and Information Science Wiki (LIS Wiki, 2008). Open access as a solution for price and permission crises of scholarly journals was introduced formally in a meeting initiated by the Open Society Institute in Budapest in 2001. The outcome of meeting was the Budapest Open Access Initiative which identified two strategies for open access, self-archiving and open access journals.

2.2.2 Definition of Open Access

One of the outcomes from the Budapest Open Access Initiatives (BOAI) was a clear definition of open access. They defined it as:

“By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself“

(definition adopted on 9 May 2008 from <http://www.earlham.edu/~peters/fos/boaifaq.htm>).

Open access literature is digital, online, free of charge, and free of most copyright and licensing restrictions (Suber, 2007). The term ‘open access’ is a name that refers to free access model of Stevan Harnad, which is peer-review full-text scholarly articles in digital form, and free of charge to users. The concept is based on the peculiar nature of academic authorship that academic authors are interested primarily in wide dissemination of their publications and seek no direct financial reward (Park & Qin, 2007). Open access means that a reader of a scientific publication can read it over the Internet, print it out and even further distribute it for non-commercial purposes without any payments or restrictions (Bjork, 2004). Some use a color code to classify open access, in which open access journals are known as golden road and self-archiving as green road to open access. Golden road provides open access to its research articles without delay, green road permits post-print archiving by authors. The pale green permits does not oppose, preprint archiving by authors, the gray allow none of the above (Suber, 2007). Harnad (2011) used the terms “sky-read” and “sky writing” for open access literature which can be read and/or written by all interested researchers with accesses to Internet facilities.

Although, open access was initiated in the developed countries particularly in United States, Canada, European Union, Australia, and New Zealand, it, now is spreading throughout the world and has become an international effort. Many developing countries have also joined the effort. The developing countries are now actively participating in the open access movement and catching upon the huge gap with the developed countries. Many open access projects have been established or are starting up in the developing countries, but the developed countries are more advanced in open access development and implementation than the developing countries (Wang & Su, 2006).

2.2.3 Open Access in Medical Area

Open access to scientific and medical literature is not a new idea. By transforming policy and practice at the British Museum Library, Antonio Panizzi took significant steps towards this goal back by providing equal access for library users in the 19th century. Around the same time, the world of medical journals was also flourishing. These journals were becoming established as the mechanism for the registration and validation of ideas through peer-review, and as vehicles for the sharing of this information (Barbour & Patterson, 2006).

Open access is consistent with the Millennium Development Goals and can help to achieve its goals. The Millennium Development Goals (MDGs), which is defined as goals to be achieved by 2015 derived from the Millennium Declaration and are to eradicate extreme poverty and hunger, to achieve universal primary education, to promote gender equality and empower women, to reduce child mortality, to improve maternal health, to combat HIV/AIDS, malaria and other diseases, to ensure environmental sustainability, and to develop global partnership for development (United Nations Millennium Development Goals, 2004). Open access also is in line with 10/90 Gap Project in reducing inequality of access to knowledge. Imbalance in health research funding has been captured in the expression “the 10/90 gap” drawing attention to the fact that of the US\$ 70 billion a year invested in global health research by the public and private sectors, less than 10% is devoted to research into the health problems that account for 90% of the global disease burden (Global Forum for Health Research, 2004). Information and communication are keys to fighting the 10/90 gap. In December 2003, an editorial in the Bulletin of the World Health Organization notes that these benefits have not been shared evenly:

By no means everyone has benefited from the overall increased trend of increased life expectancy, however, or from that of increased knowledge and its communicability. This gap goes beyond the notion of the ‘digital divide’. It is a

'knowledge divide', in which large sections of humanity are cut off not just from the information that could help but from any learning system or community that fosters problem-solving (Jupp, 2004).

One area that has been popular for the sharing of information through open access is the medical domain (Bjork, 2004). Medical scholars have accepted open access publishing as a scholarly communication method (Coonin & Younce, 2010). Of the two main roads of open access, open access journals and self-archiving, the former one is the dominating channel in medical area (Bjork et al., 2010). About 27% of articles that published in biomedicine area in 2005 were open access (Matsubayashi et al., 2009), while only 15% of articles in the domain of biology were open access in 2003 (Matsubayashi et al., 2009 citing Hajjem et al., 2003).

One of the main actors in open access movement in biomedicine has been the National Institute of Health (NIH) in the USA. The mission of NIH is to disseminate new knowledge that will lead to better health for everyone. The primary mechanism for accomplishing this mission is the sharing of ideas, data and research findings. These mechanisms perfectly fit to the principles of open access. NIH supports the availability of research results in several ways. It has an official policy statement concerning public access of NIH-funded research results. From May 2005, NIH has requested and strongly encouraged all researchers funded by NIH to make final manuscripts available to other researchers and to the public through NIH National Library of Medicine's (NLM) PubMed Central (Hedlund & Roos, 2006). Additionally, open access is equally important for traditional users of medical journals within the health care community for whom formidable financial barriers remain in the form of subscription and article charges in both developed and developing countries (Stanbrook et al., 2007).

2.2.4 Terms, Initiatives and Services of Open Access

Numerous national and international initiatives have been undertaken in order to promote the concept of open access as well as to facilitate the implementation of open access systems. The key terms, initiatives and services related to open access are described in the following sections.

2.2.4.1 Open Access Journals

Open access journals are peer-reviewed journals that typically let authors to retain copyright. These journals are free of charge for readers. Usually, open access journals have alternative funding models; they may charge a processing fee for accepted articles to be paid by the author or the author's sponsor (Suber, 2007).

The number of open access journal that publish peer reviewed and high quality research is growing steadily. For example, BioMed Central is an open access publisher which publishes 206 peer-reviewed journals (based on data on 31 January 2010 at <http://www.biomedcentral.com>).

2.2.4.2 Author-pays Model

An author-pays model is defined as “an alternative method of funding journals whereby subscription charges are replaced with author charges for publication” (Schroter, Tite & Smith, 2005). Open access journals are facilitated by new Internet-based business models, which focus on minimizing publication costs and taking the burden of costs off the subscriber’s shoulder (Mann et al., 2008). In the author-pays model, the institution of the author pays sometimes publishing fee of article (Schroter, Tite & Smith, 2005).

2.2.4.3 Self-archiving

Self-archiving is to deposit a digital document in a publicly accessible website (definition adapted from www.eprints.org). The practice of self-archiving has its roots in the field of computer science, where researchers were depositing results in ftp archives some decade ago, and later on websites (Swan & Brown, 2005). From the earliest days of the Web, individual researchers have put copies of their own publications on their homepages (Bjork, 2004). Self-archiving has become the norm in physics, with some sub-areas of physics, such as high-energy physics, having a 100% self-archiving rate (Library and Information Science Wiki (LIS Wiki, 2008). Despite the high participation of physicists in self-archiving, it has been slow in other disciplines. Even in Physics, it is growing too slowly (Harnad, 2001b). Matsubayashi et al. (2009) based on their target sample (PubMed) found that only 5.9% of open access articles self-archived through authors' websites and 4.8% via institutional repositories. More than 70% of the open access articles were provided on sites maintained by the publishers of the articles. It seems even when researchers have chance of self-archiving, they avoid it. However, in self-archiving, the opportunity is with the research community. If they provide open access to all those published articles soon, then the entire research community will enjoy the benefits of maximizing its research impact by maximizing user access to its research output (Harnad & Brody, 2004). Therefore, self-archiving rather depends on the research community (Harnad, 2007). Over 90% of journals are already green (i.e., they have given their authors the green light to self-archive); yet only about 10-20% of articles have been self-archived (Harnad et al., 2004).

2.2.4.4 Institutional Repositories (IRs)

According to Crow (2002) an institutional repository is a digital collection capturing and preserving the intellectual output of a single or multi-university community. Barton & Waters (2004) defined an institutional repository as a database with a set of services to capture, store, index, preserve and redistribute a university's scholarly research in digital formats. According to Lynch (2003) a university-based institutional repository is a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members.

A repository is a stable location for archiving papers that can be downloaded freely through the Internet (Krichel & Warner, 2002). Institutional repositories may contain pre/post-prints or both. They can be limited to journal articles or can include dissertations, course materials, learning objects, video files, or any other kind of digital file. Archives, unlike open access journals, do not have peer-review process (Park, 2007), and readers are the main referee for open access archives. However, the type of content in a repository depends on policy of that repository. In addition, technological costs for an institution in setting up a repository are low. A number of free, open sources, OAI-compliant software packages exist for managing institutional repositories (Prosser, 2004). By building a repository based on Open Archive Initiative (OAI) standards, the material deposited within repository will be fully searchable and retrievable, with search engines treating the separate archives as one. Readers will not need to know which repository exists or where they are located in order to find and make use of their contents (Prosser, 2003). Institutional repositories and subject-based repositories both compete for the same material. If institutional repositories gain momentum and are indexed effectively through standards such as the Archives Initiative - Protocol for Metadata Harvesting, they will offer a parallel

channel to the same content as subject-specific repositories, because of having clear advantages in their business models (Bjork, 2004).

2.2.4.5 Subject-based Repositories (Pub Med Central)

Subject-based repositories are document servers that are not restricted to the output of a particular institution. They offer scientists and scholars from a particular discipline, or a group of related disciplines, the opportunity to deposit their work (definition adapted on 3 May 2010 from <http://open-access.net>). PubMed Central which was launched by the NIH in the United States is a subject-based repository in biomedical area. The idea of an electronic repository for all biomedical research (called E-Biomed, later PubMed Central) was proposed by Dr. Harold Varmus who was the former director of NIH in May 1999 (Homan & Watson, 2004). PubMed Central is provided a digital archive of life sciences journal literature containing approximately 2000,000 articles (based on data available online on 26 April 2011 at www.ncbi.nlm.nih.gov/pmc). It has developed the international standards for preserving the full text of the electronic scientific literature, in order to enabling that material to be linked to other core data, such as genetic sequences and bibliographic records. It also accept individual open access articles from journals that do not participate in PubMed Central on a routine basis, facilitating both dissemination and long term accessibility for these items (Zerhouni, 2004). It should note that the first free scientific online archive which at the same time is the largest and best-known subject-based repository is Arxiv (<http://www.arxiv.org>) in the fields of physics, mathematics, non-linear science, computer science, quantitative biology and statistics. It started in 1991, initially a preprint service for physicists, initiated by Paul Ginsparg (Library and Information Science Wiki (LIS Wiki, 2008).

2.2.4.6 Pre-print and Post-print

Pre-print represents articles prior to peer-review and publishing, and post-print refers to articles after peer-review and publishing (Swan & Brown, 2005). The term pre-print refers to the articles that have been accepted for a specific venue. The terms preprint and e-print can be used conservatively to refer manuscripts in the form in which they are likely to appear in a conference proceedings, journal or book (whether in printed form, electronic form, or both).

2.2.4.7 Directory of Open Access Journals (DOAJ)

The Open Society Institute funded the development of the Directory of Open Access Journals (DOAJ) to facilitate searching and library indexing of open access journals from around the world (Chan and Costa, 2005). The DOAJ was launched in May 2003 with 375 titles, a figure that doubled to over 790 titles in less than a year. One good feature of the DOAJ is that records for each journal listed can be easily download by librarians and entered into their catalogues, thereby allowing readers to learn about the journals (Prosser, 2003). This service covers free, full text, quality controlled scientific and scholarly journals. The directory aims to cover all subjects and languages. As at 10 May 2011 there were 6491 journals in the directory, of which 2853 journals are searchable at article level. Totally, 566364 articles are included in the DOAJ service (based on data from www.doaj.org).

2.2.4.8 Open Access Publishers

Publishers have critical role in success of open access movement. If they support open access, then authors do not need anyone else's permission or cooperation to provide open access to their own work (Suber, 2004). In biomedicine, there are two successful

open access publishers that provide immediate access to research articles. The first one is BioMed Central (BMC), a commercial publisher. The second one is Public Library of Science (PLoS), a non-profit organization which consists of an independent group of researchers who have committed to providing free access to biomedical literature. Both of these publishers allow free access, while authors will be charged for publishing their articles. BMC and PLoS also submit all articles to Pub Med Central (Zerhouni, 2004). These two open access publishers with high impact open access journals have achieved outstanding success. Both use 'Gold Road' to open access in which publishing all articles are full text, have free access, and available immediately on publication. They have almost similar fee policies, which consist of article fee and a membership fee (Hedlund & Roos, 2006) and waive the fee for all researchers associated with institutions that have purchased an annual membership (Suber, 2007). BMC and PLoS are two examples of publishers that indicate their business model can work for authors, readers, and their institutions (Suber, 2003).

2.2.4.9 Electronic Thesis and Dissertation (ETDs)

Electronic Theses and Dissertations (ETDs) are collections of electronic theses and dissertations, produced by students from universities around the world. The concept of ETDs was first discussed at a 1987, but it was inactive for a few years until 1991. Finally the National Digital Library of Theses and Dissertations was established in 1996, directed by an informal steering committee. As its scope became international, the organization kept the acronym NDLTD, but changed its name to the Networked Digital Library of Theses and Dissertations (NDLTD) which is an international organization dedicated to promoting the adoption, creation, use, dissemination and preservation of electronic analogues to the traditional paper-based theses and dissertations. In 1998, interested

institutions began meeting annually for what would become a series of symposia on electronic theses and dissertations sponsored by NDLTD and designed to help universities initiate ETD projects. Today, the NDLTD's members include hundreds of universities around the world, as well as partner organizations all working toward the goal of unlocking the benefits of shared knowledge for all (Networked Digital Library of Theses and Dissertations (NDLTD), 2010).

2.2.4.10 Summary

A brief explanation about thirteen term, initiatives and services of open access are presented in sub-sections 2.2.4.1-2.2.4.9 above. These terms are well-known in medical domain or in general. The terms are included in literature review due to investigation of researchers' familiarity in present study with these expressions. Additionally, open access services can be used by author for accessing or publishing/archiving an output. Thus present study aims to find out whether researchers use these services more as authors or readers.

2.2.5 Factors Influencing Researchers in Using Open Access Publishing

Although it has been said that content is the king, but in reality, the digital revolution will not be driven by content, nor librarians or publishers. The main stakeholders in this arena are consumers who are also the information providers, or at least some of them are as put forward by Nicholas, Jamali & Rowlands (2006). The open access process was perceived as a continuum along which each type of a scholar's activity had an impact on, and was also influenced by other activities. Based on Levi-Strauss's view, scholars' involvement in open access could be divided into three segments of a single activity, including making contributions (content intake), searching for materials (content

access) as well as reading and citing (content use) (Xia, 2011). Several factors may influence use of open access publishing by main stakeholders. These factors are discussed in the following sections.

2.2.5.1 Familiarity

Familiarity is the state of being familiar (Merriam-Webster Online Dictionary, 2010). Familiarity is in line with situation awareness which is defined as the perception of reactions to a set of changing events. It is important because it appears to be linked to performance and also can be basis for decision making in most cases (Klein, 2000).

Familiarity with terms, services and initiatives of open access is important in using system. Pelizzari (2003) in his study found that majority (56%) of researcher and academic staff were not acquainted with open access initiatives. Also Vlachaki & Urquhart (2010) indicated that 58% of biomedical researchers in Greece had very little awareness about open access initiatives. According to them, knowledge of open access publishing was closely related to the researchers' experience of using open access for publication. Rowlands, Nicholas & Huntingdon (2004) conducted a large-scale survey of journal authors' opinions among almost 4,000 senior researchers from 97 countries. They found, despite positive attitudes, 82% of authors do not know or know a little about open access. Schroter & Tite (2006) carried out an electronic survey among 468 journal authors who submitted paper to the three biomedical journals (BMJ) in 2004. They concluded that authors have limited familiarity with the concept of open access publishing and surrounding issues. Hess et al. (2007), in their online survey, concluded that familiarity with the open access principle is rather low. Although, Schroter, Tite & Smith (2005) in semi-structured telephone interviews with 28 randomly selected international authors who submitted to the BMJ during 2003, found that the majority of respondents were familiar

with the term “open access publishing” and defined it accurately when prompted. However, at the same time respondents expressed lack of familiarity with open access journals as a reason for not submission to these journals before. They also found that about 12 authors were not at all familiar with the term author-pays model. Several of respondents had not made the connection between author charges and open access publishing. Also, the empirical results for the questionnaire-based study of Beer (2005) indicated that respondents generally lacked extensive awareness of specific open access initiatives.

Tarrago & Molina (2008) in their survey among Cuban researchers found that majority (87%) of participants did not know about the PLoS. About 55.2% of participants did not know the term “open access journal”. The terms such as e-print, self-archiving and institutional repositories were heard only 8%, 4% and 6% of the participants respectively. Nearly 93% had not heard of the Creative Commons license. A possible explanation is that the open access movement’s terms and initiatives emerged in developed countries, such as the United Kingdom and United States. Consequently, it is mainly authors in these countries who are aware of and familiar with these terms which are originated from their native language. However, lack of knowledge about these initiatives may be limiting the researchers’ access to scientific data which may be of interest to them. Therefore, it is necessary to publicize the advantages and potential of open access to information resources, and make it known that all Cuban biomedical journals offer such access.

Ghane (2006) conducted a survey-based study among academic staff that employed in Shiraz University (Iran) in four subject disciplines (Humanities, Science, Engineering and Agriculture/Veterinary). The sample size was 50 subjects. The findings indicated that only 39% of respondents had very high and high awareness of open access journals, while 26.83% had simply low familiarity and 29.7% had no familiarity with these journals. Only 26% of respondents had awareness about institutional repositories while a majority (74%)

was not familiar with or it was at the lowest level. The majority of respondents (66%) were unfamiliar or low-familiar with subject-based repositories while only 33% had very high or high familiarity with it. Regarding self-archiving, 45% of respondents had very low or low familiarity, 25% were acquainted at very high or high levels, but, 30% were unfamiliar with self-archiving at all. He concluded that academic staff had low familiarity with open access resources. In addition majority of 36.1% of respondents mentioned that their reason for not publishing in open access channels was unfamiliarity with open access scientific articles. Likewise, Ouya & Smart (2005) found that 28 out of 43 respondents (editors of African-based journals) said they had heard of the term open access. Respondents, who had heard about open access, generally indicated a good understanding of it. However, only 10 respondents out of 28 understood the concepts such as authors submitting articles online, allowing for delayed or limited access to content, and a possibility for charging a fee. They concluded that there is some confusion about open access journals and open access repositories. Also, there was confusion between open access publishing and online publishing in general, because several respondents assumed that open access meant publishing online only. All of these misconceptions suggest lack of awareness of open access among the group studied. The participants identified awareness training on open access publishing for Africa-based journals as an important action, in order to put them in a position to make better decisions. Swan & Brown (2004) in a study on behalf of the Joint Information Systems Committee (JISC) and the Open Society Institute (OSI) explored the experiences and opinions of both authors who had published work in open access journals and those who had not published. All open access authors were familiar with the concept of open access journals. At the same time about 62% of non-open access authors were familiar too, but familiarity of open access authors had been longer than the non-open access authors. In addition they found familiarity of respondents with e-print archives was

much lower than open access journals. Less than 30% of authors in each group were acquainted with any form e-print archive. Similarly, Coonin & Younce (2010) found that of the 325 authors, 39.4% were very aware, 43.4% were somewhat aware, 17.2% were not at all aware with open access publishing. Their sample was authors who published in open access journals. The small percentage of respondents who had published but were not aware could be because they were not aware that it was an open access journal.

Awareness of researchers about open access may improve over time. Nicholas, Jamali & Rowlands (2006) reported that in their previous survey (2004) about 34% knew nothing about open access, while in the later survey only about 19% of respondents did not know about open access. Dulle, Minish-Majanja & Cloete (2010) in their survey found that majority of university researchers (72.1%) and policy makers (90.5%) of Tanzania were aware of open access. A high percentage of familiar respondents can be sign of improving awareness about open access over time. Although policy makers were aware of open access journals but they were not familiar with the other open access features or initiatives in same level. This suggested that open access is not understood deeply by these respondents yet.

The reason why some scholars fail to submit their works to open access may not be their opposition to open access; it may be unfamiliarity with open access. Therefore, they need to be better educated of open access (Suber, 2004). In other words, open access was hampered by what people thought they knew about it, rather than what was actually the case (Hubbard, Hodgson & Fuchs, 2011).

A study conducted by Bjork, Welling & Laakso (2011) revealed that the proportion of open access journals and articles in information systems was lower than other science fields. Hence they believed that the real barrier was the level of awareness among the authors. Swan and Brown (2004) found that the reason of 70% respondents, of not

publishing in open access journals was that they were not familiar enough with open access journals in their field. Also, 56% said they could not identify an open access journal in which to publish. Respondents to Schroter, Tite, & Smith (2005) study reported that lack of familiarity about open access journals was among the reasons for not previously submitting to these journals. Rajashekar & Jayakanth (2004) argued that lack of awareness about benefits of open access was among the key reasons for the low rate of participation in this movement. Tarrago & Molina (2008) indicated that more than half (54.6%) of those who said they had not sent a paper to an open access journal, pointed to an absence of knowledge about this kind of journal as the reason. Meanwhile, Bjork et al. (2010) reported that there is lack of awareness of open access publishing among scientists in most fields except physics. As Rowlands, Nicholas & Huntingdon (2004) suggested, these findings point to an urgent need to raise awareness of open access more widely across the scholarly community so that opinions can sharpen and a proper debate take place.

General awareness of open access publishing and branding in the marketing perspective are very important to achieve successful and wide use of the open access channels. Furthermore, broad knowledge of the advantages of open access publishing is a requirement for scientists in choosing open access channels to use, but there is need much to be done to achieve this. Despite the recent rapid increase in the number of national and international conferences devoted to open access, awareness among scholars is still low. These conferences are mainly attended by the publishing and library community, not the content authors who are in the key positions (Bjork, 2004). Although evidence shows that open access does give greater dissemination, usage, and impact, authors should be aware of these benefits. Only then are they increasingly going to publish in open access journals and to deposit their papers in their local institutional repositories. In order to do this, one of the

essential change that should occur in scholarly communication, is to know the benefits of change to open access channel by scholars (Prosser, 2003).

Awareness of open access may differ between developed and developing countries. Wang & Su (2006) compared finding of their survey on awareness about open access in China with the findings of Swan & Brown in 2004. They found that one of the issues around open access is scholars' perception about open access. They reported lower awareness of open access for Chinese scholars compared with their peers in the developed countries. Additionally, the results showed that the public in China hardly know anything about open access. Also Gul, Shah & Baghwan (2010) in a survey among researchers at the University of Kashmir indicated that although the concept of open access has gained momentum in other parts of the world, it is still in the early stages among scholars at the University of Kashmir, thus signifying the need to increase their awareness of open access. However, developing a consistent policy for the institution regarding management of scholarly assets can help to increase awareness of open access and repositories amongst researchers (Prosser, 2004).

Researchers can be aware of open access via different channels such as colleagues, Internet, etc. Gul, Shah & Baghwan (2010) found that colleagues played an essential role in spreading open access awareness (57.14 %), followed by self-knowledge (28.57 %) while the service offered by library professionals was little used (13.10 %), and funding bodies had no role on awareness of researchers regarding open access. Coonin & Younce (2010) reported that of 318 respondents 43.4% becoming aware of open access publishing by colleagues, 39.3% became aware via searching the Internet, 33.3% heard about open access through their professional societies; 11.6% stated their institution made them aware of it, and 8.5% indicated that their institution's library made them aware.

2.2.5.2 Experience

Experience is defined as a “practical knowledge, skill, or practice derived from direct observation of or participation in events or in a particular activity” (Merriam-Webster Online Dictionary, 2010). Experience with open access has two dimensions, accessing to open access outputs and publishing/archiving through these channels. Gul, Shah & Baghwan (2010) found that majority of 83.33 % of researchers used open access journals as a means of accessing. Dulle, Minish-Majanja & Cloete (2010) in survey conducted among university researchers of Tanzania found that majority of researchers (62%) accessed free online content while only small part (20%) of researchers disseminated their scholarly content via this channel. Hess et al. (2007) indicated that 62% of respondents in medical science group knowingly have accessed open access literature as readers before while only 23% of this group had open access publishing experience. They concluded that in general, accessing open access literature is already roughly twice as common as publishing this way. Only one third of the participants had experience in actually publishing in open access media. The actual use is thus rather low. Similarly, Mann et al. (2008) reported that almost two-thirds (66%) of the respondents had used open access media for accessing research results at least once in their academic career, but only 28% of researchers have used them for actual publishing the result of their work. Likewise, Tarrago & Molina (2008) pointed out that 65% of the Cuban health researchers stated that they had not published any of their works in an open access journal in the last three years. Respondents did not identify Cuban open access journals as open access, perhaps because they had little knowledge of this matter or because these journals have not been classified or publicized as such. Also, according to Beer (2005) the use of open access venues in order to access the works of others shows a higher level of activity when compared to the level of activity in making their own works available.

Similarly, Nicholas, Jamali & Rowlands (2006) reported that open access to scholarly journals was supported by 8.8% of respondents who were authors. Rowlands, Nicholas & Huntingdon (2004) indicated that only 11% of authors had prior publishing practice in an open access environment. Schroter, Tite, & Smith (2005) reported that half (14) of the respondents stated that they had not previously submitted to an open access journal or were uncertain if they had. Only two had submitted a paper to an open access journal other than the BMJ. Schroter & Tite (2006), in their electronic survey indicated that only 10% had submitted to open access journals.

As for archiving in open access repositories, Rowlands, Nicholas & Huntingdon (2004) indicated that only 21% of respondents had deposited scholarly material in an institutional repository. Pelizzari (2003) found that of the 44% of the authors who knew about the existence of open access initiatives and archives, only one respondent had deposited in the open access archives. However, 56% of respondents declared that they already had scientific or teaching materials available on the web. Similarly, Coonin & Younce (2010) found that 37% of respondents have self-archived while, majority of 63% respondents said they had not.

Regarding number of publication through open access journals, Coonin & Younce (2010) found that 23.3% of respondents published one article in open access journals; 54% published 2-5 articles, 4.5% published 10-20 articles and less than 1% published more than 20 via this channel.

The growth in the number of journal titles and the emergence of strong commercial players in scientific journal publishing in the latter half of the 20th century was more due to a demand from authors to publish in peer-reviewed serials, than for a need of readers of additional titles, but open access as a new communication channel more is used for accessing media than publishing channel Bjork (2004, citing Cox, 2003). A justification

for low participation in dissemination through open access compared to accessing this content can be because of ease of access to this free content, while publishing through same media needs enough online publishing skills, sufficient familiarity with potential publishers and also having something to publish (Dulle, Minish-Majanja & Cloete, 2010). However, without actual experience of open access through publishing in these journals, it is not possible to enjoy advantages of this media. Suber (2004) argued that a surprising number of open access converts – including himself - did not go beyond understanding to enthusiasm until they provided open access to their own writings and saw for themselves, sometimes suddenly, the signs of rising impact. There is a discernible increase in e-mail from serious readers, inclusions in course syllabi, links from online indices, invitations to important conferences and citations in other publications. Similarly Vlachaki & Urquhart (2010) emphasize that open access publishing may not be evident to the researcher, unless they use it themselves.

2.2.5.3 Willingness

The willingness of researchers to use open access is sign of their future usage of this media. Dulle, Minish-Majanja & Cloete (2010) reported that although many university researchers in Tanzania do not use open access for publishing, but the majority of the respondents (78%) showed their willingness to publish using it in the future. Swan & Brown (2005) found that 49% of respondents said they are likely to publish at least one article in an open access journal in the next 3 years, 27% very likely and 22% likely publish in future. Schroter, Tite & Smith (2005) reported that most authors were willing to submit to open access journals. Also, Beer (2005) and Wang & Su (2006) indicated that respondents were willing to publish through this media, despite low awareness among them on open access. Findings of Ghane (2006) indicated that majority of 70% of

respondents showed their willingness to use open access journal as a medium for publishing. Similarly according to findings of Swan & Brown (2004) 71% of open access authors showed their willingness to publish through open access journals again after their experience. The same percentage said would eagerly publish in open access journals if their grant body required them to do so. In contrast, Schroter & Tite (2006) found that 66% of respondent preferred to submit article to a subscriptions-based journal rather than an open access ones. It suggested that a majority of respondents were not willing to publish in open access journals.

According to Wang & Su (2006) the major reasons for scholars' willingness to publish through open access journals are necessity of being scientific results free for the public, usefulness of open access for researchers particularly in the developing countries and poorer area. Open access also speeds up research cycle, can inspire more research ideas, and is beneficial to both authors and readers. In addition they believed that major reasons for scholar's unwillingness to publish in open access journals are copyright concerns, uncertainty of mutual benefits, copying of new scientific ideas, and unwillingness of publishers to submit post-prints to open access.

Regarding enthusiasm to archive in an open access repository, Pelizzari (2003) found that only 6.4% of respondents expressed their willingness to participate in an open access archive at no condition. In addition 61% of the respondents answered they were prepared to personally archive their own scientific materials in an institutional repository, if the conditions they requested were fulfilled. Also Rowlands, Nicholas & Huntingdon (2004) indicated that 55% of respondents said that they might deposit in the future while 15% said that they did not deposit and will not do it in future too. Ghane (2006) reported that 55% of respondents showed their enthusiasm to deposit their scholarly articles in an institutional repository.

2.2.5.4 Attitude

Attitude is an individual's positive or negative feelings about performing the target behavior (Venkatesh et al., 2003). Investigating researchers' attitudes towards open access publishing is vital in determining the possibility and successful implementation of this new technology-based communication channel. Mann et al. (2008) reported extremely positive attitudes towards open access. Majority of (85%) their participant liked the idea of open access publishing. Hess et al. (2007) found that the attitudes towards open access were extremely positive, but on the other hand they showed a gap between positive attitudes of respondents towards open access and low level of use and future intention to use open access publication media. They generalized that the attitudes toward open access is highly positive, nevertheless only one third of the participants have experience in actually publishing in open access media. According to Schroter, Tite, & Smith (2005) while nearly all authors supported the idea of open access publishing, few had knowingly submitted to an open access journal. Rowlands, Nicholas & Huntingdon (2004) found that in general authors' attitude towards open access was positive. Especially, the idea of open access or unlimited access was attractive for authors as a reader. Warlick & Vaughan (2007) found that general attitudes of twelve of the fourteen faculties towards open access publishing were positive. At the same time, some of the faculties revealed that positive attitudes towards open access do not actually influence their publishing decision. Ghane (2006) found that despite low familiarity of academics with open access resources, 92% of them had positive view on open access movement. Similarly, Wang & Su (2006) reported that despite fewer of respondents were aware of open access journals but all of them declared that are keen to publish in these journals, which is sign of positive attitudes towards open access. Dulle, Minish-Majanja & Cloete (2010) regarding attitude of researchers towards open access found that 80% of the respondents considered 'open access as beneficial to the

scholarly community’, ‘accessing and use of open access as a good idea’ and ‘publishing in open access is good idea’. A greater section of researchers had very positive attitudes towards open access publishing. They concluded that although attitude of the researchers with respect to open access may not be a major block for the acceptance of open access in Tanzanian public universities, but positive attitudes of all stakeholders to enhance adoption of this media is necessary. Meanwhile, Vlachaki & Urquhart (2010) based on survey findings concluded that attitudes among Greece biomedical researchers will not be clear unless they have actively experience open access publishing themselves. However, understanding author attitudes towards open access will help open access proponents focus on factors that are meaningful to a specific population of authors and avoid ineffective efforts. Findings of previous studies indicate that respondents in general have positive attitudes towards open access. According to Rowlands, Nicholas & Huntingdon (2004) perceptions are critically important at this early stage in the debate.

2.2.5.5 Free Access

The central attribute of the open access journals is to provide free access for readers. Authors who are the main readers of scholarly output enjoy free access and its benefits, such as more citations of their works. The readers who are only the consumers of scholarly works are pleased with free access to open access outlets. According to Tarrago & Molina (2008) readers receive the biggest benefits of open access.

Free access overcomes the barriers of subscription-based journals and unhappy readers/authors. Nicholas, Jamali & Rowlands (2006) reported that journal pricing issues are among the chief concerns of the authors. They were largely unhappy about the high prices of scholarly journals. Some respondents highlighted the negative effects of high

pricing on scholarly communication. A few authors emphasized the fact that high prices could reduce the readership and inhibit access of potential readers to the journals.

According to Wang & Su (2006) readers can access and read scholarly literature freely as long as they have Internet connection and do not require to be affiliated with any institutions or pay any subscription fee. Open access then extends the readership of scholarly literature beyond professional and physical boundaries. In open access, all potential users of scholarly outlets all over the world have free access. Barbour & Patterson (2006) pointed out the benefits of open access for scholarly readers of journals in terms of accessing any research literature. Schroter, Tite & Smith (2005) found that authors reported benefits of open access for themselves and other researchers including, easier and faster literature searching and the potential for medicine to improve globally.

According to Tarrago & Molina (2008) the main reason to publish in open access journals for 90% of the researchers was free and full access. Likewise, regarding the reason of publishing in open access journals, Swan & Brown (2004) found that 92% of open access authors published in these journals because of free access for all readers. They indicated that 20% of authors still would have published in those journals even if they had not been of open access while 46% said they would have stopped publishing in the journals if they had not been open access.

Delayed free access to full text of articles is an alternative way for subscription-based journals. A majority of international publishers allow the posting of some versions of published articles some time after a delay (Bjork et al., 2010). For instance, all authors who are published by Nature Publishing Groups are encouraged to submit the author's version of the accepted, peer-reviewed manuscript to their relevant funding body's archive for release six months after publication. In addition, authors are also encouraged to archive a version of the manuscript in their institution's repositories as well as on their personal web

sites six months after the original publication (based on data available online on 9 November 2010 at <http://www.nature.com>).

2.2.5.6 Ease of Access

Availability, along with ease of use, has positive effects on the use of open access journal articles. Ease of use refers to the degree of convenience experienced when using open access journal articles. It is also closely linked with availability. Scholars often prefer selecting articles that are instantly available at their desktop instead of going to the library for a copy of a printed journal issue, even though many of them prefer a print version for reading (Park & Qin, 2007).

According to Mann et al. (2008), one of the main arguments for advocates of open access is easier access to scientific knowledge. They found that 90% of the participants of the study believed open access publishing would serve this purpose. Easy accessibility to full text journal articles via Internet is a great advantage that is provided by open access journals. Nicholas, Jamali & Rowlands (2006) reported that some authors preferred to access journal articles online through the Internet. Electronic access to journals appeared to be convenient for many respondents. Schroter, Tite & Smith (2005) found that authors believed open access has benefits for them and other researchers in terms of easier and faster literature searching. Dulle, Minish-Majanja & Cloete (2010) found that 76.5% of respondents agreed or strongly agreed with easy access to free online content.

Various attempts have and are being made to reduce the information gap between rich and poor countries and provide easy access to research results for researchers in developing countries. The knowledge gap hypothesis states:

“As the infusion of mass media information into a social system increases, segment of the population with higher socioeconomic status tend to acquire this information at a faster rate than the lower states segments, so that the gap in

knowledge between these segments tend to increase rather than decrease” (Tichenor, Donohue & Olien, 1970).

Access to scholarly publishing is one of the main problems for scholars in developing countries. Scholars can easily access to free scholarly outputs by means of Internet. Hess et al. (2007) found a majority of (92%) respondents agreed that easy access to research results for researchers in developing countries as an advantage of open access publications. Mann et al. (2008) also agreed that one of the benefits of free access to research results is easier access for scholars from developing countries. According to 94% of the respondents, open access publishing would be helpful in granting better access to developing countries. Likewise Ouya & Smart (2005) reported that respondents (editors) agreed that open access would generate benefits to the global scientific community and the world in general.

2.2.5.7 Indexing/Global Exposure

Open access increases the use of research papers by increasing awareness through indexing in open access services. It means that by indexing in publicly accessible databases, more readers will be aware of indexed work (Brody, 2006). Indexing is a key point in the retrieval of documents via Internet. Putting an article an article online alone may not greatly improve access and impact of that article. A substantial percentage of the literature needs to be indexed by search services before scientists consider them useful (Lawrence, 2001b).

Indexing in popular databases is one of the chief reasons for authors in selecting a journal in which to publish their articles. According to Ouya & Smart (2005), if journals are not included in internationally searchable indexing services, then they are isolated from the global knowledge base, and therefore suffer from low exposure to researchers outside

their locale. Beer (2005) used the results of the questionnaire-based survey to suggest that open access journals needed to be indexed within the ISI indexes. Respondents declared that they would publish in open access journals if they were accredited by South African Post Secondary Education (SAPSE) which is ISI journals. According to Nariani and Fernandez (2010), respondents wanted their articles in open access journals to be immediately indexed in STM databases. Some respondents considered the linking of the article from the publishers' website to PubMed as a very important or important feature.

One of the major drawbacks of open access journals so far has been that they rarely have been indexed in the commercial indexing services for searching quality-assured publications, which universities provide to their researchers and students (Bjork, 2004). The number of ISI indexed open access journals is rather low comparison to subscription-based journals. Bjork et al. (2010) conducted a study aimed at discovering the proportion of peer-reviewed open access scholarly journal articles on the web. They used Ulrich's Periodicals Directory, ISI's Web of Science, Scopus and DOAJ as their main data sources. Articles were divided into indexed and not-indexed ISI journals. The results indicated that the proportion of fully open access journals was clearly lower in the ISI. This could be explained by the fact that, it has been more difficult for relatively new journals to get accepted into ISI than into Scopus. On the other hand, the use of SCI by university administrations as a decision support tool has become one of the strongest barriers to the success of open access journals, since it tends to strongly favor old established journals (Guedon, 2001). It is very difficult to get new journals accepted in SCI before they have established a reputation, and being outside the 'core literature' of SCI makes it very difficult to get good submissions and establish a reputation (Bjork, 2004).

A key point for efficient indexing of open access material is the success of the OAI-Protocol for Metadata Harvesting (OAI). Its widespread adoption would enable the

setting up and in particular filling up with content of open access harvesting services, which would provide good access points worldwide for these materials (Bjork, 2004). Therefore, open access outputs that use OAI-Protocol for Metadata Harvesting are retrievable web wide through search engines. Google, for example, have been pioneers in developing mechanisms for indexing and retrieval, such that it is now possible for anyone to find and retrieve information of interest to them from computers all over the planet (Barbour & Patterson, 2006). Search engines are so valuable for scholarly communities in retrieving open access content as a recent study indicated that 95.23% of respondents showed their importance to them (Gul, Shah & Baghwan, 2010).

2.2.5.8 Visibility

Visibility means the degree to which a researcher believes that publishing in open access journals enhances the exposure of publication (Park, 2007). Researchers' careers and standing depend largely on the visibility and uptake of their research (Harnad, 2001a). Although visibility is usually quoted as an advantage, it could be seen as a drawback by those not confident about the quality of their work (Zakaria & Rowland, 2006).

Open access by means of Internet maximizes the visibility of research output. Respondent of Warlick & Vaughan (2007) agreed that increasing visibility is one of the positive aspects of open access system. According to Johnson (2000) visibility through Internet is one of the strategic benefits of open access for societies. For Scaria (2003) experience of BMC journals reveals that current visibility cannot be afforded, if BMC journals were a toll-access or print journals. Also Ouya & Smart (2005) found that all respondents (African journals' editors) agreed open access would improve their journals' visibility, and possibly raise the quality of published work in the continent. Even many of them were concerned about greater visibility which would result in more article

submissions than they had the capacity to handle. Furthermore, according to Eysenbach (2006) greater visibility has advantages such as citation count (as a metric for knowledge uptake within the scientific community), an end user uptake, and cross-discipline fertilization within and beyond the scientific community.

2.2.5.9 Larger Readership

Readership was an important aspect in selecting a journal to publish (Schroter, Tite & Smith, 2005). Larger readership of open access outlet is a result of indexing, visibility, and free access. Qiu (2010) reports from Nicholas that when Science Direct opened its content to Google in March 2007, the proportion of traffic channeled from Google rose to more than 40% in the space of a few months. Open access maximizes access to the literature, but goes one step further by maximizing the utility of the literature (Barbour & Patterson, 2006) with larger readership.

Ghane (2006) found that majority of 69.3% of respondents disagreed or strongly disagreed that open access journals have lower readership than traditional journals. Hess et al. (2007) indicated that about 75% of the respondents were in agreement about the potential of open access publications to reach a larger readership. According to respondents reaching an expert readership was seen as so important for open access journals. Also Mann et al. (2008) believed that reaching a broad readership is often known as the outstanding advantage of open access publications. Similarly Wang & Su (2006) believed that open access can potentially be viewed by more people with no fee barriers. Schroter, Tite & Smith (2005) reported that respondents acknowledged benefits of open access such as wider audience.

Tarrago & Molina (2008) indicated that about 50% of respondents' chief motivation to publish in open access journals was wide audience of these journals. Swan &

Brown (2004) found that 71% of open access authors publish in these journals due to larger readership comparison to subscription-based ones. As a result 64% of respondents believed articles would be more frequently cited due to larger readership. Meanwhile the reason for 54% of non open access authors for not publishing in open access journals was smaller readership of these journals compared to subscription-based journals. Also, According to Davis (2011) although open access publishing may reach a larger readership than subscription-based publishing, it does not necessarily translate into more citations.

Target audience of open access journals was among the important factors in choosing these journals to publish in (Nariani & Fernandez, 2010). In a subscription-based system, expert readership have access to part of scholarly works that were subscribed to by their institutions, while open access journals give equal access for both expert and public readers - who were not professional researchers - to access scholarly outputs. Although some commentators have asserted that the public will not benefit from the oftentimes arcane or esoteric information that is published in specialized journals, there are many who will. The UK House of Commons Science and Technology Committee (2004) was quoted in the scientific publishing report as:

“It is not for either publishers or academics to decide who should, and who should not, be allowed to read scientific journal articles. We are encouraged by the growing interest in research findings shown by the public. It is in society’s interest that public understanding of science should increase. Increased public access to research findings should be encouraged by publishers, academics and Government alike” (Barbour & Patterson, 2006).

2.2.5.10 Fast and Wide Dissemination

Typically scholars want a fast publishing process in order to have rapid access to research findings and also fast dissemination of their research findings. According to Coonin & Younce (2010) timeliness of a publication was considered as an important factor

by 67.6% of respondents in publishing in a journal. Hess et al. (2007) indicated that for 79% of the respondents, the speed of publication is higher when publishing in open access outlets. Also Tarrago & Molina (2008) found that the reason of some participants publishing in open access journals was that these journals published articles more quickly than print and subscription-based journals. Similarly according to respondents of Schroter, Tite & Smith (2005), speed of publication was an important aspect in selecting a journal to publish in. They found that about 31% of those surveyed thought that open access journals had faster and timely publications.

Publishers charge for access to the journal, by the article, by the issue, or more frequently by an annual subscription to a journal to cover the dissemination costs (Barbour & Patterson, 2006). However, dissemination through open access journals by means of Internet is more economical and very fast way. Therefore, the authors' aim of publishing papers which is wide dissemination and peer recognition (Krichel & Warner, 2002) is met in open access system.

Wide dissemination of knowledge to a broad readership is one of the advantages of open access (Mann et al., 2008). According to respondents of Ouya & Smart (2005), open access was perhaps the only way to disseminate information as widely as possible. According to Wang & Su (2006) if scholars learn about open access and contribute to it actively, then they can benefit from the "dissemination" advantage of this media. Swan & Brown (2004) found that 87% of open access authors published in these journals due to faster publication time comparison to other types of journals. Similarly, Nariani & Fernandez (2010) reported that faculty members who had published in PLoS and BMC journals were impressed by the speed of the publication cycle from initial manuscript submission to a final edited version.

2.2.5.11 Prestige and Reputation of Open Access Journals

Prestige implies that a journal is well established and highly regarded by the research community (Park & Qin, 2007). Prestigious content is required to ensure channel dominance (Johnson, 2000) to publish. The prestige of a journal is closely related to the quality of the published articles and the advancement in this direction should be judged and assessed by the scientific community (Simo & Sallam, 2008). Prestige of a journal also depends on impact factor of a journal, reputation of a journal, indexing in special databases and others. Findings of Coonin & Younce (2010) indicated that 90.2% of authors consider the reputation of a journal as an important factor in deciding to publish in that journal.

Lack of prestige of open access journals is an incentive for authors to publish their prestigious articles in these journals. Anderson (2004) reported that a relative lack of prestige is one of the significant barriers in acceptance of open access by authors. Also Warlick & Vaughan (2007) reported that open access publications are not highly respected. Similarly Hess et al. (2007) indicated that about 51% of the participants believe that open access is not well-known enough to use as a medium for publishing their work. Likewise, Swan & Brown (2004) indicated that 69% of non open access authors had not published in these journals because of low prestige. According to Schonfeld & Housewright (2010) for a greater section of respondents in traditional publications remains the dominant dissemination channel due to reputation of these journals. Also Wang & Su (2006) argued that open access journals are currently not as prestigious as some conventional journals. In contrast, Tarrago & Molina (2008) found that the main reason for 41% of respondents for publishing in open access journals was prestige of these journals.

Findings from prior studies suggest that prestige of journals is considered much more important than being open access for respondents. However, to make open access journals as prestigious as conventional ones, some motivation should be provided for

authors. Employing prominent scholars to serve on the editorial board is a method used effectively by PLoS Biology and BioMed Central's Journal of Biology. Suber (2004) suggest inviting eminent scholars to submit their new, excellent work to open access journals. This suggests excellent submissions would build prestige and, on the other hand, prestige would attract excellent submissions. For Bjork (2004) there are some ways in which newly established journals could build their prestige. For instance, the reputation of the editor and the constitution of the editorial board are important. Also, attracting more papers from leading academics early on is important. This can again lead to a positive chain reaction of citations in other articles and journals and eventually (in the long term) inclusion in the SCI.

According to participants of Schroter, Tite & Smith (2005) study, reputation was an important aspect in selecting a journal to publish in. Attributes of reputed journals according to respondents are high impact factors, superior peer review, and high quality. Some of the authors criticized existing reputation and quality of open access journals. On the contrary, Ouya & Smart (2005) reported from respondents that open access would improve author profiles. At the same time for respondents, if their journal transit to open access, it would lose its identity and reputation.

Hubbard, Hodgson & Fuchs (2011) conducted a study where they found that according to respondents, the prestige attached to certain journals in a field was more important than mere citation. However it should be mentioned that being open access journals is not in contrast with being a prestigious journal. For instance Nature is one of the world's most prestigious scientific journals, as it started to publish since November 1869. It is the world's most highly cited interdisciplinary science journal, as stated by the 2009 Journal Citation Report Science Edition (based on data available online on 12 January 2010 at <http://thomsonreuters.com>). Its Impact Factor is 34.480. This prestigious journal

has put an open access option and authors can either publish through the traditional subscribed access way or make their paper an open access one through payment of an article-processing charge (based on data available online on 9 November 2010 at <http://www.nature.com>). It seems both reputation and prestige of an open access journal closely depends on impact factor of a journal. However, most of the open access journals are young and new. These journals need time to achieve the required reputation and prestige among scholars.

2.2.5.12 Impact Factor/Citation

Impact factor is a measure of the frequency with which the average article in a journal has been cited in a particular year or period (definition adapted from <http://thomsonreuters.com>). The citation impact is accordingly rewarded by universities (through salary increases and promotions) as well as by funding bodies (through grant funding and renewal). It is also rewarded by libraries (through journal selection and renewal, based on the journal's average citation "impact factor") (Harnad, 2006).

Although the main interest of authors for publishing their works is to maximize the impact of their article, current system places barriers between the authors' work and their potential readers, resulting in reduced dissemination and impact of their work (Prosser, 2003). The authors of refereed journal articles write their articles mainly for "research impact" purpose intended for their effects on research and researchers. In order to reach researchers and to have an effect on their research, these refereed journal articles have to be accessed by their potential users. Subscription-based journals cause access and impact barrier whose careers (promotion, tenure, funding and prizes) depend largely on the size of the research impact of their work (Harnad, 2001b). Authors write for impact so that they can achieve the widest possible dissemination of their work, which requires that their work

be online, free of charge and free of the usage limitations (Suber, 2003). Researchers do not expect payment for their research, but they are very keen on the impact that their work would have. Their market value is much dependent on the total impact of all the papers that they have written (Krichel & Warner, 2002; Suber, 2007).

One of the benefits of making research work open for access is to enhance citations and therefore, the impact factor (Lawrence, 2001a). For instance PLoS Medicine is an open access medical journal that was launched in 2004 and is now the fourth-leading medical journal in the world, with an impact factor of 13.8 (Palepu, 2007). Also, according to Hagemann (2005) about 72% of free versions of papers published in the *Astrophysical Journal* are available mainly through ArXiv that on average is cited twice as often as the remaining 28% that do not have free versions available in repositories. Brody (2006 cited Richardson, 2005) stated that, the usage of *Nucleic Acids Research Journal* papers doubled when the journal changed to open access model. Hedlund & Roos (2006) reported that the impact factors of BMC open access journals varied between 1 and 5.4 in 2004. Nariani & Fernandez (2010) found that the impact factor of the journal was one of the most common considerations of the researchers while choosing an open access journal. According to some of the respondents, the impact factor of open access journals had steadily increased over time and is going to be comparable to the high profile journals.

Swan & Brown (2004) found that the reason of 69% of non-open access authors for not publishing in open access journals was due to their perception of low impact for these journals. Both open access authors and non-open access authors had concerns of publishing through this model due to low impact. According to 40% of open access authors, publishing in these journals may limit impact, 74% of non-open access authors had same concerns. The reason why both groups had concerns with the impact of open access journals is that when considering the journal impact factor criterion alone, the fact

was that most open access journals still had not reached a high rating in their impact factor. On the other hand, due to free access to all potential readers, open access journals were expected to benefit from higher citations frequencies over time. According to participants of Schroter, Tite & Smith (2005) study the reason for not submitting articles to open access journals was that they did not have impact factors. Likewise Warlick & Vaughan (2007) conducted a semi-structured interview with the authors of two major research universities in North Carolina and Duke University. They found that there was a continued belief that open access publications have a lower impact factor than traditional journals. Also Schroter & Tite (2006) found that about 27% of respondents thought open access journals had lower impact factors. According to participants of Mann et al. (2008) study traditional media is superior with regard to the impact factor may be due to the current impact factors of open access outlets. Their findings indicated that for 60% of respondents the impact factor of open access journals was insufficient. Also low impact factor was reason of almost 72% of respondents for not publishing their work in open access journals. Schroter, Tite & Smith (2005) explained that new open access journals with lower impact factors will need to do more to reassure authors regarding impact of these journals. In contrast, the editors of African-based journals agreed that open access would improve their journals' impact (Ouya & Smart, 2005). Hess et al. (2007) in their survey reported that 58% of respondents see the impact factor of open access publications as a barrier due to insufficient or absence of impact factor of these outputs. Also, in a study undertaken by Hubbard, Hodgson & Fuchs (2011) it was found that more than 90% of respondents had not used open access journals due to the low impact factor which was presumed to be a sign of low prestige. Moreover, other respondents believed that a major drawback to the acceptance of open access was the lack of quality associated with these journals.

Tarrago & Molina (2008) claimed that the impact of open access journals is a reason for some researchers to publish in these journals. Authors would be more concerned with the impact factor of the journal where their work was published, rather than with issues of whether their article was accessible to those who could not pay (Balaram, 2003).

Several extensive experimental studies (Norris, Oppenheim & Rowland, 2008; Brody, 2006; Eysenbach, 2006; Hajjem, Harnad & Gingras, 2005; Lawrence, 2001b) have shown that open access outlets have received more citations. Also Xia, Myers & Wilhoite (2011) found that the free availability of LIS journals' articles increased their citations when articles from the same journals were evaluated. Meanwhile, Davis (2009) examined the citations advantage of articles published in 11 biological and medical open access journals since 2003 to 2007. He found that all journals showed a small (17%) but significant increase in article citations. Also, Davis (2011) indicated that while articles from open access journals were downloaded more and also had a broader audience; they were not cited more frequently than closed access articles within the first three years after publication. This seems to suggest that the real benefit of free access to the scientific literature was for those outside the core research community that rarely contributed to the body of scholarly literature.

Although the above mentioned studies showed more citation rates for open access outlets, potential users of open access (authors and readers) had a different perspective. Coonin & Younce (2010) found that citation was an important factor for 55.3% of authors when deciding to publish in a journal. Hess et al. (2007) reported that about 44% of respondents saw open access publications as having a citation advantage while 31% did not see any advantages. They concluded that open access publications had higher citation rates. Ghane (2006) indicated that 51.3% of respondents disagreed or strongly disagreed that open access papers may be less cited, while 20.5% believed or strongly believed with

less citation of open access journals. However, it should be emphasized that only being open access did not result in more citations, but the quality of papers was more important for researchers to cite them in their work. Although Swan, Needham & Brown (2005) believed that one of the advantages of open access is the acceleration and enhancement of the impact of scholarly research, only being open to access was not enough to result in higher citations. According to Swan (2010) “citability resets upon the quality, relevance, originality and influence of a piece of work. Research reports that add little or nothing to development or thinking in a field earn little or no attention from other researchers, even if they can be readily accessed”. According to her, open access work can receive more citations, if citable articles became available to audiences that were not accessible before. Hence, putting a paper earlier before its worldwide potential audience may affect subsequent citation patterns. Authors usually prefer to allow their superior papers for open access and not poorer ones. Finally, good quality open access articles receive more citations than poorer articles.

The Web has led to several new citation measures and methods such as article-download counts and h-index that were previously impractical. H-index was developed in 2005 by Jorge Hirsch at the University of California in San Diego, to quantify the impact and quality of individual scientists’ research output (Meho, 2007). Publishing in high impact factor journals or journals that received more citations led to higher h-index. Therefore with this assumption that free and open access papers obtained more citations it is expected that the h-index of these papers would increase.

However, the end result of open access activities was defined by an increased use of these documents in the form of citations, which motivated researchers to make more open access contributions through their academic and research process (Xia, 2011).

2.2.5.13 Career Benefits

Typically an open access journal can be chosen by authors as an option to publish an article if it influences their career benefits positively. The career benefit is one of the important factors in acceptance of open access publishing. Kingsley (2008) through in-depth interviews with 43 researchers in three disciplines at two universities of Australia found that, the reward function of scholarly publishing is the key factor for researchers in managing academic careers and supporting traditional publishing systems. According to Park & Qin (2007), journals function as more than a communication device and are deeply embedded in the academic reward system. Tenure and promotion decision making are perhaps the most critical and most unpredictable aspects of the process. Perceptions of whether or not an open access journal outlet provides advantages for tenure and promotion decision making positively affects scholars' publishing intentions.

The concept of open access journals is new and authors are not certain whether they are considered by evaluating committee of their parent institution for promotion. Hess et al. (2007) indicated that 60% of their participants of study think that publishing in open access media had a negative impact on gaining promotion and tenure. They concluded that open access publications had a negative impact in this study on their career promotion. Findings showed that according to 64% of respondents, publishing in open access outlets is disadvantageous with regard to securing research grants. Likewise Mann et al. (2008) found that despite the general positive attitude of participants, a majority of them (61%) feared that publishing through open access journals might put a risk to their chances of promotion and tenure. Also 63% were worried that open access publishing would damage their chances for research funds. According to Schonfeld & Housewright (2010) for the majority of respondents, the traditional publishing channel continues to dominate the dissemination channels due to career benefits of these journals. One-third of respondents

strongly agreed that tenure and promotion practices “unnecessarily constrain” their publishing choices otherwise they would take different approaches for the dissemination of their work. Despite the above mentioned concerns of the respondents, probably they continue to use this model unless there is an overall cultural shift and structural change initiated of the highest levels of academic administrators. In contrast, Ghane (2006) found that about 46.2% of respondents disagreed or strongly disagreed that open access would reduce their career advancement, only 23.1% of them were in agreement. Also 39.5% of respondents disagreed or strongly disagreed that open access would badly affect their academic promotion while 26.3% were in agreement. Similarly, Nariani & Fernandez (2010) found that according to most of the faculty members publishing in open access journals, it was not a barrier in the tenure and promotion process as they did not have any departmental restrictions about publishing in these journals.

Publishing in high quality journals in most fields and universities is highly rewarded and often include shortlists of journals. Research assessment committees give more attention to the journals which have a high impact factor. Therefore, authors aiming for career benefits publish in those journals. According to respondents of Schroter, Tite & Smith (2005) since initiatives such as the research assessment exercise have obliged authors to publish in journals with high impact factors, journal quality was more important than being open access when deciding where to submit. Similarly, Nicholas, Jamali & Rowlands (2006) reported from some of their interviewees that as long as the current system of evaluation of authors in which authors were evaluated by the number of their publications and the impact factor of the journals and so forth, remains in place, a change in the scholarly publishing system is hard to foresee. According to Bjork (2004) the tenure systems in many countries, universities and institutions were strong motivating forces to publish in high quality journals. This system naturally discourages the younger academics

not to publish their best work in relatively unknown open access journals. Therefore, the academic reward system puts any new journals, whether subscription-based or open to access ones, in a disadvantaged position. It is only when a journal is able to get sufficient submissions of quality articles that it stands a chance of joining the group of journals with high prestige, and even that happens after a delay of several years. However, it is probably impossible to expect the whole academic community to change its evaluation system could take a better account of the benefits offered by the open access media. The experiences of the past ten years show that it is very difficult for new open access journals to become top ranked journals in their fields.

An obvious shortcut is if established journals would change their business models and become open access, but despite isolated examples, this is unlikely to happen on a larger scale as long as publishing is as profitable a business as it is today.

2.2.5.14 Business Model of Open Access

One of the main characteristics of open access publishing is to be free of charge, but for readers not to produce. Defiantly open access journals require financial support to survive in a publishing arena. They need some financial sources other than access or subscription fees to cover their costs. In a business model of open access instead of paying to read the literature there is a payment to publish.

Sustainability of a journal may be judged by its ability to generate its own operational costs (Ouya & Smart, 2005). Financial sustainability or sustainability of a business model is a key point in the success of open access journals. Some justify that open access is economically sustainable while others believes that it is not. In terms of financial sustainability, according to Frequently Asked Questions of Budapest Open Access Initiative, open access publishing is sustainable economically, since there are existing

journals in this case and also due to two background reasons. First, there is evidence to show that the costs of open access publishing are significantly lower than the costs of traditional publishing, and second, the money to cover these significantly reduced costs can be found even if only by redirecting the sources now paying the higher costs of traditional publication (based on data available online on 18 January 2010 at <http://www.earlham.edu/~peters/fos/boaifaq.htm>). In macroeconomic terms, it is obvious that both an open access model and a toll access model are equally 'sustainable' (that is, affordable to the scholarly community). An open access model has the same costs as a toll access model (Cockerill, 2006). Additionally, most open access journals have so far been established by individual pioneers or groups of academics. The main business model has been used to minimize costs and to fund the operations as a form of open source project, where hardly any transfer of money is involved and all costs are absorbed by the employers of the individuals participating. A Web survey involving the editors of 55 open access journals confirmed that this was a predominant business model, where only approximately 10% of the journals had explicit budgets (Bjork, 2004). Among the journals listed in the DOAJ, about 10% were totally supported or partially financed by academic and research institutions (Open Society Institute, 2004). Ensuring the economic feasibility of open access journals is one of the main problems. Financial issues and concerns could ruin open access publishing and this would lead to a reduction in the quality of papers. Hence, poor institutions might not be able to compete with rich ones in publishing ventures (Nicholas, Jamali & Rowlands, 2006). The business model is insufficient in terms of sustaining operations in the longer term and for scaling up from a few papers a year to larger publication volumes, since that might necessitate employing staff. The business model issue is central to the further proliferation of open access journals (Bjork, 2004). Funding an open access journal is a key factor when deciding to launch open access

projects and make them sustainable. Open access journals will survive only if they can raise sufficient funds to cover the costs of publication (Park & Qin, 2007). The financial support ensures the feasibility and stability of open access journals (Simo & Sallam, 2008). The application of open access models relies on the availability of financial resources, which are limited in most of the developing countries (Wang & Su, 2006).

There is an important question that who should pay the publishing costs of open access journals? There appears to be no clear-cut answer to this question. Value judgments about who should bear the costs of dissemination of scientific work depend on the standpoint of the individual (Wellcome Trust, 2004). Swan & Brown (2004) found that 36% of the respondents had not paid a fee because it was not required, 19% had it waived by the publisher. Also 25% of them had paid the fee from their research grant, 8% from departmental funds and 9% from other institutional funds. Only 4% of authors paid the fee on their own. For a majority of authors, if a fee must be paid it should come from their research grants. However, using research grants to cover publishing fees depended upon the willingness of institutions and grant awarding bodies to allow their funds to be used for this purpose. Also Wang & Su (2006), in relation to the payment of publishing costs for open access journals, provided four options for respondents to answer, including authors themselves, government, funding bodies, and their institutions. The results showed that funding bodies and their institutions were the top two among their answers, while only one interviewee chose the government and none of them thought that the authors should pay for the cost out of their personal budget. Coonin & Younce (2010) found that out of the 323 respondents who had published in open access journals, 26.9% said they had paid publishing fees, 31% said funding agency or institution paid for it, and 42.1% mentioned that they had not paid publication fees.

Open access journals have high costs, but can be covered by charging the author's sponsor (employer or funder) rather than the reader's sponsor (library). In this way institutions could pay for outgoing articles rather than incoming articles, but it is natural to consider the cost of dissemination just like any others costs of research, and in the long run paying for dissemination would cost institutions much less than paying for access. Moreover, the result is that the full cost of dissemination is covered so that worldwide access can be free of charge (Suber, 2003). There are different business models, such as author-pays model, advertisement, subsidies from learned societies, or research funding bodies (Bjork, 2004) in order to keep the end product freely available on the Web, rather than take recourse to subscription fees.

2.2.5.14.1 Author-pays Model

The term 'author-pays' reflects the transfer of journals publishing costs from readers to authors, operating on the assumption that organizations which fund research will also pay for its publication (Balaram, 2003). The author-pays model, in which the author's institute pays for the publication costs per article, was pioneered by such organizations as the PLoS and BMC (Chan & Costa, 2005). The concept of payment to publish in open access journals is an alternative cost-recovery model whereby instead of covering publication costs by charging institutions an annual subscription fee for access, publishers charge institutions a publication fee, per outgoing article, for peer review (Harnad, 2011).

The author-pays model, as an option for paying publishing fees for open access journals, has received both negative and positive opinion (Barbour & Patterson, 2006). Individual authors, readers and publishers interpret the costs they bear as incentives or disincentives, to carry out particular actions (Wellcome Trust, 2004). Some justify author-pays model for this group that open access journals pay their bills the same way broadcast

television and radio stations do. Those with an interest in disseminating the content pay the production costs upfront so that access can be free of charge for everyone with the right equipment (Suber, 2006). According to the Wellcome Trust (2004) in terms of economic efficiency, it is better for individuals to incur the true cost of their activities; then they will modify their behavior in some way so that the costs they incur from those actions are in some measure balanced by the benefit they receive. Furthermore, even in commercial system, authors often have to make a financial contribution to the costs of publication in the form of page charges, figure reproduction charges, reprint costs, etc., as well as giving away the copyright in their text (Prosser, 2003). In China, the publication fee was common for traditional journals and authors were already familiar with the concept of publication fees (Wang & Su, 2006).

However, “Author-pays” is one of the main hindrances that reduce the use of open access journals among researchers. A study carried out by Hubbard, Hodgson & Fuchs (2011) found that for 60% of the researchers, one of the main reasons for not publishing in open access journals was the high publishing fees. The cost of publishing was a disincentive factor for many of the respondents in their acceptance of these journals. Rowlands, Nicholas & Huntingdon (2004) found that approximately half of (48%) the respondents of the study expressed that they would not pay for publication fees of an article even if it was in the best open access journal in their field. Park & Qin (2007) found that scholars’ perception of cost negatively affects their willingness to publish articles in the open access journal outlet. Also scholars’ perception of career benefit negatively affected their perception of costs of publishing. Schroter & Tite (2006) found that about 55% of respondents thought they would not continue to submit articles to their respective journals if they became open access and charged authors. Regarding the author-pays model, Schonfeld & Housewright (2010) learned from respondents that they made their

work visible through open access to their peers; hence there was no need to pay. In their study Nariani & Fernandez (2010) found that high article processing charges were a barrier, especially for researchers who did not have research grants.

Another concern often expressed was that not all authors were able to pay the publishing fees. Schroter & Tite (2006) reported that authors disliked the idea of author charges without institutional support and were concerned about its implications for authors from developing countries and those without research funding would not be able to pay. About 66% of respondents said that they would prefer to submit to a subscription-based journal than an open access journal with a publishing fee. Over half (56%) thought that they had to make a contribution or pay the full cost of an author charge. Schroter, Tite & Smith (2005) found that authors were typically against author charges. Many respondents thought there was a negative implication of shifting costs to authors; for them authors should not be required to pay. Some thought that the charge might be acceptable if grant agencies and universities agreed to support authors. Several authors were concerned for those who could not afford to pay (unfunded research and researchers in developing countries) and stressed that waivers would be necessary.

Similarly Tarrago & Molina (2008) found that many respondents expressed their concerns about the author-pays policy which may exclude researchers in developing countries, research on underfunded subjects, and young authors unable to pay. Swan & Brown (2004) clarified that the open access fee model was against researchers from developing countries, researchers in fields that did not have financial support, and young researchers who did not have the means to pay for their publications.

Bjork (2004) argued that in author charges models like BMC journals, getting individual researchers to pay sums in the order of 500-1500 Euro for a publication might be very difficult unless a journal was already regarded as a top-level journal in its field.

Although PLoS and BMC, for example, both offered fee waivers to authors with insufficient funds (Barbour & Patterson, 2006), there still was an on-going debate about the economic viability of author-pays model by authors from developing countries. The long-term sustainability of waving publishing fees was not clear. It was not known what would happen to research access in developing countries when the publishers' agreements ended and when donations and subsidies were no longer available. For poorly resourced research institutions, while the differential pricing approach to access was attractive in the short term, it was indeed at odds with the needs of the developing countries (Chan & Costa, 2005). Balaram (2003) believed that for researchers in India and the developing world, the PLoS initiative may be fundamentally flawed. Similarly, Ouya & Smart (2005) argued that there were few researchers in sub-Saharan African institutions which could afford even a fraction of the fees charged by Northern journals following author-pays model. The charges imposed by publishers to publish an article were not affordable for most of the authors from developing countries. Wang & Su (2006) reported that the Chinese government and funding bodies had currently taken very limited and explicit efforts to promote open access in China. The limitations of financial resources in China may greatly hinder the open access development in China. Balaram (2003) argued that in developing countries it would be nearly impossible to pay high publication charges from limited research grants, while in the West, the Howard Hughes Foundation, the Wellcome Trust and the Max Planck Society were gearing up to absorb publication costs.

Misconceptions about open access journals because of publishing fees may discourage researchers from publishing in these journals. Schroter & Tite (2006) found that 46% of participants agreed that people would think anyone could pay to get published. In addition Fang & Zhu (2006) indicated that some scholars think that requiring a publication

fee would lower academic standards for open access published articles. It also would signal the peer-review, resulting in a great deal of low quality research papers.

Institutional membership is a way to get a discount for publishing fees of open access journals. In this way institutions pay publishing fees for open access journals as a subscription fee to open access publishers; the articles by affiliated authors would then be published in these journals. For instance, BMC has created an option of 'institutional membership' in an effort to lower the hurdles and take the burden of payment off the shoulders of individual scientists (Velterop, 2003). According to Nariani & Fernandez (2010), one of the reasons health science and biology researchers have published in open access journals was that the publishing fees for open access journals for respondents have been paid through institutional memberships; additionally they did not have to pay for extra features including color images and video files. Swan & Brown (2004) found that more than half of open access authors had not paid to publish their work in open access journals. This was probably due to institutional membership of their respective universities. Additionally, institutional membership was used by subscription-based journals for open access publishing. For instance, University of California (UC) libraries and Springer Science and Business Media have an agreement in which articles by UC-affiliated authors were accepted for publication in a Springer journal published using Springer Open Choice with full and immediate open access. Therefore, there was no separate per-article charge, since costs were factored into the overall license (based on data available online on 25 February 2009 at <http://www.today.ucla.edu>).

However, the responsibility of effecting the change from the conventional publishing model to an open access model is still on the shoulders of individual authors at present. The sad fact is that the existing pressures on authors to conform could sometimes prevent them from choosing open access journals. The stance that an increasing number of

funding agencies were taking namely that the cost of publishing was to be seen as an integral part of the cost of the research itself, was most helpful (Velterop, 2003). To receive institutional support in terms of covering publishing fees was among the facilitating conditions that might influence the acceptance of open access publishing. Hess et al. (2007) found that about 65% of the respondents stated that they did not get (any) support from their institutions when publishing in open access journals. Wang & Su (2006) explored whether respondents' institutions had offered any encouragement and incentives to make their publications available as open access. None of the interviewees in this study indicated that their institutions had taken efforts in this direction, but they wished that their institutions could cover the publishing costs on their behalf.

2.2.5.14.2 Advertisements

Advertisements are another way to cover the publishing costs for open access journals. Open access models are getting attractive if income is not generated through content itself; instead it comes through generating attention similar to the advertising market (Hess et al., 2007). Advertisements can work in some limited fields of science such as medicine, where drug companies, for instance, may have an interest (Bjork, 2004). In fact, well-managed and subject related advertisement on the websites could be potentially useful for authors and readers. It could be a potential window to introduce the relevant industry to their academic and research communities. However, this model should be used with great caution and with reasonable consideration of users' needs and receptivity. The number and quality of commercial uses should be highly regulated and well maintained. Advertisements and other commercial uses of the media should not occupy a large part of the web space nor be too distractive to the readers. The commercial use should be subject-related and of potential interests to readers. Even so, there are scholarly users who might

have objections to the commercial use of open access projects (Wang & Su, 2006). BMC currently offers advertising services on its website which are required to be related with biological and medical research.

2.2.5.14.3 Hybrid Model

A hybrid way is another business model employed to cover the publishing costs of open access journals in which a mixture of subscription only and open access is used. Each author decides whether his/her article will be open access, by paying an author charge (Bjork, 2004). According to Gaulea & Maystre (2011) some of the open access articles that received more citations were due to the choice of open access option of hybrid journals by authors, for their high quality papers. In this model, a decision to choose open access options was considered after journal acceptance.

Financial contribution to a journal publisher is not specific to open access journals only. According to Swan (2008) many traditional publishers also offered authors the option of paying a publication charge in order to include a particular article in open access system, even if the remainder articles of that journal was only available on subscription bases. For example, Oxford University Press, in response to calls from the academic community to make research freely available online without the barrier of a subscription to access, initiated an open access experiment with one of its prestigious journals, Nucleic Acids Research (NAR), recently listed by ISI as one of the top ten 'hottest' journals of the decade in biology and biochemistry. The journal covers its costs through a combination of author charges and subscription revenues, with author charges gradually increasing over time until the model becomes self-funding. The adoption of a transitional approach was of vital importance for both authors and readers (Goode, 2003). This approach has been adopted by open access publishers and is now offered as an option by several major traditional

publishers such as Blackwell Publishing, Oxford University Press and Springer. The key to the success of this model is that funding agencies regard publication as an integral part of the research process, and therefore included in research grants or funds to cover the open access publication fees. However, increasingly, the funding agencies were recognizing that open access was also in their own interests, because it maximizes the impact of the research that they fund (Barbour & Patterson, 2006).

2.2.5.14.4 Funding Bodies

Funding bodies are another way to cover the publishing fees of open access journals. Funding bodies could be as government agencies, non-government foundations, corporate foundations or others which provide financial support for scholarly work. Funding bodies have a critical role in promoting open access among researchers through provision of funds for open access authors as well as promoting them to deposit their work in open access archives. Additionally, it is possible to use external funding to cover publishing costs. External funding bodies such as Health InterNetwork Access to Research Initiative (HINARI), Soros Foundation, Wellcome Trust and others are also available for open access development. However, the availability of external financial resources was limited, and additional efforts to apply for the grants and raise funds are required. The other concern is the sustainability of external resources. Often the grants are time designated, such as for a three-year or five-year period. Some may be reapplied and renewed while others may not (Wang & Su, 2006). Furthermore, open access journals are usually funded largely by the voluntary work of the editors involved and direct or implicit grants (the free usage of the host university's Web servers could be seen as a subsidy) (Bjork, 2004). However, according to Wang & Su (2006), if open access mainly operates by voluntary contributors, sustainability is a big concern. This is one of the major

difficulties to promote open access in China. Also, according to Bjork (2004) the currently dominating, volunteer work model does not easily scale up to large-scale and sustainable operations and the other business models need yet to demonstrate their strengths.

2.2.5.15 Sustainability (Long-term Preservation)

Sustainability is the capacity to endure (definition adapted from <http://en.wikipedia.org/wiki>). Sustainability often refers to the "three pillars" of social, environmental and economic sustainability (Adams, 2006). The stable maintenance of access to the output and the ability to enable discovery into the future is perhaps the most obvious of the aspects of sustainability (Livingston & Nastasie, 2006). Sustainability of the open access system can be discussed based on stability and long term preservation. Hess et al. (2007) found that about 53% of the participants thought that open access publications lack a guarantee of long-term availability. Also participants in study by Mann et al., (2008) stated that guarantee for long term availability of published articles was better fulfilled by traditional media. However, in biomedical fields the existence of PubMed Central plays a key role in reducing concerns about stability of many new journals, including open access electronic journals. Since open access articles would be permanently archived in PubMed Central and available whatever the future status of the original journal in which they were published, scientists do not have to worry about the possibility that their article may not be available in the future (Zerhouni, 2004).

2.2.5.16 Information and Communication Technology (ICT)

The existence of ICT is one of the most important requirements for using an open access system. Open access publishing is a new channel for scholarly communication, and running it without ICT would be impossible. According to BOAI, open access is "an old

tradition and new technology have converged to make possible an unprecedented public good” (definition adapted from <http://www.soros.org/openaccess>).

The growth of the Internet offers the potential to revitalize scholarly publishing as it breaks down old patterns of communication (Johnson, 2000). The use of open access by authors means that they can take advantage of the Internet as a technology for sharing knowledge instantly, with a worldwide audience, with minor costs, in a digital form and suitable for unlimited processing (Suber, 2007). Park (2007) investigated the technological advantage of open access publishing among researchers. He found that researchers supported the positive influence of technological advantages such as quick and easy data access, easy communication between authors/readers, speedy publishing process, and richness of data on their intention to adapt open access publishing. According to Hess et al. (2007) technical and personal requirements have to be met to provide open access publications. The technical requirements such as IT-infrastructure, Internet access and necessary software were fulfilled according to 95% of the participants. Existing knowledge, which was necessary for publishing in an open access mode, was sufficient for 62% of respondents. They concluded that the requirements for publishing in open access models seemed to be fulfilled. They also concluded that publishing in terms of open access was considered to be easy to learn.

The development of information technologies and the advancement of the Web are fundamental to open access development. A country’s IT infrastructure and public ability to access the Internet have a direct impact on open access. There is a huge gap of information technologies between the developed and the developing countries, which is known as the digital divide. It is believed that the digital divide has a strong impact on a country’s total scientific research output (Wang & Su, 2006). According to Dulle, Minish-Majanja & Cloete (2010) poor research conditions, insufficient information search skills,

inadequate online publishing skills, and the slow Internet connectivity were the main issues that hindered the use of open access for accessing and publishing through this media. Goodman (2004) argued that computer availability, computer literacy, and the knowledge of how to use search engines effectively were among the issues to be addressed. Also Bjork (2004) reported that information technology infrastructure was one of the hindrances in the acceptance of open access publishing. For example Ouya & Smart (2005) mentioned that the lack of ICT facilities in their study was important. They reported that their respondents in the study, who were journal editors, needed to develop several capacities. These included technological (modern equipment, software), human (manpower, technical expertise), and financial (hosting fees for the Web). Otherwise, African researchers would not fully benefit from open access journals, because of ICT limitations. It seems that lack of general infrastructure in Africa is as a potential block in the acceptance of open access. Then they reported that only 16 journals out of 30 planned to go full-text online and had an institutional website that could host their online content. The remaining 14 (47%) did not. Unless these latter journals could find a web host, their presence on the Internet might be delayed.

It is important to acknowledge that the availability of Internet connectivity will continue to hamper access even to open access materials in the poorest parts of our planet (Barbour & Patterson, 2006). According to Beer (2005), due to insufficient Internet bandwidth, accessing open access literature had become a frustrating experience. As a result, the benefits of open access have not been fully realized in South Africa. Similarly Wang & Su (2006) found that one of the issues around open access was information technologies. Ouya & Smart (2005) also mentioned that sustainability on the involved the possible consequences of server problems, or if an institution decided to stop publishing a

journal. In such an eventuality, ‘Who will continue to maintain access?’ asked a respondent.

The use of new technology takes time to be accepted by the respective communities. In other words, there could initially be some kind of resistance in adaptation to it. For instance Ouya & Smart (2005) argued that for the acceptance of open access journals, they would need to overcome institutional resistance such as convincing the various committees, members of the association, and authors of the change, and convince customers who would still want paper copies because the printing option would be ceased after transition.

Open access journals are free access electronic journals, and the IT infrastructure of these journals is like that of electronic peer-reviewed journals. For example, the technical infrastructure of BMC is on par with the leading commercial publishers. The technical infrastructure of open access journals is never brought from outside companies or larger publishers and the host institution could provide it. However, one of the drawbacks of these systems is that they are very helpless, just in case the person in charge for some reason or the other stops working with the journal (Bjork, 2004).

Dissemination by means of the Internet is cheap and fast in comparison to the costs of printing and mailing bulky paper journals. The Internet is global, and so information can be disseminated much more broadly than is possible in print. The vast storage space of the Internet also means that it is possible to allow access not only to the results of papers, but also to relevant raw data and background information, which greatly increases their value for scientific research (Barbour & Patterson, 2006). The Internet is an excellent channel for the free distribution of information in the public domain. A scientific publication, as an information good, can easily be delivered electronically to the end user (Bjork, 2004). IT infrastructure is an essential requirement for establishing and improving open access.

Internet access is a major IT infrastructure indicator. Therefore, it is used to illustrate the digital divide among countries and regions. Figure 2.1 shows Internet users in three regions: developed countries, developing countries and world use. As the figure shows the use of Internet increased during 1998 to 2009 at all levels, but still the digital gap among developing countries, developed countries and world not only still exist but has been widened. Thus, it can be concluded that for the open access movement to succeed, the enthusiasm and collaborative spirit of researchers involved in this efforts alone was not enough (Bjork, 2004).

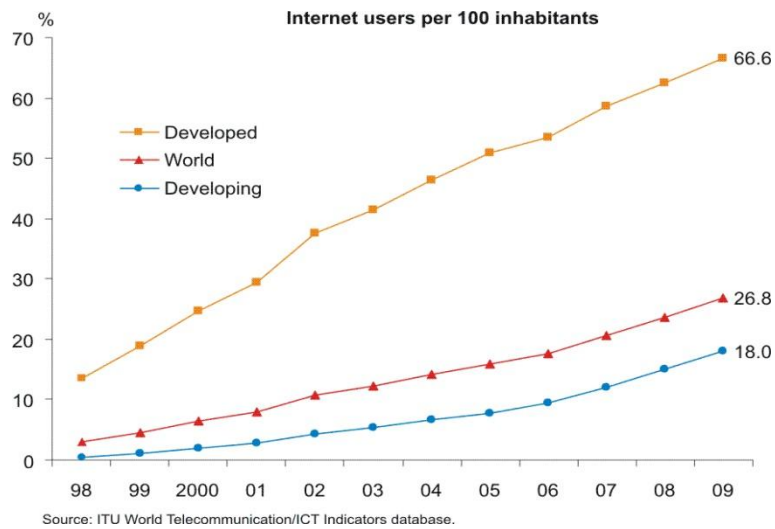


Figure 2.1: Internet use by Developed/Developing countries and World (based on data available online on 18 August 2010 at <http://www.itu.int>)

2.2.5.17 Electronic Submission of Articles

Electronic submission is not unique to open access journals alone as all electronic journals use this submission method. The advancement of ICT, particularly the use of the Internet, makes it possible to submit manuscripts electronically. Nicholas, Jamali & Rowlands (2006) found that the majority of authors welcomed the move to e-submissions. Respondents found it more efficient than print submissions. They thought that it also helps

to speed up the publication process. Wang & Su (2006) mentioned that the electronic submission process of open access journals should be easy and convenient to promote its usage.

2.2.5.18 Copyright

Unlike the authors of novels, authors of articles in scholarly journals transfer their copyrights or exclusive rights for distribution to the publishers (Barbour & Patterson, 2006). Usually, copyright grants the author the right to limited distribution of copies to colleagues. The emergence of the Internet has presented new challenges concerning the non-commercial distribution of documents by posting copies on the Web (Bjork, 2004). The internationalization of studies, as well as the unequal growth of the web as a parallel publication channel, has made aspects of copyright even more pressing and critical (Pelizzari, 2003). Since any tangible intellectual material can be protected by copyright, it does not matter if the material is freely distributed (whether in print or online), provided access to it does not violate copyright laws. In other words, copyright is a means to provide an incentive so that creators do not keep intellectual materials to themselves (Bide, 2002).

Open access journals have adopted a rather liberal approach reminiscent of the licensing schemes used by the open source programming community. As a rule the author retains the copyright to the work. Initially, the copyright issue does not constitute an obstacle for the proliferation of open access journals (Bjork, 2004). When an author retains the copyright and consents to open access, then there is no legal barrier to open access at all (Suber, 2003). It is important for an author to retain copyrights in an open access publishing environment. This avails a document to any number of potential research literature users. At present, this is severely hampered by restrictive licensing arrangements adopted by most publishers (Barbour & Patterson, 2006). Although, the retention of

copyright is an advantage for open access publishing, it does not seem to motivate authors in choosing this channel for publishing their work. Warlick & Vaughan (2007) pointed out that to retain a copyright was an incentive for only a minority (three of fourteen) of respondents who published in open access journals. Findings from a study by Coonin & Younce (2010) indicated that to retain a copyright was considered rather less important as a factor in deciding to publish in an open access journal; only 16.9% considered it important.

Additionally, Wang & Su (2006) hinted that there were three major reasons for the reluctance of Chinese scholars to publish in open access journals. First, they had copyright concerns. Secondly, publishers were unwilling or even disallowed authors to submit post-prints for open access. Thirdly, they feared that their preliminary scientific ideas would be copied by others. Ghane (2006) highlighted the lack of knowledge about copyright laws as an important issue and suggested that it should be considered in the near future by academics and their institutions.

The Open Content Movement (opencontent.org) was inspired by GNU public license which is a free, copy left license for software and other kinds of works (based on data available online on 27 February 2010 at <http://www.gnu.org>) and has developed a license a long similar principles to protect any open access content. A “Counter Copyright” campaign was launched by the Berkman center for Internet and society at Harvard Law School in 1999. They suggested that:

If you place (CC) icon at the end of your work, you signed to authors that you are allowing them to use, modify, edit, adapt and redistribute the work that you crated. This campaign has now been superseded by the creative commons initiative (Gadd, Oppenheim and Probets, 2004).

Open access journals are published under a license compatible with Creative Commons. It is a nonprofit organization which works to increase the amount of creativity

(cultural, educational, and scientific content) in “the commons” — the body of work that is available to the public for free and legal sharing, uses, repurposing, and remixing. Creative Commons defines the spectrum of possibilities and boundaries between full copyright and the public domain. From all rights reserved to no rights reserved. This licensing scheme helps to protect copyrights while allowing certain uses of your work — a “some rights reserved” copyright. It should be mentioned that a Creative Commons license is not an alternative for a copyright; it works alongside a copyright, so one can modify his/her copyright terms to best suit his/her needs. Creative Commons has collaborated with intellectual property experts all around the world to ensure that its licenses are legal and can work globally (based on data available online on 15 February 2010 at <http://creativecommons.org>).

2.2.5.19 Plagiarism

Some authors may have concerns with the possibility of plagiarism and the ease of copying their papers in an open access system. Wang & Su (2006) reported that one of the major difficulties to promote open access in China is the fears of preliminary research ideas to be “stolen” which might prevent authors’ submissions to open access journals. Also Beer (2005) mentioned some concerns of scholars regarding plagiarism. However, as mentioned by Prosser (2004), the same tools that allowed a paper to be found and plagiarized also allowed plagiarism to be detected. When the full-text of the paper is freely available to all, it is actually easier to detect plagiarism than it would be if the paper was only available to a limited number of subscribers.

2.2.5.20 Peer-review (Quality Control)

Refereeing (also called peer-review) is the system of evaluation and feedback by which expert researchers ensure the quality of each other's research findings. Peer-review is a quality-control and certification filter necessitated by the vast scale of learned research today. Without it, no one would know where to start reading in the piles of new works reported every day, or decide what was worth reading, and believing, and trying to build one's own further research upon it (Harnad, 2001b). The peer-review process serves the reader as a mark of quality (helping them to decide which papers they wished to read), while it is used by authors to validate their research (which is of particular importance in their next grant proposal or attempt at promotion) (Prosser, 2003). Peer-reviewed journal articles are important for researchers in their academic curricular vitae, academic performance reviews and in future processes for obtaining research funds (Harnad, 2011). The findings from a study by Coonin & Younce (2010) indicated that according to 96.7% of respondents, peer-reviewing of the journal was the most important factor for them in deciding where to publish their work. Also the quality of the editor/editorial board was important for the 74.4% of authors who published in open access journals.

Publishers charge access fees in exchange for formatting, peer-review and distribution services in scholarly literature. Authors accept restricted access in exchange for peer-review and distribution services that were provided (Krichel & Warner, 2002). The cost of quality-control and certification differentiates the refereed literature from an unfiltered work. The refereeing process, however, is and continues to be a medium-independently essential for scholarly and scientific research (Harnad, 2001b). It should be noted that peer-review does not guarantee correctness of published research; it does provide some mechanism to prevent making inefficient claims that are not based on scientific evidence (Balaram, 2003). Nicholas, Jamali & Rowlands (2006) argued that

although authors have supported the necessity and importance of the peer-review process, at the same time they have criticized the current system of peer-review. They concluded that the peer-review process, though imperfect, is the only quality-assurance mechanism. Peer review was 'very' or 'quite' important for 96% of the corresponding authors.

Although open access journals conduct peer-reviews, they are not enough for some authors who look for journals with higher quality controls. Authors prefer to submit their research to established high-quality, high-impact journals, instead of submitting it to new alternative journals with no track records, authorships or niches, just because those journals happen to be prepared to provide quality-controls and certifications of their own (Harnad, 2001b).

Although Open Access journals are peer-reviewed, the level of reviewing may differ among them; for example in Nature open access papers and subscribed access papers look exactly the same to a reviewer. Reviewers do not consider the author's choice, hence avoiding any possibility of a conflict of interest through the peer-review process (based on data available online on 9 November 2010 at <http://www.nature.com>). On the other hand, there are so many low quality open access journals that have poor reviews that cause a big concern regarding the quality of these journals.

Wang & Su (2006) concluded that the peer-review process which serves as the quality control mechanism in a publication is very important to open access; open access journals should never compromise the quality of their contents. The quality of journals is one of the chief factors that influence an author to choose a journal. Therefore, even if a high quality journal charged authors, they might choose it to publish their work. Schroter, Tite & Smith (2005) found that many respondents said they would probably continue to submit their work to journals they considered to be of high quality even if they charged authors, but this would depend on price and whether they received financial support.

According to Warlick & Vaughan (2007) the maintenance of strict peer-reviews is one way to ensure and promote the quality of open access publications. In addition, open peer-reviews and the posting of editorial comments were cited as valuable features available within some of the open access journals. Nicholas, Jamali & Rowlands (2006) reported that many authors were worried about changes of scholarly publishing systems due to the application of IT and the consequent introduction of new publishing models. These changes and the introduction of the new models might negatively affect the peer-review process. Their survey indicated that 34% of the authors who made a qualitative comment wrote about various aspects of the peer-review process. The main concern was the importance of maintaining a rigorous review process. About 11% of the authors highlighted the importance of peer-reviews. Ghane (2006) found that the majority (39.5%) of respondents believed or strongly believed that open access materials had low level of peer-reviews, but about 36.8% strongly disagreed or disagreed with the notion. He concluded that poor quality control of open access journals was one of the main reasons for not publishing in these journals.

According to Xia (2011) as long as was still at the core of an academic evaluation system; the quality of publishing would be more important than open access, although both did not necessarily conflict with one other. Also Schroter, Tite & Smith (2005) in their study indicated that respondents thought that journal quality was more important than open access when deciding where to submit their work. In other words, journal quality was a priority in decision making than the availability of open access publishing. The quality of peer-review systems was an important aspect when selecting a journal in which to publish. The main reason for respondents for not submitting to open access journals were inferior peer-review and low quality of these journals. Furthermore, some participants assumed that open access meant publishing without peer-review or printed journals. The respondents

also had concern regarding the possibility of vanity publishing (poor quality research being published for a fee) and a flood of non peer-reviewed papers on the Internet in open access publishing.

However, open access journals may need to do more to reassure authors of the quality of their journals. A prominent statement from the referees would increase academic and managerial acceptance of open access journals as valid publication output opportunities and appropriate dissemination media for academic and research content (Hubbard, Hodgson & Fuchs, 2011).

2.2.5.21 Open Access Policy

Policy is defined as a “high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body” (Merriam-Webster Dictionary, 2010). It refers to the regulations and mandates made by governments and non-governmental organizations (NGO) which play an important role in scientific development. Due to the great influences of governments and NGOs, the policies issued can make open access visible and accepted to all related parties. Thus, such policies can considerably promote the advancement of open access in their respective countries. The United States is one of the countries that have taken the leadership in open access development in the world. Such a success cannot be achieved without good policies issued by the United States government and NGOs. Policies are important in order to promote the open access concept and influence the public view of open access. When open access was launched in China as a new publishing model, there were objections and misunderstanding from various parties involved, including publishers, authors, and readers. Policies can help to improve the public awareness on open access. At present, there is no publicly stated open access policy

in China either by the government or any NGOs. It seems that one of the issues surrounding open access is policies (Wang & Su, 2006).

The policy of an institution states that an institution supports open access or not. Hedlund & Roos (2006) argued that the institutional policy to promote open access publishing along with policymaking, governmental policy in science/technology, policy of other funding bodies, interest groups/officials and also increased demands of productivity/accountability were among the social environmental incentive factors for open access publishing. According to Wang & Su (2006), the education and promotion of the open access concept among the government officials were among the most important steps needed to introduce open access in China. Beer (2005) found that respondents believed that research institutions should spread and fund open access initiatives. He argued that minimal modifications of the current legislation would help to make open access mandatory in South Africa. He suggested that a new national information policy - in the form of an open access mandate - was required to encourage knowledge diffusion in South Africa and also stimulate the national system for innovation.

Over the last few years, the number of formal policies on open access from institutions and research funders has started to increase, most prominently in the area of health sciences. The earliest mandatory policy for open access to health science research came in 2005 from the Wellcome Trust. Over 90% of UK health science research is now produced under a mandatory open access policy, opening up the UK's findings to be shared with the rest of the world's research community. The NIH is the biggest funder of scientific research in the world. The NIH policy began as a voluntary one but this resulted in only around 4% of the total articles funded by NIH money being self-archived by researchers, hence it was essential to adapt a mandatory policy. The new mandate means

that from now on all of the research outputs would be deposited in the PubMed Central repository and would be freely available to health science researchers (Swan, 2008).

According to the report of Ministry of Health and Medical Education, presenting scholarly journal in university websites is important in their ranking (Iran. Ministry of Health and Medical Education, 2007). However, by applying an open access publishing system not only above principle was achieved but also published articles in these journals would be searchable seamlessly through search engines. Saghaei (2007) pointed out that currently a considerable proportion of university granted research in Iran was published in closed-access international journals. He suggested that “Now is the time for university officials to encourage researchers to move toward an ethical model of submission to the open access journals”.

The existence of adequate open access journals may create an impetus for authors to use the system. Tarrago & Molina (2008) found that 35% of respondents had not been able to find any open access journals in which to publish their work. According to Hedlund & Roos (2006), the availability of open access journals is one of social environmental incentive factors for open access publishing. Dulle, Minish-Majanja & Cloete (2010) found that 61.3% of the researchers generally believed that they understood the implications of publishing in open access outlets. It means that they were more likely to publish their work through scholarly open access media. In addition the existence of initiatives to introduce open access for researchers may have an important role in the promotion of open access. Hedlund & Roos (2006) asserted that one of the most important factors in the social environments promoting open access publishing in medicine have been the political and practical initiatives made by NIH and the National Library of Medicine.

2.2.5.22 Publicizing Open Access

The success of journal publishing depends on getting authors to submit their best papers to the journal in question. In order to attract authors, the marketing and branding of journals are very important for long-term success. A publisher can also become a brand for an individual journal category. In this respect the leading commercial publishers, learned societies and leading universities, particularly from the United States and United Kingdom, have an enviable position. Libraries and authors alike find it much easier to accept a new journal from a well-established publisher. Branding is extremely important from a marketing viewpoint, and in this respect it is interesting to examine the success or failure of attempts such as BMC and the PLoS as open access publishers (Bjork, 2004).

For instance, given the high profile and brand-value of Nature, the creation of journals for Scientific Reports by Nature Publishing Group was a new era in the publishing of high prestige open access journals. If the arrival of such journals led to the closure of lower-volume, middle-ranking traditional journals, the reason was not open access, but rather Nature's brand position. The brand could influence online and electronic production as well as its dissemination to be more successful compared to less highly regarded brands (Hubbard, Hodgson & Fuchs, 2011). It is necessary to publicize the advantages and potentials of open access to information resource centers. For instance, academic departments or libraries can provide links to subject archives such as PubMed Central, and free journals online in medical literature (Tarrago & Molina, 2008) to introduce them to the academic community. According to Bjork (2004) most open access journals have not yet been established as brands and on the whole the marketing of such journals has been very poor, somewhat due to lack of resources for marketing and partly because of a lack of understanding of the need for marketing. However he predicted that BMC could be an exception and in the near future it might become a brand by itself. Even more spectacular

has been the start of the PLoS journal of Biology in October 2003, which managed to become headline news in many media. PLoS, however, used millions of dollars of its initial grant funding for marketing and included several Nobel laureates on its editorial board. DOAJ tries to improve the marketing of open access journals by providing university libraries (and scientists) world-wide with up-to date information about available journals. Currently, out of 6223 journals that were included in the directory, 2656 of them are searchable at article level (based on data available online on 2 March 2011 at <http://www.doaj.org>).

2.2.5.23 Social Influence

Social influence is defined as the degree to which an individual perceives that he or she should use the new system that others believe to be important (Venkatesh et al., 2003). Peers and colleagues are among a group of people who may influence a researcher to use open access. Suber (2004) recommends that scientist researchers who support open access should talk their colleagues about open access in places such as campus meetings and conferences. He also suggested to researchers to talk about open access with colleagues through the journals and newsletters that serve in their fields, and even to talk with their students who would be the authors of tomorrow. If one provided open access to his/her own work, then talking about that experience with colleagues would be useful. Indeed, firsthand testimonials from trusted colleagues are much more effective than good policy arguments. They are also more effective with this audience than good advice from librarians or university administrators. The main challenge is getting the attention of busy colleagues and showing them that this matters for their research impact and career. Only researchers can do this for their fellow other researchers. This is the message that the busy colleagues must understand. According to Lawrence (2001b), to hear about open access

from a trusted colleague is influential. Open access is about sharing research results without any barriers with colleagues worldwide. This widens the user audience and increases the impact of their work. In addition, according to Gul, Shah & Baghwan (2010) colleagues played an essential role in promoting open access awareness while funding bodies had no role in this regard. Likewise, Coonin & Younce (2010) found that the influence of the grant-awarding body was considered the least importance reason in deciding to publish in a journal; only 6.3% thought it was important. Also, Nariani & Fernandez (2010) found that among the reasons for publishing in open access journals were the reading of these journals by their peers as well as the recommendation of their colleague. Similarly, Schonfeld & Housewright (2010) found that peer networks remained among the most important factors for faculty in learning about and being encouraged to try new electronic research resources. Word of mouth was considerably the most common way by which faculties learned about new research resources. The recommendations made by peers to use a resource and awareness by peers about a resource were the key drivers in motivating faculty to try a new resource. Meanwhile, according to Mann et al. (2008) the low use of open access among colleagues may hinder further diffusion of this media. They explained that a low use of these journals by respondents' peers with a wait-and-see attitude that many researchers currently show when it comes to open access publishing could affect other users.

The reputation of an editorial board in an open access journal may also have a significant influence on the use of open access journals. For example PLoS, used millions of dollars of its initial grant funding on marketing and included several Nobel laureates on its editorial board (Bjork, 2004). The reputation of an editorial board in traditional publications was still superior to the one of open access publication (Mann et al., 2008). Furthermore, those involved administratively in a scholarly journal or acted as reviewers

had greater awareness of open access publishing (Beer, 2005). Therefore the support of open access by these groups could influence their peers to use system.

2.2.5.24 Summary

Several concepts such as familiarity, experience, willingness, attitudes, free access, ease of access, indexing, visibility, larger readership, fast and wide dissemination, prestige/reputation, impact factor/citation, career benefits, author-pays, sustainability, ICT, electronic submission, copyright, peer-review, existence of initiatives, publicizing and social influence were established from previous studies on open access. Table 2.1 presents a summary of these concepts.

Table 2.1: Concepts around Open Access

Familiarity(low)	Bjork et al. 2010; Tarrago & Molina, 2008; Hess et al., 2007; Park, 2007; Barbour & Patterson, 2006; Ghane, 2006; Schroter & Tite, 2006; Wang & Su, 2006; Schroter, Tite, & Smith, 2005, Rowlands, Nicholas & Huntingdon, 2004; Suber, 2004, Pelizzari, 2003
Experience(low)	Dulle, Minish-Majanja & Cloete, 2010; Tarrago & Molina, 2008; Hess et al., 2007; Nicholas, Jamali & Rowlands, 2006; Schroter & Tite, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2005; Rowlands, Nicholas & Huntingdon, 2004
Attitude(positive)	Mann et al., 2008; Hess et al., 2007; Warlick & Vaughan 2007; Ghane, 2006; Wang & Su, 2006
More citation	Norris, Oppenheim & Rowland, 2008; Brody, 2006; Hajjem, Harnad & Gingras, 2005; Harnad & Brody, 2004; Prosser, 2003; Crow, 2002; Lawrence, 2001b
Indexing by search engines	Gul, Shah & Baghwan, 2010; Brody, 2006; Beer, 2005; Barbour & Patterson, 2006; Lawrence, 2001b
Visibility	Warlick & Vaughan, 2007; Eysenbach, 2006; Hedlund & Roos, 2006; Ouya & Smart, 2005; Prosser, 2003; Scaria, 2003; Johnson, 2000

Table 2.1, continued

Fast and wide dissemination	Coonin & Younce, 2010; Nariani & Fernandez, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Hedlund & Roos, 2006; Ouya & Smart, 2005; Wang & Su, 2006; Schroter, Tite, & Smith, 2005; Swan & Brown, 2004
Larger readership	Qiu, 2011; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Barbour & Patterson, 2006; Ghane, 2006; Wang & Su, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2004; Lawrence, 2001b
To retain copyright	Coonin & Younce, 2010; Warlick & Vaughan, 2007; Barbour & Patterson, 2006; Suber, 2003
Electronic submission	Nicholas, Jamali & Rowlands, 2006; Wang & Su, 2006
Free access	Schonfeld & Housewright, 2010; Mann et al., 2008; Hess et al., 2007; Barbour & Patterson, 2006; Wang & Su, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2004
Ease of access	Dulle, Minish-Majanja & Cloete, 2010; Mann et al., 2008; Park & Qin, 2007; Nicholas, Jamali & Rowlands, 2006; Schroter, Tite & Smith, 2005
Easy access for researchers in developing countries	Mann et al., 2008; Hess et al., 2007; Moller, 2006; Ouya & Smart, 2005
Peer influence	Mann et al., 2008; Hess et al., 2007; Park, 2007
Editorial board influence	Mann et al., 2008; Hess et al., 2007; Bjork, 2004
Superior recommendation	Mann et al., 2008; Hess et al., 2007
Financial support due to concern with author-pay	Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Coonin & Younce, 2010; Swan & Brown, 2004; Wang & Su, 2006; Barbour & Patterson, 2006; Schroter & Tite, 2006; Wellcome Trust, 2004; Rowlands, Nicholas & Huntingdon, 2004
Consider for career benefits	Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Kingsley, 2008; Mann et al., 2008; Hess et al., 2007; Park & Qin, 2007; Ghane, 2006; Nicholas, Jamali & Rowlands, 2006; Schroter, Tite, & Smith, 2005; Bjork, 2004
Necessity of publicizing open access (due to unfamiliarity)	Tarrago & Molina, 2008; Ghane, 2006; Foster & Gibbons, 2005; Schroter, Tite & Smith, 2005; Suber, 2004; Swan & Brown, 2004; Rajashekar & Jayakanth, 2004
Existence of venue	Tarrago & Molina, 2008; Ouya & Smart, 2005
ICT & Technical expertise	Dulle, Minish-Majanja & Cloete, 2010; Hess et al., 2007; Park, 2007; Barbour & Patterson, 2006; Wang & Su, 2006; Ouya & Smart, 2005; Beer, 2005; Bjork, 2004; Goodman, 2004; Arunachalam, 2003
Concern with author pay	Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Tarrago & Molina, 2008; Park & Qin, 2007; Barbour & Patterson, 2006; Nicholas, Jamali & Rowlands, 2006; Schroter, Tite, & Smith, 2005; Wang & Su, 2006; Anderson, 2004; Swan & Brown, 2004; Bjork, 2004; Wellcome Trust, 2004
Concern with sustainability	Mann et al., 2008; Hess et al., 2007
Concern with copy right	Anderson, 2004; Bjork, 2004; Swan & Brown, 2004; Beer, 2005; Wang & Su, 2006
Concern with plagiarism	Wang & Su, 2006; Beer, 2005
Concern with peer-review	Schroter & Tite, 2006; Beer, 2005; Ouya & Smart, 2005; Swan & Brown, 2004
Vanity publishing	Chan & Kirsop, 2002
Concern with low prestige	Schonfeld & Housewright, 2010; Tarrago & Molina, 2008; Warlick & Vaughan, 2007; Wang & Su, 2006, Swan & Brown, 2004; Anderson, 2004; Prosser, 2003
Low indexing in popular database	Bjork et al., 2010; Nariani & Fernandez, 2010; Ouya & Smart; Beer, 2005; Bjork, 2004

These ideas were grouped based on similarity in six different dimensions which formed the framework of study on acceptance of open access publishing. Figure 2.2 indicates the conceptual framework of study which includes six dimensions (general ideas) around the open access concept.

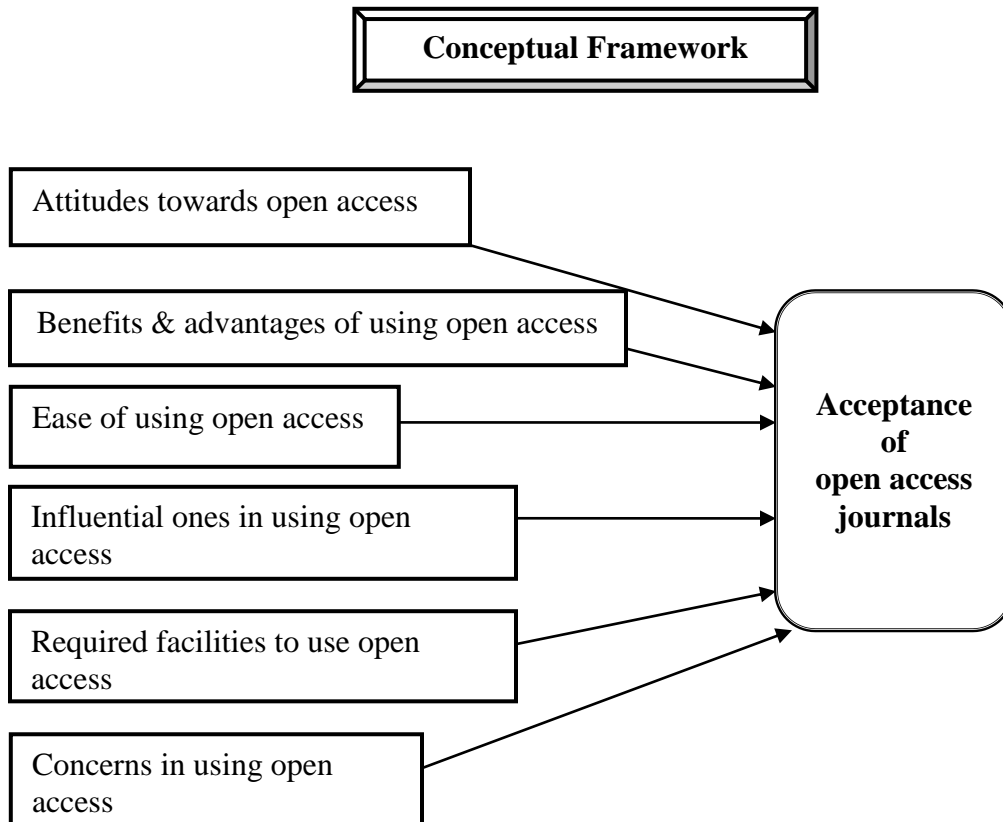


Figure 2.2: Conceptual Framework based of Review of Literature on Open Access

The main dimensions or categories consisted of benefits and advantages of using open access, ease of using, facility and requirements, influential ones, anxiety and attitudes. For instance more citation, indexing by search engines, visibility, fast and wide dissimilation, larger readership and to obtain copyright were placed under advantage and benefits of using open access. Concepts such as electronic submission, free access, ease of access, easy access for researchers in developing countries were placed under ease of using

open access. Concepts such as peer's influence, editorial board influence and superior recommendations were placed under influential ones in using open access. Concepts such as covering publishing fee, necessity of publicizing open access, career benefits, existence of venue, existence of ICT and technical expertise were categorized under required facilities and conditions to use open access. Concepts such as concerns with author-pays, sustainability, copyright, plagiarism, peer-review, vanity publishing, low prestige and low indexing in popular databases were placed under concerns in using open access. These factors were used to test their possible influence on acceptance of open access publishing. Additionally these ideas were used to build a questionnaire based on objectives of the study. Several other indicators based on these ideas were included in the questionnaire under each dimension to test their influence on the acceptance of open access publishing. Moreover, most of the previous studies on open access from the viewpoint of researchers were descriptive in nature. In order to link the present study to the previous research, the perspectives of researchers on each element were important. Additionally the Table includes single concepts such as attitude, familiarity and experience.

2.3 Literature on Dimensions of UTAUT Model

In this section, some previous studies that were used dimensions of UTAUT model such as performance expectancy, facilitating conditions, social influence, effort expectancy, attitude and anxiety, are reviewed in order to link the concept elements in the open access publishing and formulate a theoretical framework for this study.

2.3.1 Introduction

When a study is based on a model or theory to support its framework, it is likely to have a higher probability of gaining acceptance among other researchers. Therefore, after

reviewing the literature, concepts related to open access publishing were obtained. The theory and dimensions of UTAUT were used to construct and formulate a conceptual framework for this study.

2.3.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

The formulation of UTAUT is based on conceptual and empirical similarities across the eight prominent competing technologies acceptance models. UTAUT integrates elements from Theory of Reasoned Action (TRA), Motivational Model, Theory of Planned Behavior (TPB), a combined Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognition Theory (SCT). The unification of these models provides UTAUT with eight constructs: performance expectancy, effort expectancy, attitude towards using technology, social influence, facilitating conditions, self-efficacy, anxiety and behavioral intention to use the system. The study (UTAUT model) carried out in both voluntary and mandatory setting and a pretested questionnaire containing items measuring constructs from all eight models was administered at three different points in time. They were post-training (T1), one month after implementation (T2), and three months after implementation (T3). During more than six months post-training period actual use behavior was measured. Finally 31 items of seven construct were used to estimate UTAUT. This model explained about 70% of the variance in intention to use technology. Therefore, it seems to be better in comparison to the other eight models, which only explained between 17% and 42% of the variance (Venkatesh et al. 2003). Figure 2.3, below indicates components of UTAUT model.

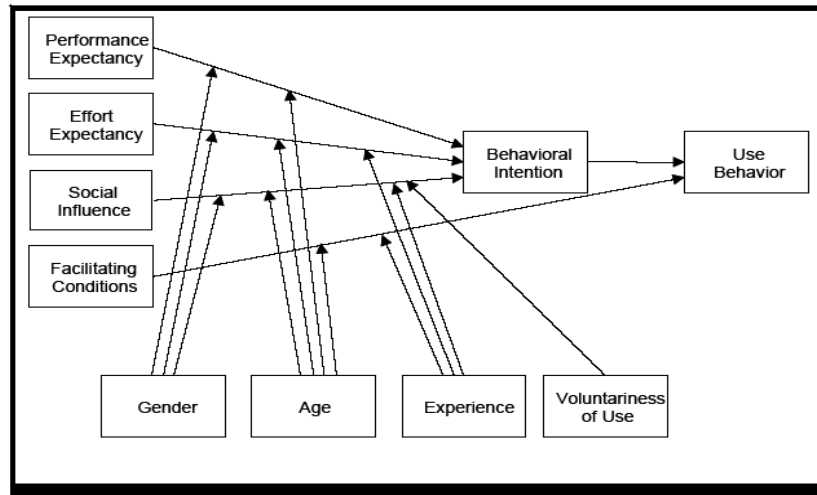


Figure 2.3: Unified Theory of Acceptance and Use of Technology(UTAUT) adapted from: Venkatesh et al. (2003)

Because of the reputation and efficacy of UTAUT model, a great number of researchers have validated, revised, extended or modified it for use in different contexts to study the acceptance of an innovation. In addition some constructs of UTAUT model are commonly used with other technology acceptance models.

2.3.2.1 Performance Expectancy

Performance expectancy is the first construct of the UTAUT model. Performance expectancy is defined as the degree to which an individual believes that using the system will help him/her to achieve some improvement in job performance. The five constructs from the different models that pertain to performance expectancy were perceived usefulness (TAM/TAM2 and Combined-TAM (C-TAM), TPB, extrinsic motivation (Motivational Model), and job-fit (MPCU), relative advantage (IDT), and outcome expectations (SCT). The performance expectancy construct within each individual model was the strongest predictor of intention and remains significant at all points of measurement in both voluntary and mandatory settings (Venkatesh et al., 2003).

Additionally, the performance expectancy construct was consistently a strong predictor of intention in prior studies (Venkatesh et al., 2003 citing Davis, Bagozzi & Warshaw 1992; Taylor & Todd 1995; Venkatesh & Davis 2000).

Several studies used performance expectancy as a proposition in their proposed models. Chismar & Wiley-Patton (2003) tested the extended TAM2 in the context of physicians' intention to adopt Internet-based health applications. Using stepwise regression analyses, they found that performance expectancy (perceived usefulness) had a significant effect on intention to use. Louho, Kallioja & Oittinen (2006) conducted a study to find the most significant factors affecting user acceptance and use of code reading applications and to find what kind of expectations users had towards code reading applications. Based on the results of linear regression, performance expectancy had a significant influence on behavioral intention.

Carter & Schaupp (2008) proposed a model for e-filing acceptance in which adoption/personal factors were considered to impact citizen acceptance of electronic filing systems. The results from multiple regression indicated that performance expectancy had a significant impact on intention to use e-filing system. Mann et al. (2008) set out to investigate why open access was highly appreciated but rarely used. They proposed a model which included three main propositions of UTAUT model as well as other propositions as predictors of intention to use open access publishing. The results of multiple linear regression indicated that performance expectancy was a significant predictor of intention to use system. It had the largest predictive power among the significant factors. The results of multiple regression in the study of Siracuse & Sowell (2008) showed that perceived usefulness had a significant influence on intention to use and actual personal digital assistants usage. Al-Shafi, Weerakkody & Janssen (2009) used the UTAUT model to explore the adoption and diffusion of e-government services in Qatar.

The results from Pearson correlation revealed that performance expectancy had a significant relationship with behavioral use of e-government services in Qatar. However, results of regression indicated that performance expectancy had no significant influence on behavioral intention to use e-government services. Jong & Wang (2009) intended to modify UTAUT model in order to determine technology acceptance of web-based learning system by Taiwan technical university students. They proposed a research model in which seven constructs had a direct impact on user intention or usage. Results of multiple regression indicated that performance expectancy had a significant influence on behavioral intention to use a system.

Wu, Tao & Yang (2006) conducted a study to find out the consumers' behavioral intention and to bring out the consumers' actual application of 3G mobile telecommunication service by using four constructs of UTAUT model. Results of Structural Equation Model (SEM) using AMOS indicated that performance expectancy significantly influenced behavioral intention to use a system. Bandyopadhyay & Fraccastoro (2007) explored the effect of culture through the social influence on user acceptance of Prepayment Metering Systems in India. Confirmatory factor analysis using AMOS indicated that performance expectancy had a significant influence on consumers' intention to use the Prepayment Metering Systems. Kripanont (2007), in his PhD project, generated and validated a research model that describes Internet usage behavior and behavioral intentions among Thai academics. SEM and Multiple-Group Analysis with AMOS were used to test the proposed model. Findings indicated that perceived usefulness (performance expectancy) significantly influenced usage.

Al-Gahtani, Hubona & Wang (2007) investigated the intention to use and the actual use of iInformation technology (IT) in Saudi Arabia based on the UTAUT model. They used a PLS-Graph to test the model. They found that performance expectancy had a

positive influence on behavioral intention. Tibenderana & Ogao (2008) examined some measures of intention in revalidating and expanding UTAUT model in the context of hybrid library services using university communities of Uganda. They adopted a conceptual model generated by the Partial Least Square (PLS)-Graph to measure direct effects and the Generalized Linear model was used to measure the direct and the interaction effects between the constructs moderated by other variables. The performance expectancy demonstrated an effect on users' acceptance of electronic library services. Wills, El-Gayar & Bennett (2008) utilized the UTAUT model in order to evaluate acceptance and use of electronic medical records (EMRs). Results of PLS indicated that performance expectancy was the second most important factor that had the most direct influence on intention to use.

Debusse, Lawley & Shibl (2008) investigated the perceptions of educators toward an automated feedback generator specifically in terms of staff workload impact and student feedback quality. They used mean scores to rate four propositions of the UTAUT model. They found that performance expectancy was rated very positively across the key areas of time required, costs and, to a lesser extent, quality of feedback.

Hedlund (2008) adapted constructs of the UTAUT model to study the acceptance, use/non-use of institutional archives among researchers in business schools of Finland. UTAUT constructs were divided into two general factors: social environment and personal factors of the researcher. Performance expectancy was included in later divisions. This study used constructs of the UTAUT model only as a framework to describe indicators of constructs. Qingfei, Shaobo & Gang (2008) used the UTAUT model to describe a theoretical framework that incorporated the characteristics of m-commerce to enhance the understanding of m-commerce acceptance and usage in China. In the proposed model, they replaced performance expectancy by utility expectancy. However, the planned model was

not based on empirical data. Dulle, Minish-Majanja & Cloete (2010) in a survey research discussed the factors that influence the adaptation of open access for scholarly communication in public universities of Tanzania. According to them, performance expectancy was identified as the positive factor likely to facilitate open access adoption in Tanzanian public universities. Later Dulle & Minish-Majanja (2011), using binary logistic regression statistics, indicated that performance expectancy had significant influence on intention to use open access publishing while it had not such influence on actual usage of this system. Schaper & Pervan (2004) proposed a model to explain ICT acceptance by occupational therapists in Australia. The proposed model consisted of individual context, technological context, the specific professional environment of the user, moderators and dependent variables (behavioral intention and use behavior). Performance expectancy was included in the technological context. However, this study proposed a research model without empirical data. Hennington & Janz (2007) used the UTAUT model to understand what factors either enabled or hindered technology adoption and use of electronic medical records (EMRs) technology among physicians. They tested the relationships of four main constructs of the UTAUT model as independent variables with behavioral intention and use behavior. Rosen (2005) investigated the effects of the inclusion of the Personal Innovativeness Information Technology (PIIT) construct in the UTAUT model framework. The proposed research model included hypothesis to test the impact of four constructs of UTAUT model as well as PIIT on behavioral intention as well as its influence on use behavior.

2.3.2.2 Effort Expectancy

Effort expectancy is the second construct of the UTAUT model. It is defined as the degree of ease associated with the use of the system. Three constructs from the existing

models capture the concept of effort expectancy: perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT). The effort expectancy construct within each model is significant in both voluntary and mandatory usage contexts. However, each one is significant only during the first time period (post-training), becoming insignificant over periods of extended and sustained usage of effort-oriented constructs as expected to be more salient in the early stages of a new behavior, when process issues represent hurdles to be overcome, and later become overshadowed by instrumentality concerns (Venkatesh et al., 2003).

In prior studies (Louho, Kallioja & Oittinen, 2006; Bandyopadhyay & Fraccastoro, 2007; Debusse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008) effort expectancy had been a strong predictor of behavioral intention. On the other hand, some studies (Chismar & Wiley-Patton, 2003; Wu, Tao & Yang, 2006; Al-Gahtani, Hubona & Wang, 2007; Carter & Schaupp, 2008; Mann et al., 2008; Al-Shafi, Weerakkody & Janssen, 2009; Siracuse & Sowell, 2008; Jong & Wang, 2009) found that effort expectancy was insignificant as far as intention was concerned. Kripanont (2007) perceived that ease of use significantly influenced usage in teaching while it did not significantly influence usage in other tasks.

Qingfei, Shaobo & Gang (2008) in a proposed model considered trust factors in concepts such as usefulness and ease of use to describe the characteristics of m-commerce and enhance the understanding of m-commerce acceptance and its usage in China. Tibenderana & Ogao (2008) in their proposed model found that effort expectancy was irrelevant in e-library contexts and replaced it with the independent variable “relevance”. Dulle, Minish-Majanja & Cloete (2010) identified effort expectancy as the positive factor likely to facilitate open access adoption in Tanzanian public universities. Dulle and Minishi-Majanja (2011) indicated that this factor had significant influence on intention to

use open access publishing while it was not significant on actual usage. Effort expectancy was included in a technological context in the proposed model of Schaper & Pervan (2004). Effort expectancy (expected ease of use of a system) was among the personal factors in the proposed model of Hedlund (2008) to study the acceptance, use/non-use of institutional archives. Hennington & Janz (2007) and Rosen (2005) considered effort expectancy as the main construct in their proposed model.

2.3.2.3 Social Influence

Social influence is the third construct of UTAUT model. It is defined as the degree to which an individual perceives how important others believe he or she should use the new system. Social influence as a direct determinant of behavioral intention is represented as a subjective norm in TRA, TAM2, TPB/DTPB and C-TAM-TPB, social factors in MPCU, and image in IDT. The social influence construct is not significant in voluntary contexts. However, it becomes significant when its use is mandated (Venkatesh et al., 2003). In voluntary contexts, social influence operates by influencing perceptions about the technology and the mechanisms at play here are internalization and identification. In mandatory settings, social influence appears to be important only in the early stages of individual experience with the technology, with its role eroding over time and eventually becoming insignificant with sustained usage (Venkatesh & Davis, 2000).

The direct effect of social influence on behavioral intention has been shown in technology acceptance studies (Venkatesh & Davis 2000; Wu, Tao & Yang, 2006; Bandyopadhyay & Fraccastoro, 2007; Carter & Schaupp, 2008; Kaba, N'Da & Mbarika, 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009). However, a number of previous studies (Chismar & Wiley-Patton 2003; Louho, Kallioja & Oittinen, 2006; Park, 2007; Debuse, Lawley & Shibl, 2008; Mann et al., 2008; Al-Shafi, Weerakkody &

Janssen, 2009) showed that social influences had not a significant influence on behavioral intention. In addition, some studies found that social influence had a direct impact on use behavior (Jong & Wang, 2009). Social influence was among the social environment factors in the proposed model of Hedlund (2008) to study the acceptance of institutional archives. Dulle, Minish-Majanja & Cloete (2010) identified social influence as a positive factor likely to facilitate open access adoption in Tanzanian public universities. Later Dulle and Minish-Majanja (2011) found that social influence had no significant influence on intention to use open access while it was significant on actual usage. According to Tibenderana & Ogao (2008) social influence demonstrated an effect on users' acceptance of electronic library services. Social influence was included in the specific professional environment of the user in the proposed model of Schaper & Pervan (2004). Also Hennington & Janz (2007) and Rosen (2005) considered social influence as a main construct in their proposed model.

2.3.2.4 Facilitating Conditions

Facilitating conditions is the fourth construct of UTAUT model. It is defined as the degree to which an individual believes that organizational and technical infrastructure exists to support the use of the system. This definition captures concepts embodied by three different constructs: perceived behavioral control (TPB/ DTPB, C-TAM-TPB), facilitating conditions (MPCU), and compatibility (IDT). Each of these constructs is operationalized to include aspects of the technological and/or organizational environment that are designed to remove barriers to use (Venkatesh et al., 2003).

The empirical evidence from prior studies (Wu, Tao & Yang, 2006; Al-Gahtani, Hubona & Wang, 2007; Wills, El-Gayar & Bennett, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Jong & Wang, 2009) indicated that facilitating conditions have a direct

impact on behavioral intention; but Kaba, N'Da & Mbarika (2008) found that facilitating conditions had no significant impact on intention. In addition, facilitating conditions had a significant impact on use behavior (Venkatesh et al., 2003; Kripanont, 2007; Wills, El-Gayar and Bennett, 2008). Tibenderana & Ogao (2008) found that facilitating conditions had an effect on users' acceptance of electronic library services. Debusse, Lawley & Shibl (2008) found that facilitating conditions based on mean scores were rated highly. Facilitating conditions were social environment factors in the proposed model by Hedlund (2008) to study the acceptance of institutional archives. Majanja and Cloete (2010) identified facilitating conditions as a positive factor that may facilitate adoption of open access. Dulle and Minishi-Majanja (2011) found that facilitating conditions had significant influence on actual usage. Meanwhile Qingfei, Shaobo & Gang (2008) in their proposed model replaced cost factor by UTAUT's facilitating conditions to describe a theoretical framework that incorporated the characteristics of m-commerce to enhance understanding of m-commerce acceptance and its usage in China. Organizational facilitating conditions were included in the specific professional environment of the user in the proposed model of Schaper & Pervan (2004). Also Hennington & Janz (2007) and Rosen (2005) considered facilitating conditions as an important construct in their proposed model.

2.3.2.5 Anxiety

Anxiety is the feeling of nervousness when it comes to using a new technology (Venkatesh et al., 2003). In other words, evoking anxiousness or emotional reactions when it comes to performing a behavior (e.g., using a computer). Anxiety is one of the core constructs of SCT which is one of the most powerful theories of human behavior (Bandura, 1986). Although anxiety appeared to be significant as a direct determinant of intention in SCT, it was not assumed to be a direct determinant of intention in the UTAUT model

(Venkatesh et al., 2003). According to Louho, Kallioja & Oittinen (2006) anxiety had no significant impact on intention to use code reading applications. Schaper & Pervan (2004) proposed a model to explain ICT acceptance by occupational therapists in Australia. They hypothesized that anxiety had no significant impact on intention. However, despite anxiety being insignificant in these studies, it was relevant in open access contexts. As summarized and indicated in Table 2.1 on pages 97-98, researchers had some concerns such as author-pays, sustainability, copyright, plagiarism, peer-review, vanity publishing, low prestige and low indexing in popular database that may influence acceptance of open access publishing.

2.3.2.6 Attitude

Attitude toward using technology is defined as an individual's overall affective reaction to using a system. Four constructs from the existing models align closely with this definition: attitude toward behavior (TRA, TPB/DTPB, and C-TAM-TPB), intrinsic motivation (MM), affect toward use (MPCU), and affect (SCT). As cited Fishbein & Ajzen (1975) in TRA, attitude toward behavior is "an individual's positive or negative feelings (evaluative affect) about performing the target behavior". In addition, attitude toward using technology is defined as an individual's overall affective reaction to using a system (Venkatesh et al., 2003). Defined as evaluative response tendencies, attitudes exert a dynamic and directive influence on behavior. As a general rule, positive attitudes predispose behaviors that support or enhance the attitude object, while negative attitudes predispose unfavorable behaviors toward the attitude object. Social psychologists rely extensively on the attitude construct to predict and explain human behavior, to the extent that attitudes have been called the most distinctive and indispensable concept in social psychology (Ajzen, 1996).

Attitude was initially included the UTAUT model, but according to Venkatesh et al. (2003) it had no significant influence on behavioral intention because of interactive effects with the constructs of performance and effort expectancy. However, a number of studies (Louho, Kallioja & Oittinen, 2006; Jong & Wang, 2009) indicated that attitudes had a direct impact on behavioral intention. Furthermore according to Jong & Wang (2009) attitudes had a direct impact on use behavior and Siracuse & Sowell (2008) found that the intention to use and self-reported use of personal digital assistants were strongly correlated with attitude towards behavior.

Attitude was proposed as a factor in previous open access studies. For instance, according to Park (2007) the attitudinal factors (behavioral experience, perceived knowledge, perceived career benefit, perceived visible advantage, perceived authoritative advantage, and perceived technological advantage) were significant in intention to use open access publishing. Also attitude was the main component in the proposed model of Mann et al. (2008) to investigate open access. Results of multiple linear regression indicated that attitudes had no influence on intention to use open access; it had the second predictive power among four proposed factors. Dulle, Minish-Majanja & Cloete (2010) identified researchers' general perceptions as a positive factor likely to facilitate the adoption of open access in Tanzanian public universities. Dulle and Minishi-Majanja (2011) indicated that attitude of researchers significantly influence their intention to use open access, while it was not significant on actual usage. Additionally, as summarized and indicated in Table 2.1 on pages 97-98, several studies surveyed attitudes of researchers regarding open access publishing. Therefore, attitude is a rational factor in open access that could influence its acceptance.

2.3.2.7 Behavioral Intention /Use Behavior

The role of intention as a predictor of behavior (e.g., usage) is critical and has been well-established in Information Systems and the reference disciplines (Venkatesh et al., 2003 citing Ajzen 1991; Sheppard, Hartwick & Warshaw, 1988; Taylor & Todd 1995). Compatible with the fundamental theory for all of the intention models, it was expected that behavioral intention had a significant positive influence on technology usage. Schaper & Pervan (2004, citing Chau & Hu 2001; Chismar & Wiley- Patton 2003; Davis, Bagozzi & Warshaw 1989; Sheppard, Harwick & Warshaw 1988; Venkatesh et al. 2003), indicated that the influence of behavioral intention is well documented in the technology acceptance literature and has been found to be conclusive when applied to industry and health-care contexts. They also cited Ajzen 1991; Mathieson 1991; Sheppard, Harwick & Warshaw 1988; Taylor and Todd 1995; Venkatesh & Morris 2000, that the link between intention to use a technology and actual usage is well-established and therefore both variables (Schaper & Pervan, 2004) may be used to measure technology acceptance. Behavioral intention had a direct impact on use behavior (Venkatesh et al., 2003; Al-Gahtani, Hubona & Wang, 2007; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009; Dulle & Minishi-Majanja, 2011). Interestingly, results of Pearson correlation in a study of Al-Shafi, Weerakkody & Janssen (2009) revealed that behavioral intention was not a significant predictor of the behavioral use of e-government services. Additionally several studies (Chismar & Wiley-Patton, 2003; Louho, Kallioja & Oittinen, 2006; Wu, Tao & Yang, 2006; Bandyopadhyay & Fraccastoro, 2007; Park, 2007; Carter & Schaupp, 2008; Mann et al., 2008; Al-Shafi, Weerakkody & Janssen, 2009) evaluated behavioral intention as a dependent variable that was manipulated by independent variables.

Although using the log system is the preferred method to measure use behavior in UTAUT model and information systems research (Venkatesh et al., 2003), self-reporting

measures to assess use behavior as an alternative where usage logs were not available, is used (Kripanont, 2007 citing Davis et al., 1989). For instance Siracuse & Sowell (2008) utilized self-reported use of personal digital assistants as actual use. Additionally, several studies (Schaper & Pervan, 2004; Rosen, 2005; Al-Gahtani, Hubona & Wang, 2007; Hennington & Janz, 2007; Kripanont, 2007; Siracuse & Sowell, 2008; Tibenderana & Ogao, 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009) considered both behavioral intention and use behavior as dependent variables in technology acceptance.

2.3.2.8 Demographic Variables

Demographic variables can have a direct influence on dependent variables or act as a moderator between constructs and dependent variables. A moderating variable is a variable that has a strong effect on the relationship between an independent variable and a dependent variable (Sekaran, 2006). Each study, depending on its aim and framework, may use demographic variables as a moderator, indicator or both.

Gender: According to Venkatesh et al. (2003) the influence of performance expectancy, effort expectancy, and social influence toward behavioral intention were moderated by gender. Al-Shafi, Weerakkody & Janssen (2009) revealed that gender had a significant association with behavioral use of e-government services in Qatar. Park (2007) found that the intention to change regarding open access publishing for the male group is greater than it is for the female group. Bandyopadhyay & Fraccastoro (2007) found that the influence of performance expectancy, effort expectancy and social influence were moderated by gender. Dulle & Minishi-Majanja (2011) indicated that gender moderated the influence of effort expectancy towards researchers' behavioral intention of open access usage. It also moderated the effect of social influence towards actual open access usage. Furthermore,

Hedlund (2008) introduced gender as the moderator of performance expectancy, effort expectancy, social influence and facilitating conditions in her proposed model. Other studies found gender to be an insignificant factor. Kripanont (2007) found that the influence of constructs toward use behavior and the influence of use behavior toward behavioral intention were not moderated by gender. Al-Gahtani, Hubona & Wang (2007) found that gender was not a statistically significant moderator. In addition, Schaper & Pervan (2004) found that the effect of gender as a moderator was more complex and may differ from previous research on technology acceptance.

Age: Influence of performance expectancy, effort expectancy, social influence and facilitating conditions toward behavioral intention were moderated by age (Venkatesh et al., 2003; Schaper & Pervan, 2004). Kripanont (2007) indicated that the influences of determinants toward use behavior as well as use behavior toward behavioral intention were moderated by age. Al-Gahtani, Hubona & Wang (2007) found that age was a statistically significant moderator on facilitating conditions. Bandyopadhyay & Fraccastoro (2007) observed that the influence of performance expectancy, effort expectancy and social influence were moderated by age. According to Al-Shafi, Weerakkody & Janssen (2009) the results Pearson correlation revealed that age had a significant association with behavioral use of e-government services in Qatar. Dulle & Minishi-Majanja (2011) found that age moderated the influence of effort expectancy towards researchers' behavioral intention of open access usage. It also moderated the effect of social influence and facilitating conditions towards open access usage. In addition, Hedlund (2008) introduced age as a moderator of performance expectancy, effort expectancy, social influence and facilitating conditions in her proposed model. In contrast, Park (2007) indicated that there

was no significant difference between two age groups regarding intention to use open access publishing.

Experience: Influence of effort expectancy, social influence and facilitating conditions toward behavioral intention were moderated by experience (Venkatesh et al., 2003; Schaper & Pervan, 2004). Al-Gahtani, Hubona & Wang (2007) found that experience was a statistically significant moderator on effort expectancy and facilitating conditions. Bandyopadhyay & Fraccastoro (2007) found that the influence of effort expectancy and social influence were moderated by experience. According to Al-Shafi, Weerakkody & Janssen (2009), Internet experience had a significant relationship with behavioral use of e-government services in Qatar. Dulle & Minishi-Majanja (2011) indicated that experience moderated the influence of effort expectancy towards researchers' behavioral intention of open access usage. It also moderated the effect of social influence towards open access usage. In addition, Hedlund (2008) introduced experience as a moderator of performance expectancy, effort expectancy, social influence and facilitating conditions in her proposed model. While Kripanont (2007) indicated that the influence of determinants towards use behavior and use behavior towards behavioral intention were not moderated by experience. Also Carter & Schaupp (2008) indicated that e-filing in a previous year had no influence on the intention to use an e-file system in the future.

Familiarity: Familiarity could be based on a situation awareness theory which is defined as the perception of reactions to a set of changing events. Situation awareness is important, because it is linked to performance and also it is the basis for decision making in most cases (Klein, 2000, p.45). Tibenderana & Ogao (2008) in a proposed model based on UTAUT model considered "awareness" as a moderator. Also Park (2007) found that

attitudinal factors which included perceived knowledge had a significant impact on intention to use open access. Kaba, N'da & Mbarika (2008) indicated that familiarity had a direct influence on both the user's attitude and cellular phone usage. Several previous studies including Bjork et al. 2010; Tarrago & Molina, 2008; Hess et al., 2007; Park, 2007; Barbour & Patterson, 2006; Ghane, 2006; Schroter & Tite, 2006; Wang & Su, 2006; Rowlands & Nicholas, 2005; Schroter, Tite & Smith, 2005, Suber, 2004; Pelizzari, 2003) have discussed the familiarity of researchers with open access. However, it is not known whether familiarity had any influence on the acceptance of open access or not.

2.4 Summary of Chapter 2

The literature review in this study consists of two sections. The first section which contains a review regarding open access, started with the history of scholarly journals from the first scholarly journal to the advent of open access journals, followed by definition of open access, thirteen terms and initiatives of open access and the factors that may influence acceptance of open access publishing. The second section of the literature review includes a review of different domains including open access and about technology acceptance studies particularly based on four constructs of UTAUT model.

Several factors that may influence the acceptance of open access publishing are discussed based on findings of previous research studies and the perspective of dominant scholars in the domain. Finally a conceptual framework for this study was formulated based on concepts around open access publishing.

A majority of research studies (Coonin & Younce, 2010; Nariani & Fernandez, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Park, 2007; Nicholas, Jamali & Rowlands, 2006; Schroter & Tite, 2006; Beer, 2005; Swan & Brown, 2004) in

open access area used a quantitative methodology employing questionnaire as a data collection tools.

A number of other studies (Dulle, Minish-Majanja & Cloete 2010; Hedlund, 2008; Hess et al., 2007) used theoretical frameworks to investigate the adaptation of open access through descriptive data and only a few studies (Dulle & Minish-Majanja, 2011; Mann et al., 2008; Park, 2007) tested the dimensions of open access publishing based on theoretical formworks. Several previous studies (Chismar & Wiley-Patton , 2003; Louho, Kallioja & Oittinen, 2006; Carter & Schaupp, 2008; Mann et al. ,2008; Siracuse & Sowell, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Jong & Wang, 2009) on acceptance of technology used regression analysis to test the model. Also, a number of studies (Wu, Tao & Yang, 2006; Bandyopadhyay & Fraccastoro, 2007; Kripanont, 2007) which employed SEM by using Amos software and some other studies (Al-Gahtani, Hubona & Wang, 2007; Tibenderana & Ogao, 2008; Wills, El-Gayar & Bennett, 2008) used PLS base SEM software to evaluate the proposed model.

Finally based on two sections of the literature review a theoretical framework of study was formulated. Table 2.2 indicates the flow from conceptual framework to theoretical framework.

Table 2.2: Flow from Conceptual Framework to Theoretical Framework

Present research framework	Construct	Fitting Theory
Attitude towards open access	Attitude	Combined of TAM and Theory of Reasoned Action, Theory of Planed Behavior(TPB), Theory of Reasoned Action (TRA)
Benefits and advantages of using open access	Performance expectancy	Unified Theory of Acceptance and Use of Technology (UTAUT)
Ease of using open access	Effort expectancy	
Influential ones in using open access	Social influence	
Required facilities to use open access	Facilitating conditions	
Concerns in using open access	Anxiety	Social Cognitive Theory (SCT)

Attitudes towards using open access were matched with attitude construct which were included in a preliminary proposed model of UTAUT and was adapted from theories like Combined [use] of TAM/ TRA, TPB and TRA. Benefits and advantages of using open access were matched with performance expectancy construct of UTAUT model. Ease of using open access was matched with effort expectancy construct which was adopted from UTAUT model. Influential ones in using open access were matched with social influence construct which was adopted of UTAT model. Requirements and conditions to use open access were matched with facilitating conditions construct adapted of UTAUT model. Concerns in using open access were matched with anxiety construct which was included in a preliminary proposed model of UTAUT and was adapted from SCT.

The theoretical framework for this study comprises of eight constructs (attitude, performance expectancy, effort expectancy, social influence, facilitating conditions and anxiety) and seven demographic variables. Constructs and demographic variables are combined together as independent variables while intention to use open access journals and use of open access journals are dependent variables or outcome of study. Additionally, intention to use open access journals is another construct or independent variable of use of open access journals. It is expected that the proposed factors would have a significant influence on the acceptance of open access publishing. The theoretical framework of study is presented in Figure 3.1 in the next chapter.

The next chapter presents sections on methodology, sample selection, variables of study, design of survey questionnaire, data collection and data analysis.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This study investigated the current status of familiarity and experience with open access among Iranian medical researchers, as well as the factors influencing acceptance of open access publishing among them. The study aimed to identify the factors that are significant for using and intention to use open access journals among the researchers.

The research philosophy or paradigm of this study has a position related to positivism. Positivism is the belief shared by many scientists that there is a reality exists quite apart from our own perception of it, and that it can be understood through observation and that it follows general laws (Schutt, 2009). This paradigm is often associated with quantitative approaches (Creswell & Clark, 2007).

This chapter covers nine sections, namely the theoretical framework, the methodology employed, sample selection, variables of study, design of survey instrument, data collection, data entry, data cleaning, and data analysis.

3.2 Theoretical Framework

A theory is a logically interrelated set of propositions about empirical reality (Schutt, 2009, p. 38). The idea of theory is the ability to explain and understand the findings of research within a framework that makes sense of the data and makes it possible for a systematic study of a particular phenomenon. Therefore, theorizing is an attempt to integrate all the information in a logical manner, using a collection of theories and models from literature to help conceptualize and test the reasons for the problems.

The theoretical drive or theoretical thrust of this study is deductive in nature. Theoretical drive is the general direction of the research study, as determined from the original questions or purpose. The theoretical drive could be inductive or deductive (Morse, 2003). In quantitative studies, theory is used deductively and placed in the beginning of the proposal for the study in order to test or verify a theory, which means the researcher advances a theory, collects data to test it, and reflects on its confirmation or disconfirmation, by the results. The theory becomes a framework for the entire study, an organizing model for the research questions or hypotheses and for the data collection procedure (Creswell, 2009).

In the present study a review of literature was carried out to identify the concepts around acceptance of open access and to formulate a conceptual framework. Individual indicators were obtained from the review of literature and pooled into a meaningful composite to reflect the dimensions of acceptance of open access publishing that should be measured. Additionally, to select an appropriate theoretical framework that matched with the conceptual framework, prior studies that addressed the topic or were closely related to be topic were examined to understand the theories and models that were used by other researchers. The theories were mostly on technology acceptance. In selecting a model as a theoretical framework, efforts were made to identify dimensions that explained the central research question.

The theoretical framework in this study was mainly based on constructs (dimensions) of the UTAUT model. These constructs are performance expectancy, effort expectancy, social influence and facilitating conditions. This technology acceptance model is a combination of elements from other eight important models. Look at section 2.3.2 for further information regarding this model. Figure 3.1 shows the components of UTAUT model.

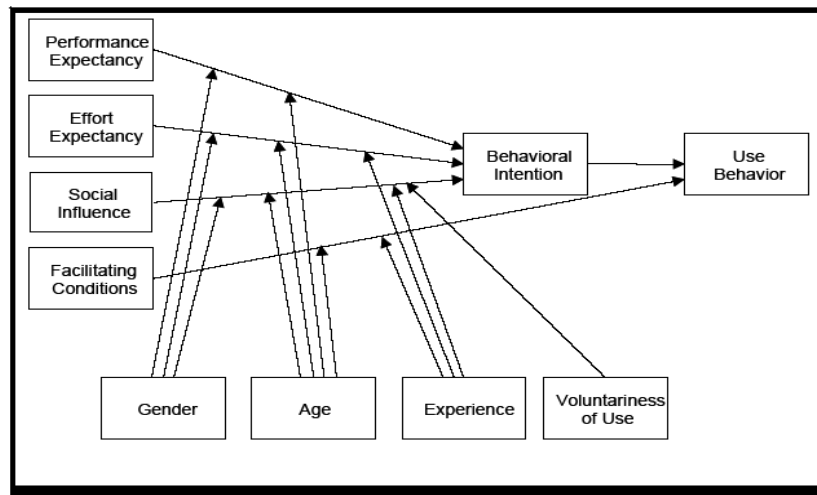


Figure: 3.1 Unified Theory of Acceptance and Use of Technology (UTAUT) adapted from: Venkatesh et al. (2003)

The theoretical framework of study includes the unique characteristics in the acceptance of open access publishing to enhance its relevancy in the medical sector of Iran. It was predicted that concepts such as performance expectancy, effort expectancy, social influence, facilitating conditions, anxiety and attitude would have an influence on the acceptance of open access publishing. Although attitude towards using technology and anxiety were theorized not to be direct determinants of behavioral intention in estimating UTAUT model, these dimensions were used in this study due to their importance in open access context.

This model was adopted with the following considerations: 1) applicable to open access, 2) inclusion of attitude and anxiety; and 3) inclusion of the characteristics of targeted group. It should be noted that after factor analysis anxiety was loaded, anxiety was split into two factors: the first factor was called anxiety and the second one concerns with author-pays. Therefore, seven dimensions (factors) were used to test their influence on acceptance of open access publishing. The justifications for using four dimensions of UTAUT as a theoretical framework are that first, the conceptual framework of study which consists of meaningful composites matched with four dimensions of UTAUT as well as

two proposed dimensions of this UTAUT model (attitude and anxiety) which were found insignificant. Secondly, prior studies (Dulle, Minish-Majanja & Cloete 2010; Hedlund, 2008; Mann et al., 2008; Hess et al., 2007) in open access used these dimensions as their theoretical framework. Additionally, Dulle & Minishi-Majanja (2011) in their survey study justified that UTAUT model is appropriate to understand the important factors that influence researcher acceptance of open access. Thirdly, this model is a combination of eight models and its validity was 70%, which is higher than validity (42%-17%) of included models (Venkatesh et al., 2003). It should be noted that, this study only used dimensions as an umbrella to put related items (obtained from literature review and preliminary interview) in a complex but meaningful manner and after conducting construct validity through factor analysis on them, their influence on acceptance of open access publishing were tested.

3.3 Methodology

The methodology of the present study is quantitative in nature. In a quantitative project, the problem is best addressed by understanding the factors or variables which influence an outcome (Creswell, 2003). Due to almost total lack of research studies on open access from the perspective of academic staff in the medical area in Iran, it was considered that the broad statistical information provided by a quantitative approach would be more appropriate. Figure 3.2 indicates flow of research in the present study.

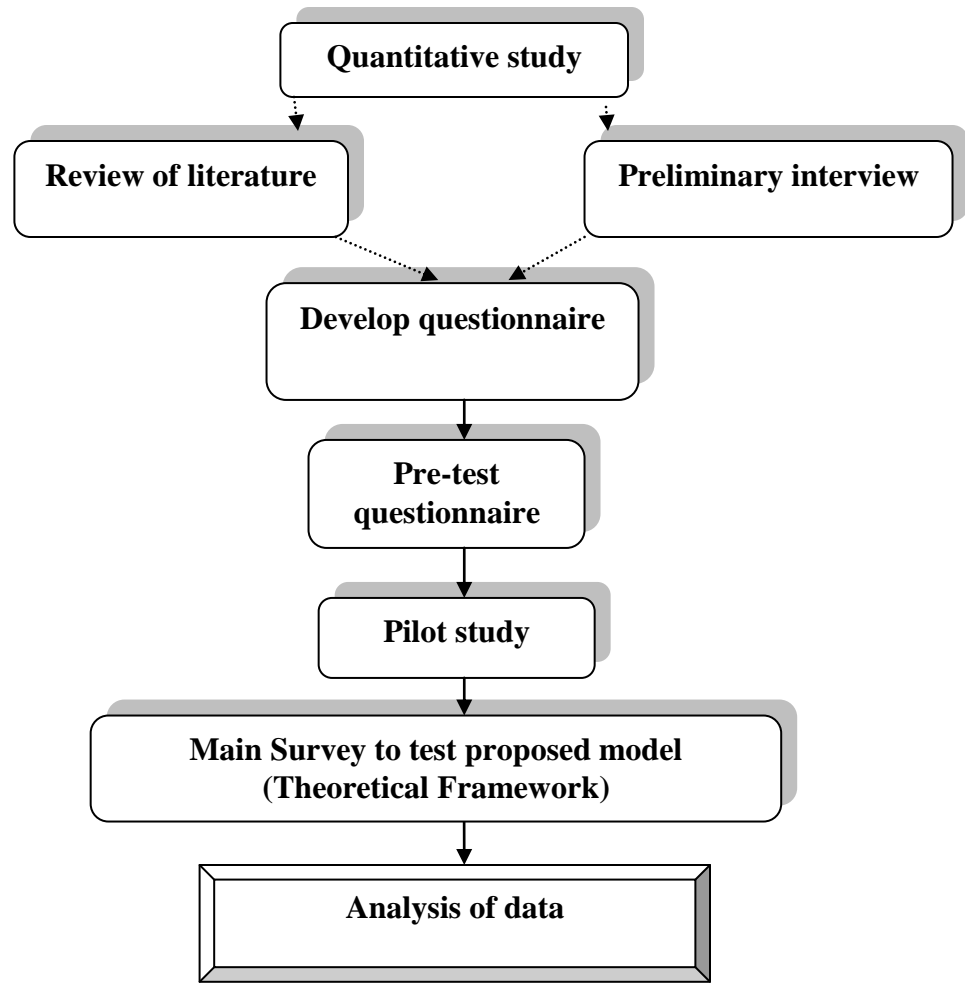


Figure 3.2: Research Flow

This quantitative study used a survey design. The “research design is a set of procedures to collect, analyze, interpret, and report data in research studies” (Creswell & Clark, 2007, p.58). A quantitative survey is a systematic method for data collection, with the goal of predicting population attributes or behaviors (Teddle & Tashakkori, 2009). A quantitative survey is a more appropriate way for verifying current familiarity with open access initiatives in order to determine participation in open access by a target sample, as well as the consideration of influential factors in the use of open access journals. Additionally, a survey is efficient because many variables can be measured without substantially increasing the time or cost. Furthermore, survey research is often the only

means available for developing a representative picture of attitudes and characteristics of a large population (Schutt, 2009). The research approach of the present study can be summarized as a cross-sectional use of survey methods to answer the research questions and to determine influential factors in the acceptance of open access publishing.

3.4 Sample Selection

In sample selection for a survey, a study should consider two aspects: representativeness and generalizability. The sample should be representative of the population of interest and large enough for generalization.

3.4.1 Population

Defining the population of interest is the first step in a sampling procedure. Prior to describing a targeted population, a brief review about the public universities of Iran was undertaken. In general, the public universities of Iran comprise of two types; medical universities under the Ministry of Health and Medical Education, and the other public universities under the Ministry of Science, Research, and Information Technology.

Based on the report of Ministry of Health and Medical Education, in total, there were 43 medical universities in Iran at the time (2009) of the study. It should be noted that the Ministry of Health and Medical Education has categorized these universities into three types (Type One, Type Two, and Type Three). Type One includes nine medical universities and comprises of about 70% of researchers; Type Two is made up of 20 universities and 25.5% of the researchers in medical sciences, and Type Three includes 14 universities and 4.5% of medical sciences researchers (Iran. Ministry of Health and Medical Education, 2007). Out of these 43 medical universities, 38 universities had medical schools. The target population of this study was researchers of these 38 medical

schools who totaled to about 5970 subjects (Mohammadi, Mojtahedzadeh & Karimi, 2006). (See Appendix C for the names of universities based on three types). The reason for choosing the target population was due to importance of distribution/access up to date scholarly outputs in health sector which is depends on death and health. Additionally, while health sector had published a number of open access journals, there was lack of study regarding perspective of medical researchers about open access. Also the target population was public medical schools, which were not comparable with private sector in terms of number of medical schools and academic staff.

3.4.2 Sampling

A sample should be selected from a population in a way which is representative of the population in the best way possible. In order to address representativeness in the present study, a sample which comprised of both clinical and basic science researchers at medical schools in the three types of medical universities was identified. The aim was to select a sample of the population that most closely matched the characteristics of that population. Sampling methods, sample size and representativeness of the sample are the key factors in sampling (Cohen, Manion & Morrison, 2007) which are presented in following sub-sections.

3.4.2.1 Sampling Methods

The sampling strategy used for this study was probability sampling, for the reason that a probability sample draws samples randomly from the wider population, and it is possible to make generalizations. In probability sampling every member of the population has an equal chance of being included in the sample; inclusion or exclusion from the sample is a matter of chance and nothing else (Cohen, Manion & Morrison, 2007). In the

present study the sampling frame was determined by writing the name of researchers from the universities' website and providing a list of name to choose sample. Proportionate stratified sampling was used for sampling in this study. Stratified sampling is “a method of sampling in which sample elements are selected separately from population strata that are identified in advance by the researcher” (Schutt, 2009, p.165).

First of all in order to select a stratified random sample for present study, the characteristics that appeared in the wider population had also to appear in the sample (type of university) identified and the wider population was divided into three homogenous groups (Type One, Type Two, and Type Three). Secondly, a randomly selected sample within these groups was carried out (Cohen, Manion & Morrison, 2007). Thus, each group would be represented exactly in proportion to its size in the population from which the sample was drawn (Schutt, 2009), and the sample was a representation from various subgroups in the population. The reason for choosing stratified sampling for this study was due to the distribution of elements all over the country, considering that the three subgroups were the best alternatives in this situation.

3.4.2.2 Sample Size

In determining a sample size for a probability sample it is essential to consider not only the population size but also the confidence level and confidence interval. This is an index of how sure a researcher can be 95% or 99% of the time that the responses lie within a given variation range, and a given confidence interval (Cohen, Manion & Morrison, 2007). In order to make a decision regarding the sample size, the generalized scientific guideline which provided by Krejcie & Morgan (1970) was used. Based on this guideline for a population 6000, 361 samples with 95% of confidence level and .05% confidence

interval (margin of error) is enough. Therefore with a population of about 5970 subjects, a sample of 361 subjects is considered sufficient for the present study.

Table 3.1 indicates the distribution of population in medical schools based on three types of university.

Table: 3.1 Distribution of population

Type of University	Population
Type One	57%
Type Two	35%
Type Three	8%
Total	100

Based on proportionate stratified sampling, first stratum was the universities which ranked in Type One and comprised of 57% of population, therefore, 57% of the sample was from this category. The second stratum was Type Two of universities with 35% of the population and consequently 35% of the sample. Finally, Type Three universities which only included 8% of the whole population and same percentage of sample were selected for this category. In addition, random numbers that represented researchers were generated using Excel's random number generator to select the sample.

3.5 Variables of Study

“A variable can be considered as a construct, operationalized construct or particular property in which the researcher is interested” (Cohen, Manion & Morrison, 2007, p.504). The variables for this study consist of dependent and independent variables. These variables were used to determine the influence of independent variables on dependents variable. Figure 3.2 indicate the variables of study which includes of two dependent and 14 independent variables.

Independent Variables

Dependent Variables

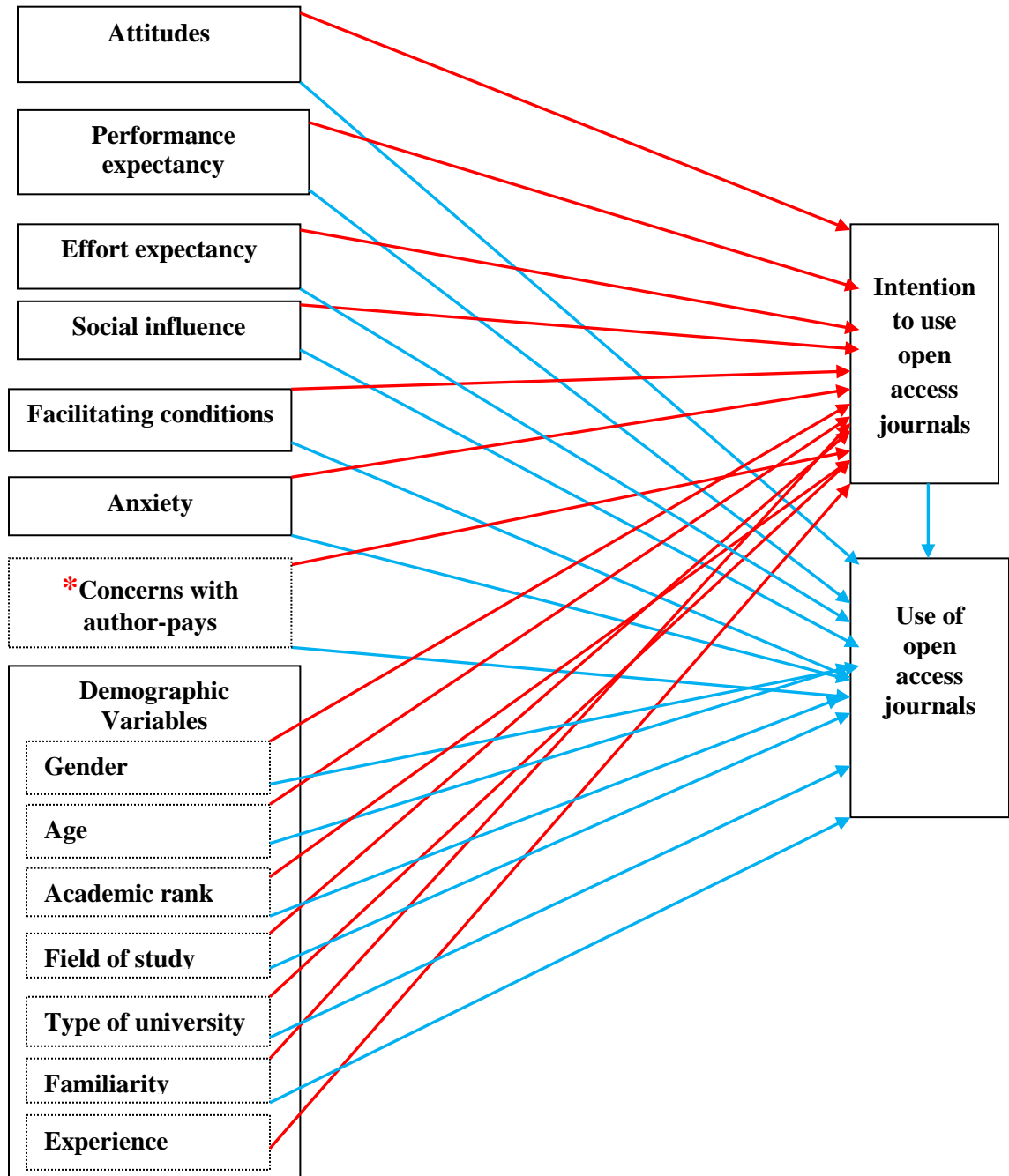


Figure 3.3: Variables of Study

The red arrows in the Figure 3.3 indicate the independent variables of intention to use open access journals as a dependent variable. The blue arrows show the independent variables of

the use of open access journals. Furthermore concerns with author-pays which is shown with a sign (*) in Figure 3.3, was added to the list of independent variables after factor analysis.

3.5.1 Independent Variables

Independent variables comprised of construct independent variables and demographic variables.

3.5.1.1 Independent Variables (Constructs)

Independent variables are variables that most likely cause, influence, or affect outcomes. They are also called treatment, manipulated, antecedent, or predictor variables (Creswell, 2009). Several concepts were obtained from review of literature and categorized based on similarities and conceptual framework of study on six dimensions regarding acceptance of open access was formulated. These dimensions matched with the four constructs of the UTAUT model as well as two other constructs validated through factor analysis and identified as construct independent variables to study their influence on acceptance of open access publishing.

A number of studies (see section 2.3) used these factors as independent variables to test their influence on acceptance of a technology. Some of them were found significant and some others were insignificant. However, the present study used them in different context and population to find out their influence on acceptance of open access publishing. In this study, both intention to use and use of open access journals were analyzed based on the influence of independent variables.

Performance expectancy: Performance expectancy signifies the benefits of using open access for the researchers. Performance expectancy was identified as an independent

variable by several previous studies (Venkatesh et al., 2003; Bandyopadhyay & Fraccastoro, 2007; Carter & Schaupp, 2008; Debuse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009) to test its influence on acceptance of a technology. Additionally, this factor was identified as an independent variable to study its influence on acceptance of open access publishing (Mann et al., 2008; Dulle & Minishi-Majanja, 2011).

Effort expectancy: Effort expectancy or ease of use was considered an independent variable in this study. A number of previous studies (Louho, Kallioja & Oittinen, 2006; Bandyopadhyay & Fraccastoro, 2007; Debuse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008) used effort expectancy as an independent variable to examine its influence on acceptance of a technology. Meanwhile Dulle & Minishi-Majanja (2011) and Mann et al. (2008) considered effort expectancy as an independent variable to study its influence on acceptance of open access publishing.

Social influence: Social influence indicates the role of important persons on researchers to use open access publishing. This factor was indicated as an independent variable by several technology acceptance studies (Bandyopadhyay & Fraccastoro, 2007; Carter & Schaupp, 2008; Kaba, N'Da & Mbarika, 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009) to find out whether it manipulated the acceptance of a technology in terms of intention to use. Also, previous studies on open access (Dulle & Minishi-Majanja, 2011; Mann et al., 2008; Park, 2007) used social influence as an independent variable in their studies.

Facilitating conditions: Facilitating conditions represent facilities and requirements in using open access publishing. Several prior studies (Al-Shafi, Weerakkody & Janssen, 2009; Jong & Wang, 2009; Wills, Debusse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008; Al-Gahtani, Hubona & Wang, 2007; Wu, Tao & Yang, 2006) in different domains used facilitating conditions as an independent variable to test its influence on acceptance of a technology. Meanwhile Dulle & Minishi-Majanja (2011) utilized facilitating conditions as a variable to examine its influence on actual use of open access publishing.

Attitude: Attitude indicates positive or negative attitudes and overall perception of researchers about open access. This factor was an independent variable in preliminary proposed model of UTAUT, which was found insignificant and did not included in UTAUT model as a construct (Venkatesh et al., 2003). A number of previous studies (Jong & Wang, 2009; Siracuse & Sowell, 2008; Louho, Kallioja & Oittinen, 2006) on different context used attitude as an independent variable to test its influence on acceptance a technology. Furthermore, some other studies (Dulle and Minishi-Majanja, 2011; Mann et al., 2008; Park, 2007) used attitude as an independent variable to examine its influence on the acceptance of open access publishing.

Anxiety: Anxiety, like attitude was an independent variable in preliminary proposed model of UTAUT, which was found insignificant and did not included in UTAUT model as a construct (Venkatesh et al., 2003). Also Louho, Kallioja & Oittinen (2006) and Schaper & Pervan (2004) considered anxiety as an independent variable in their study to examination its influence on acceptance of a technology. Additionally, as mentioned earlier in chapter two, several studies on open access, reported that researchers had some concerns regarding

usage of open access journals as a dissemination channel. It was possible that anxiety was a construct to represent the concerns such as author-pays (Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Tarrago & Molina, 2008; Nicholas, Jamali & Rowlands, 2006; Wang & Su, 2006; Swan & Brown, 2004), sustainability (Mann et al., 2008; Hess et al., 2007), plagiarism (Wang & Su, 2006; Beer, 2005), low level of peer-review (Schroter & Tite, 2006; Beer, 2005; Ouya & Smart, 2005; Swan & Brown, 2004), vanity publishing (Chan & Kirsop, 2002), low prestige (Tarrago & Molina, 2008; Swan & Brown, 2004) and low indexing in popular database (Bjork et al., 2010) hinder the acceptance of open access as a publishing media.

Concerns with author-pays: Concerns with author-pays was identified as an independent variable after factor analysis. This factor initially was a division of anxiety.

3.5.1.2 Independent Variables (Demographic)

Several characteristics of researchers were considered as bases for ascription: their personal traits (gender and age), academic origins (field of study and academic rank), prestige of academic employers (type of university), their familiarity and experience with the system. Therefore, this study was comprised of seven demographic variables: gender, age, field of study, academic rank, type of university, experience and familiarity.

Gender: Being a male or female is likely to be an important factor in acceptance of open access publishing. A number of studies (Venkatesh et al. (2003; Park, 2007; Bandyopadhyay & Fraccastoro, 2007; Hedlund, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Dulle & Minishi-Majanja, 2011) in different domains including open access used gender as an independent variable.

Age: Age was considered to be an independent variable to find out its influence on acceptance of open access publishing. Some previous studies (Venkatesh et al., 2003; Schaper & Pervan, 2004; Al-Gahtani, Hubona & Wang, 2007; Bandyopadhyay & Fraccastoro, 2007; Kripanont, 2007; Park, 2007; Hedlund, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Dulle & Minishi-Majanja, 2011) used age as an independent variable on acceptance of a technology.

Field of study: Field of study was a professional trait of target sample; therefore, it was identified as a demographic variable. Field of study of researchers includes clinical and basic science that may influence acceptance of open access publishing. In Iran the majority of clinical academic staffs usually spend most of their time in clinical/educational work in universities' hospitals and their personal offices attending to patients than conducting research. Therefore, they have less time compared to basic science researchers for doing research. It was probable that basic science researchers had more intention to use open access journals or had used them in the past. Additionally, Orji (2010) found that the influencing factors in acceptance Electronic Library System (ELS) vary between the three academic disciplines (Art and Science, Engineering and Social Science) that considered in study. He found different academic discipline to have different effects on acceptance of a technology. Also Hess et al. (2007) considered discipline of respondent as a demographic variable to study open access based on UTAUT model.

Academic rank: Academic rank of was identified as a demographic variable in this study due to academic profile of target sample. Academic rank was categorized as being Full Professor, Associate Professor, Assistant Professor and Lecturer. The ranking was

important to understand because it could influence acceptance of open access publishing. Previous studies (Kripanont, 2007; Hess et al., 2007) were considered academic position as a demographic variable in their study based on UTAUT model.

Type of university: Type of university was considered as a demographic variable, due to existing of a kind of ranking in affiliated universities' of the target sample of the study. Type of medical universities was identified as a demographic variable in a number of previous studies (Shekofteh et al., 2010; Rokni, 2005; Arabshahi, Ajami & Siabani, 2004) conducted on medical domain of Iran. Universities with higher ranking have better facilities compared to low ranking universities; therefore, the type of university can be an important factor in intention to use and use of open access publishing.

Experience: Experience was identified to be a demographic independent variable that could influence intention to use open access journals. Experience as an demographic variable was used by a number of previous studies (Venkatesh et al., 2003; Schaper & Pervan, 2004; Al-Gahtani, Hubona & Wang, 2007; Bandyopadhyay & Fraccastoro, 2007; Hedlund, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Dulle & Minishi-Majanja, 2011).

Familiarity: Familiarity or unfamiliarity of researchers with open access journals may influence them in using these journals. Situational awareness, (familiarity) is linked to performance and also can be basis for decision making in most cases (Klein, 2000). Also, Tibenderana & Ogao (2008) in a proposed model based on UTAUT model considered familiarity (awareness) as a demographic variable in acceptance of e-library. Furthermore, as mentioned earlier, several prior studies (Bjork et al. 2010; Tarrago & Molina, 2008; Hess et al., 2007; Park, 2007; Barbour & Patterson, 2006; Ghane, 2006; Schroter & Tite,

2006; Wang & Su, 2006; Rowlands & Nicholas, 2005; Schroter, Tite & Smith, 2005, Suber, 2004) reported low familiarity of researchers with open access or unfamiliarity as a reason of not publishing through open access journals.

3.5.2 Dependent Variables

Dependent variables or outcomes are variables that depend on the independent variables; they are the outcomes or results of the influence of the independent variables (Creswell, 2009). A dependent variable is measured to see whether the manipulation of the independent variable had an effect or not (Salkind, 2006). The dependent variables of this study were:

Intention to Use Open Access Journals: Intention to use open access journals was considered as a dependent variable. Intention was assessed on a three seven-point Likert scale statements regarding researchers' intent to publish in open access journals. The measures were adapted from Davis et al. (1989 cited in Venkatesh et al., 2003) and extensively used in much of the previous individual acceptance research (Venkatesh et al., 2003). Additionally, intention was used to predict self-reported use of open access journals.

Use of Open Access Journals: Self-reported use of open access journals was utilized as a dependent variable. Use of open access journals was evaluated by one ratio statement regarding researchers' self-reporting manuscript submission to open access journals. Although using a log system is a preferred method to measure the use of behavior in UTAUT model and information systems research (Venkatesh et al., 2003), a self-report

measure is used to assess use behavior, as an alternative where usage logs were not available for use (Kripanont, 2007 citing Davis et al., 1989).

3.6 Design of Survey Questionnaire

The questionnaire was developed based on some previous panel studies (Mann et al. 2008; Hess et al. 2007; Park, 2007; Moller, 2006; Rowlands & Nicholas, 2005; Swan & Brown, 2005; Venkatesh et al. 2003) and preliminary interviews with subjects of the study as explained in section 3.7.1 of this chapter. In order to design a primary questionnaire, based on the aim of the study, indicators were selected from previous panel studies. However, indicators were integrated into the questionnaire if they were related to the research objectives. In order to know whether there were any new factors or indicators from the perspective of the targeted population, in-depth interviews were carried out with the subjects of the study. In this study the indicators that were found from interviews were added to the previously developed questionnaire and proceeded to carry on with the pretesting stage. The theoretical framework and the research questions guided the questionnaire design process. In the following Table 3.2, initial items for the instrumentation based on literature review and interviews are presented.

Table: 3.2 Initial Items for the Variables based on Literature Review and Interview

	Variables (definitions)	Items	Relevant Items from the Previous Literature	Relevant Items from the Pilot Interviews
1		Are better than traditional journals	Moller, 2006	
2		Offer proper peer-review	Proper peer-review (Moller, 2006)	Proper peer-review
3		Publish faster than traditional journals	Publish fast (Moller, 2006)	Publish fast
4	Attitude	Provide greater visibility for one's work	Visibility (Warlick & Vaughan, 2007; Eysenbach, 2006; Hedlund & Roos, 2006; Moller, 2006; Ouya & Smart, 2005; Prosser, 2003; Scaria, 2003; Johnson, 2000)	Visibility
5		Offer greater impact's on ones work	Impact (Moller, 2006)	Impact
6		Increase readership	Readership (Qiu, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Barbour & Patterson, 2006; Ghane, 2006; Wang & Su, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2004; Lawrence, 2001b)	Readership
7		Make author's work become prestigious	Prestigious (Park, 2007)	
8		Make author well-known	Well-known (Park, 2007)	
9		Allow author to be recognize by their academic community	Recognize (Park, 2007)	
10		May increase author's chance for promotion	Promotion (Park, 2007)	
11		Such as BMC have higher acceptance standard than other journals	-	High quality
12		Is valuable use of time	Save time (Venkatesh et al., 2003)	Save time
13		Using the system is good idea	Good idea (Venkatesh et al., 2003)	Good Idea
14		I like working with the system	Like system (Venkatesh et al., 2003)	Do not/like
15		More citation and therefore high impact factors	More citations (Norris, Oppenheim & Rowland, 2008; Brody, 2006; Hajjem, Harnad & Gingras, 2005; Harnad & Brody, 2004; Prosser, 2003; Crow, 2002; Lawrence, 2001b)	More citation
16	Performance Expectancy	To bring higher H-index for me	-	H-index
17		To obtain copyright of my work	Readership (Barbour & Patterson, 2006; Warlick & Vaughan, 2007; Coonin & Younce, 2010; Moller, 2006)	
18		Larger readership	Mann et al., 2008; Moller, 2006; Swan & Brown, 2005	Larger readership
19		Greater exposure within and beyond the scientific community through Web	Visibility (Warlick & Vaughan, 2007; Eysenbach, 2006; Hedlund & Roos, 2006; Ouya & Smart, 2005; Prosser, 2003; Scaria, 2003; Johnson, 2000)	Visibility

Table: 3.2, continued

20	Faster and wider dissemination through Web	Dissimination (Coonin & Younce, 2010; Nariani & Fernandez , 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Hedlund & Roos, 2006; Ouya & Smart,2005; Wang & Su, 2006; Schroter, Tite, & Smith, 2005; Swan & Brown, 2004)	Faster dissemination
21	Indexing in a free web database/search engines	Indexing (Gul, Shah & Baghwan, 2010; Brody, 2006; Beer, 2005; Barbour & Patterson, 2006; Lawrence, 2001b)	Searchable in Google
22	vast storage space which allow to add extra data(photos, video, audio or datasets)	Storage space (Barbour & Patterson, 2006)	
23	To receive more feedback from readers	Readers ' feedback (Beer, 2005)	comments
24	To receive faster feedback from referees	Referees' feedback (Beer, 2005)	Free and full access
25	Free and full access for all potential reader	Schonfeld & Housewright, 2010; Mann et al., 2008 ; Hess et al., 2007; Wang & Su, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2004	
26	To promote developing countries' engagement with global science	Developing countries' involvements (Moller, 2006)	
27	To enhance developing countries' access to scholarly literature	Developing countries' access (Moller, 2006)	
28	More cost-effective to the academic research community in the long run	Cost-effective (Hess et al., 2007; Wang & Su, 2006; Krichel, & Warner, 2002)	
29	Their high quality even if they charge authors		Quality
30	Archiving in Pub Med Central	Archiving (Zerhouni, 2004)	
31	Anxiety The idea of author charges without institutional support in open access journals	Author-pays (Barbour & Patterson, 2006; Nicholas, Jamali & Rowlands ,2006 ; Schroter, Tite, & Smith, 2005; ; Wang & Su, 2006; Anderson ,2004; Swan & Brown,2004; Bjork ,2004; Wellcome Trust , 2004)	Author-pays
32	Misunderstanding by my colleagues that I published in open access journal only because of paying	Misconception about author-pays(Schroter & Tite ,2006)	Author-pays
33	Matters of plagiarism and misusing of my work in open access system	plagiarism (Wang & Su, 2006; Moller, 2006; Beer, 2005; Prosser, 2004)	plagiarism
34	Low indexing of OA journals by commercial publishers or popular databases such as ISI	Low indexing in ISI (Beer, 2005; Bjork, 2004)	Low indexing in ISI
35	Inferior peer review, and low quality of most open access journals	Low peer-review (Ghane, 2006; Schroter, Tite & Smit, 2005)	Low peer-review

Table: 3.2, continued

36		Negative effect of publishing in open access journals on my career benefit/promotion	Negative effect on career (Swan & Brown, 2004; Moller, 2006)	
37		Validity of my credit to pay publishing cost of open access publisher		Credit card
38		Vanity publishing (poor quality research being published for a fee in open access journal)	Poor work (Schroter, Tite, & Smith , 2005)	Poor work
39		A relative lack of prestige in open access journals	Low prestig (Warlick & Vaughan, 2007; Wang & Su, 2006; Swan & Brown, 2005; Anderson, 2004)	Low prestige
40		Lack of guarantee for long-term availability and stability of open access journals	Sustainability (Mann et al., 2008; Hess et al., 2007; Park, 2007)	
41		Commercial vision of open access publisher when they charge	Commercial vision (Moller, 2006)	Commercial vision
42		The recommendation of my peers	Peers' recommendation (Suber, 2004; Lawrence, 2001b; Gul, Shah & Baghwan, 2010, Nariani & Fernandez, 2010; Mann et al., 2008; Schonfeld & Housewright, 2010; park, 2007	-
43		The recommendation of my superiors	superiors' recommendation (park, 2007)	
44	Social influence	The recommendation of people who are important to me	Important ones' recommendation (park, 2007)	
45		My peer's article in a certain open access journal	Peers' article (park, 2007)	
46		A superior's article in a certain open access journal	Superiors' article (park, 2007)	Influence of top authors
47		To have a top editorial board in these journals	Editorial board (Mann et al., 2008; Swan & Brown, 2005; Bjork, 2004)	Influence of editorial board
48		The recommendation of my institution	Recommendation of institution (Swan & Brown, 2005)	
49		The recommendation of my grant-awarding body	Recommendation of grant bodies (Swan & Brown, 2005)	Influence of grant body
50		The recommendation of co-publishing colleagues	Recommendation of co-publishing colleagues (Swan & Brown, 2005)	
51		To have necessary knowledge to use open access system	Necessary knowledge (Venkatesh et al., 2003)	knowledge of open access
52		To have sufficient ICT skill to use open access channel	ICT skills (Venkatesh et al., 2003)	ICT skill
53		Existence of specific staff/s to assist with difficulties of system	Staff to assist (Venkatesh et al., 2003)	Supporting staff/s
54	Facilitating conditions	To publicize the advantages and potential of open access to information resources (sufficient awareness about open access) by university	Awariness(Tarrago & Molina, 2008; Ghane, 2006; Foster & Gibbons, 2005; Schroter, Tite & Smith ,2005; Suber, 2004; Swan & Brown, 2004; Rajashekar & Jayakanth, 2004)	Necessity of awareness

Table: 3.2, continued

55		To pay publishing fee of publisher like BMC by university, then researcher publish tin free		Institutional membership
56		To pay publishing fee of open access journals by university	Financial support (park, 2007)	Financial support
57		To be enough good quality open access journal to publish in(such as BMC)	Venue (Hedlund & Roos, 2006; Tarrago & Molina , 2008)	
58		To consider open access journals by academic reward system for carrier benefit	Career benefits (Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Kingsley, 2008; Mann et al., 2008; Hess et al., 2007; Park, 2007; Park & Qin, 2007; Ghane, 2006; Nicholas, Jamali & Rowlands, 2006; Schroter, Tite & Smith, 2005; Bjork, 2004)	Consider for career benefits
59		To support open access journals with impact by evaluation committees of periodicals factor		Consider for career benefits
60		Recognizing of open access journals by Iranian research funders	Research funders (Swan & Brown, 2005)	
61		To provide high speed Internet connectivity to use open access channel	Internet (Hess et al., 2007; park, 2007; Barbour & Patterson, 2006; Wang & Su, 2006; Ouya & Smart, 2005; Beer, 2005; Bjork, 2004; Goodman ,2004; Arunachalam, 2003)	To provide high-speed Internet
62		Existence of initiatives in country to promote open access publishing	Open access initiatives (Hedlund & Roos ,2006; Tarrago & Molina, 2008)	
63		Free availability(ease of use) for all readers on the web	Free access (Mann et al., 2008; Hess et al., 2007; Barbour & Patterson, 2006 ; Wang & Su, 2006; Nicholas, Huntington & Rowlands, 2005; Schroter, Tite & Smith, 2005; Swan & Brown, 2004; Swan & Brown, 2005)	Free access
64	Effort expectancy	Ease of access to readers	Ease of access (Mann et al., 2008; Hess et al., 2007)	Easy access
65		Easy access to research results for researchers in developing countries	Easy access for developing countries (Mann et al., 2008; Hess et al., 2007; Ouya & Smart, 2005)	
66		Ease of recognition of a suitable open access journals	Recognition of open access journals (Hess et al., 2007; Swan & Brown, 2005)	
67		Ease of electronic manuscript submission process in open access journals	Electronic submission (Park, 2007; Nicholas, Jamali & Rowlands, 2006)	Ease of electronic submission
68		Ease of learning about how to publish in an open access journals	Ease of learning (Hess et al., 2007)	
69	Intention	I intend to use the system in the next 6 months	Davis et al., 1989; Venkatesh et al., 2003; Park, 2007	
70		I predict I would use the system in the next 12 months	Davis et al. (1989; Venkatesh et al., 2003; Park, 2007	
71		I plan to use the system in the next 18 months	Davis et al. (1989; Venkatesh et al., 2003; Park, 2007	

3.6.1 Type of Questions in Questionnaire

In the present study, the questionnaire comprised four types of questions that were dichotomous questions, tick only items, multiple choice items and a ranking on a seven-point Likert scale. It should be noted that although the Likert scale is an ordinal scale, the present study considered and used it as an interval scale. According to McCall (2001) the numerical values of the items on the scale can be summed to arrive at an overall score (or perhaps average score) for those items considered as addressing the same underlying construct. Additionally several authors (Vogt, 2007; Morgan, 2004; Harwell & Gatti, 2001; Clason & Dormody, 2000) justified the use of Likert scale as an interval measurement. Therefore, the numerical coding of the questionnaire from “1” to “7” in this study makes it possible to analyze Likert scale data with descriptive and inferential statistical methods.

In this study, the consideration of what items belong to a specific latent construct (factor) was initially based on the review of the literature and then after the main survey, factor analysis was done to confirm it. Each construct comprises at least three items (indicators) and no more than 10 items. These nine constructs were measured by a total of 71 items (68 items for independent variable and 3 items for dependent variables). Furthermore, at the end respondents were invited to write additional comments if they wished. (See the questionnaire in Appendix B).

3.7 Data Collection

This study is technically mixed because it has both quantitative (questionnaire) and qualitative (open-end question and interview) data, which is called a quasi-mixed method design. Quasi-mixed designs are the ones in which two types of data are collected (quantitative and qualitative), with little or no integration of the two types of findings or inferences from the study. Despite the existence of both types of data, this study was not a

mixed method because the quantitative components was the focus of the study and also the quantitative and qualitative results and inferences were not integrated in answering the research questions (Teddlie & Tashakkori, 2009).

The data collection process started with preliminary interviews in order to complete the design of the questionnaire, followed by pretesting, piloting and the main survey. Prior to collecting the data, an approval from the Institute of Postgraduate Studies of University Malaya was obtained and confirmed by the Embassy of Iran in Malaysia. A second permission was granted by the research deputies of investigated universities in which the data collection was conducted personally.

3.7.1 Preliminary Interview

In the present study, in-depth interviews (semi-structured) were carried out with two aims, first whether there were any new items from the perspective of subjects of study to be added to the questionnaire and second, to confirm whether the proposed model was supported by interview results. In-depth interviews helped in the articulation of dimensions and in the details of instrument building. This kind of interview can often lead directly to a useful conceptualization and the building of a pilot instrument (Oppenheim, 2001). Interviews in this study focused on interviewees' awareness and experiences both as an author/reader and why they used or did not use open access journals.

Regarding the sample size, the typical goal for sampling in qualitative analysis is to reach "theoretical saturation" concerning the topic or process being investigated. In the present study, interviews were conducted with 27 researchers from three medical schools. When new interviews could no longer yield new information and all potential sources of variation had been adequately explored, the interviews were stopped.

Interview subjects were purposively selected among clinical/basic science researchers. Of the 27 interviewees, 13 were clinical researchers and 14 were basic science researchers. The 27 interviewees comprised three Professors, seven Associate Professors, 16 Assistant Professors, and one Lecturer.

All interviews were conducted by the principal researcher and each interview lasted approximately between 30 to 60 minutes. The interview sessions were recorded using a digital IC recorder. Before starting each interview permission was obtained to record the communication. The interview sessions took place between May 5 and June 18, 2009 at a location of the participants' choice, at on-campus offices or the hospital where they worked. The location of universities in different geographic areas of the country made conducting the interviews difficult for the investigator. The respondents were informed that the information they gave would be kept strictly confidential.

Interviews were transcribed and classified manually based on already structured dimensions of the study. It should be noted that the transcription and classification of interviews first was conducted in Persian language, and then items under each category was translated to the English language. The conceptual/theoretical framework of this study was a guided transcription. Then new indicators that were observed from the interview transcripts were transformed into scales for the questionnaire.

3.7.2 Pretest

Pretesting has always been an important part of the questionnaire design (Dillman, 2000). It acts as a means to examine whether the questionnaire is understandable, written clearly, and structured well.

The present research used two strategies in pretesting, first by consulting five experts who belonged to domains such as statistics, education, research methodology,

computer science, and information systems to provide their judgments on the questionnaire especially on the items in each set (concept) to check whether individual items corresponded with the concepts. In addition, the preliminary questionnaire which was in English language, was pretested using five students of Master of English Language and also two academic staff of English Language Education to find out whether statements were understandable enough to attract correct responses.

Second, pretesting was carried out with five medical students and two academic staff from one medical school. Based on their feedback, some questions were rephrased for clarity. Regarding the sample size in pretest, Hunt et al. (1982, citing Feber & Verdoorn, 1962) suggested that a sample of 12 is satisfactory. In addition after pretesting the investigator decided to change the language of the preliminary questionnaire from English language to Persian language. It was predicted that the Persian version of the questionnaire would be answered more precisely. Only, the terms and initiatives about open access were kept in English language. After providing the Persian version of the questionnaire it was pretested again. Pretesting was carried out with five medical students and five academic staff of the target medical school. The researcher had a face-to-face meeting with respondents to discuss any aspects of the questionnaire ranging from its layout, format, continuity between sections to its contents and wording. All the participants of the pretest reviewed the preliminary questionnaire before meeting with the researcher for discussions. Interviews were held with only five respondents who volunteered to provide a verbal feedback about the clarity of the modified instruments. Pretest questionnaires responses to each question were reviewed and comments were noted. The questions that respondents did not seem to understand as the investigator had aimed or that were not working well for some other reason were revised. Based on suggestions and feedback from the participants of pretest and other experts, the questionnaire was redesigned to improve the content,

simplify the survey, and reduce the questionnaire length. Finally, after the research supervisor reviewed the questionnaire extensively, it was used in the pilot study.

3.7.3 Pilot Study

The pilot test was conducted on the questionnaire in order to establish the content validity of the instrument and to improve the questionnaire format, and the scales (Creswell, 2009). The questionnaire draft was piloted among researchers of one medical school, who were representative of the target population. The aim was to estimate the length of the time for completing the questionnaire and to investigate whether the questions were properly understood by respondents. A pilot study deals with the overall design of the instrument rather than only specific questions (Wilson & Sapsford, 2006). In order to have a representative sample of the target population, both clinical and basic science researchers were selected for the pilot study.

In this study, a total of 70 questionnaires were randomly distributed among the pilot samples. According to Cooper & Schindler (1998) sample size of the pilot group may range from 25 to 100 subjects. The approximate time to complete the pilot survey was around 20-25 minutes. The pilot survey was carried out from 25 July until 10 of August 2009.

The cover letter of the questionnaire did not mention anything about pilot study, because, it was found in past research that the response rate would suffer if a subject learned that a questionnaire was part of a pilot test (not a real investigation) and then decided not to participate in the pilot study (Dillman, 2007).

After collecting data for the pilot study, it was analyzed by using preliminary basic statistical methods using SPSS, and the reliability of the questionnaire was assessed in order to proceed to the main survey. The reliability of 71 seven-point Likert scale

composed in seven factor was greater than .90 for four factors, over .80 for two factors and over .76 for one factor. Based on the reliability test results, some basic data analysis, feedback of respondents and expert validity; some changes were made on the content and format of the questionnaire to improve its overall structure. For instance, one major problem mentioned by respondents was about the length of questionnaire, therefore, by considering the purpose and research questions of study, it was revised again and one section that was not related to the theoretical framework of study was dropped.

3.7.4 Main Survey

Conducting the main survey was the final stage of data collection which was carried out after pretesting and piloting the questionnaire. In the following sections, the format and content of questionnaire as well as questionnaire distribution are discussed.

3.7.4.1 Questionnaire

The questionnaire was made up of two general sections: cover letter and the questionnaire itself. The general content of the questionnaire comprised nine sections which included survey indicators and demographic information of respondents. A cover letter is an important part of any questionnaire. It is the only channel through which a researcher can convince a subject to respond to a questionnaire (Dillman, 2007). In the cover letter for this study, aim of study, importance of respondents' response and time duration of completing the questionnaire were mentioned. In order to establish credentials and legitimacy, the covering letter explained that the study was a research project at University of Malaya, Malaysia, and that all information obtained would be subjected to anonymity and confidentiality and used only for the purposes of the present study. Furthermore the cover letter for the questionnaire clearly stated that this survey was for

respondents who were researchers of medical schools at public medical universities. (See cover letter of the questionnaire in Appendix A)

The content of the questionnaire included nine sections and consisted of 71 Likert scale indicators which reflected seven constructs, representing factors influencing acceptance of open access publishing. Likert-scale items were rated between “1” to “7” scales from “Strongly disagree” to “Strongly agree”. The other indicators of the questionnaire consisted of multiple choice questions which were be ticked by respondents and dichotomy items, as well as five demographic items. In addition respondents were asked to comment on open access if they wished. (See questionnaire in Appendix B). It should be noted that due to dropping some of indicators after factor analysis, the questionnaire in the appendix, only includes 51 out of 71 Likert scale indicators that used for further analyzing.

3.7.4.2 Distribution of Questionnaire

A questionnaire can be administrated in several ways, such as self-administration, post, face-to-face interview, telephone, and internet (Cohen, Manion & Morrison, 2007). Distribution of questionnaire for this study was carried out using mixed mode of self-administrated and by means of Internet. This study was conducted with the assumption that possibly some of the targeted sample did not have equal Internet access and computer proficiency to complete the questionnaire electronically; hence investigator decided on using mixed-mode approach through face to face and e-mail survey. The targeted respondents should have equal access to Internet as well as the necessary computer skills to navigate on an Internet-based survey (Cox & Cox, 2008 citing Howes & Mailloux, 2001; Dillman, 2007; Solomon, 2001).

Self-administrated questionnaire can be accomplished in two ways; one way is completing the questionnaire in the presence of the investigator, or to fill out questionnaire without the presence of the investigator (Cohen, Manion & Morrison, 2007). Using self-administrated way in this study, investigator delivered questionnaires to respondents personally, if respondents had time to complete the questionnaire in her presence, it was collected immediately, otherwise researcher had to collect it at respondent's mentioned time and date. The justification to use the self-administrated approach is that personal survey method is regarded as the most flexible form of collecting survey data (Reynolds & Diamantopoulos, 1996).

In addition, questionnaires were distributed by means of Internet. In order to do this the questionnaires were sent via e-mail as MS word attachments. E-mail survey is a survey that is sent and answered through e-mail (Schutt, 2009). The reason for using e-mail survey was that, e-mails have the attraction of immediacy and it also tends to attract greater response rates than web-based surveys (Cohen, Manion & Morrison, 2007). Furthermore, for some population like academic staff, e-mail is an attractive option that greatly simplifies contacting the sample and tallying their responses (Vogt, 2007). Also in terms of Internet access, academic staff (researcher) who have very high rates of Internet use make Internet-based surveys a viable option compared to other survey methods (Schutt, 2009). It should be noted that recently Internet-based surveys have moved from being in the form of e-mails to e-mails-plus-attachments of questionnaire itself, to e-mails directing potential respondents to a website, or simply to web sites (Cohen, Manion & Morrison, 2007); however, attaching word format of questionnaire was considered more suitable for this study.

For doing web-based survey, using Gmail, an e-mail message was sent out to the researchers along with a questionnaire attachment in word format. The researchers were

informed that they could request a paper copy of the survey if they had problems with filling out questionnaire in softcopy format. Approximately 1800 questionnaire were sent via e-mails to academic staffs in three types of medical universities. The above mentioned figure represented about 30% of all public medical schools in Iran which was 5970 subjects (Mohammadi, Mojtahedzadeh & Karimi, 2006). In order to account for no responders, the investigator counted on increasing the sample size. According to Salkind (2006) if the investigator mailing out surveys or questionnaires (and he/she knows what can happen for many of them), count on increasing your sample size by 40% to 50% to compensate for lost mail and non respondents. Out of 1800 e-mailed questionnaire, 1500 were effectively sent out and 300 were returned as undeliverable and remained in inbox. Also a follow-up letter was sent by e-mail, because it was more cost-effective and a quickest way for this case. It should be noted that during the personal visit for data collection, those who had already responded by e-mail were not given another questionnaire.

The survey was cross-sectional in that it assessed the attitudes for the sample at a given point in time, in this particular instance, their behaviors up until the end of November 2009. Additionally, it was decided that an offer of a gift-token be given (48 Pen drives which had been purchased using a grant of University of Malaya as well as five antiviruses which were provided from the personal budget of investigator) to respondents.

3.8 Data Entry

The majority of returned questionnaires were through personal collection efforts and the remaining via e-mail as word attachments, therefore, data entry was conducted manually, which was time consuming. Data based on type were coded and entered in SPSS spreadsheets. For example 13, items that represented researchers' familiarity and

experience with terms, initiatives, and services of open access were entered as dichotomous items. Multiple choice items were based on number of options coded and were entered in spreadsheets. Likert scale items which were already coded from “1” to “7” were entered in SPSS.

3.9 Data Cleaning

Data cleaning is the process of checking data for errors before/after the data has been entered in a computer file. The first step of data cleaning in this study was to check responses before they were entered into the SPSS. In order to ensure that whether only one valid answer code had been clearly marked for each question, the softcopy questionnaires were printed and all questionnaires verified for duplicate responses, excluding those questions that respondents had permission to check more than one option. The next step in data cleaning was to make sure that no invalid codes had been entered. Data was entered in SPSS manually; therefore it was possible to enter wrong codes. Due to defining ID code for each case, SPSS made it possible to sort data in ascending and descending orders; therefore, any wrong codes were monitored and corrected.

3.10 Data Analysis

Data analysis was carried out in three stages. The first stage was to test reliability and validity of questionnaire. To test reliability of the scale, Cronbach’s alpha was computed for each variable. Explanatory factor analysis was used to measure the validity of the instrument which consisted of 71 seven point Likert scale statements composed of seven factors (constructs). Due to the framework of this study, construct validity was used to test the validity. Construct validity is assessed through convergent validity, which assess whether the items that should be related have correlation. According to Sekaran (2006)

convergent validity is established through factor analysis. The second stage of data analysis was a test of normality, whereby the normality of data distribution was measured by using both kurtosis and skewness.

The third stage of data analysis involved descriptive statistics such as frequency, percentage, mean score to answer the first research question and part of the second research question. Hierarchical multiple regression was used to the answer second research question. Several previous studies (Chismar & Wiley-Patton, 2003; Louho, Kallioja & Oittinen, 2006; Carter & Schaupp, 2008; Mann et al., 2008; Siracuse & Sowell, 2008; Al-Shafi, Weerakkody & Janssen, 2009; Jong & Wang, 2009) on acceptance of technology used regression to test the influence of factors on the acceptance of a technology. Finally, several multiple regressions were used to determine the moderating role of demographic variables between constructs and outcomes. The data obtained from this study were analyzed using the Statistical Package for Social Science (SPSS) 17.0 program by applying statistical formulates and computation.

3.10.1 Assessment of Quality of Data

Several factors such as modes of data collection, survey design, and measurement may affect quality of data in surveys (Karr, Sanil & Banks, 2006); therefore, before conducting the main statistical analysis, reliability, validity and normality of the variables were assessed. These assessments are important aspects of all research designs and measurement techniques (Vogt, 2007).

3.10.1.1 Reliability of Variables

The reliability test was done to establish whether the instrument was reliable for data collection. One of the reliability analyses in quantitative studies that measures internal

consistency of measurement is Cronbach alpha. It provides a coefficient of inter-item correlations, that is, the correlation of each item with the sum of all the other items. This is a measure of the internal consistency among the items (Cohen, Manion & Morrison, 2007).

In this study the Cronbach alpha reliability test of the Likert scale was performed using data from eight sections (attitude, performance expectancy, anxiety, concerns with author-pays, social influence, facilitating conditions, effort expectancy and intention) which were completed by 367 respondents. Alpha value for the seven factors was over .80. Only, one factor (concerns with author-pays) which had three items obtained alpha .56. Based on the following rules of thumb for Cronbach's alpha coefficient: "[alpha] >.9--Excellent, [alpha] >.8--Good, [alpha] >.7--Acceptable, [alpha] >.6--Questionable, [alpha] >.5--Poor, and [alpha] <.5--Unacceptable" (Gliem & Gliem, 2003, p.231), alpha value .80 is good and .56 is poor. However, for a three-item scale an alpha of .5 might be regarded as quite sufficient too (Bradley, 1994, p. 30).

3.10.1.2 Validity of Measurement Scale

The validity of a scale refers to the degree to which it measures what it is supposed to measure (Pallant, 2001). Several types of validity tests are used to test the goodness of measures. In this study, two types of validity were important: content and construct validity. Content validity means that the measure includes an adequate and representative set of items that tap the concept.

This study conducted content validity assessments of the instrument prior to the use of the instrument in pretesting stage, piloting and main survey. Besides, the opinions of a panel of judges were used to confirm the content and face validity of the instrument in all stages. Construct validity testifies as to how well the results obtained from the use of the measure fit the theories around which the test is designed.

Construct validity was assessed through convergent validity. Due to predefined factors based on the literature review, convergent validity was used in this study. Convergent validity assesses whether the items that should be related have correlation. Some ways in which convergent validity could be established are through: correlational analysis and factor analysis. In this study factor analysis was used to establish convergent validity. Factor analysis is a multivariate technique that would confirm the dimensions of the concept that have been operationally defined, as well as indicate which items are most appropriate for each dimension (establishing construct validity) (Sekaran, 2006). There are two broad categories of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), and each have a different purpose. Exploratory factor analysis focuses on finding structures (patterns) of correlations in the data (Vogt, 2007). In this study, exploratory factor analyses was used to evaluate the construct validity and to operationalize the factors (dimensions) in the acceptance of open access publishing including attitude, performance expectancy, facilitating conditions, effort expectancy, anxiety, and intention.

There are three main steps in conducting factor analysis. Step one is the assessment of suitability of the data for factor analysis. Two statistical measures generated by SPSS help to assess the factorability of data, they are the Bartlett's Test of Sphericity (Bartlett's Test) and Kaiser-Meyer-Olkin (KMO). The Bartlett's Test for the present study was significant ($p < 0.001$) which was appropriate for factor analysis. Regarding KMO value Kaiser (1974) proposed the following criteria: > 0.9 is marvelous, > 0.8 is meritorious, > 0.7 is middling, > 0.6 is mediocre, > 0.5 is miserable, and < 0.5 is unacceptable. For this study, the KMO was found to be 0.833. Thus, it was considered appropriate to apply factor analysis.

The second step is factor extraction. Factor extraction involves deterring the smallest number of factors that can be used to best represent the inter-relations among the set of variables. In the present study the principal components analysis (the most commonly used method) was performed and a total of eight factors with eigenvalues greater than 1.0 were identified. Kaiser's criterion or eigenvalue rule was used to assist in the decision regarding number of factors to retain. Using this rule only a factor with an eigenvalue of 1.0 or more should retain for further investigation (Pallant, 2001). Also, out of eight factors, the indicators that represent seven of factors explained a variance between 50.5% - 64.5% in each factors, and one factor (intention) explained 81.1% of the variance, which are acceptable (Netemeyer, Bearden & Sharma, 2003).

It should be noted that after factor analysis, anxiety was loaded in two factors, therefore the number of factors increased to eight. The new factor was named concerns with author-pays.

The third step is factor rotation. There are two main approaches to rotation, resulting in either orthogonal (uncorrelated) or oblique (correlate) factor solution. According to Tabachnick & Fidell (1996) cited in Pallant, (2001) orthogonal rotation results in solutions that are easier to interpret and to report. Varimax method is an orthogonal rotation approach which was used in this study. This method is commonly used and attempts to minimize the number of variables that have high loading on each factor (Pallant, 2001). In the present study varimax rotation solution was performed and out of 71 measures, 51 that loaded above 0.5 in eight constructs were retained. Loading ± 0.5 or greater in a factor is considered practically significant (Hair et al., 2010) and that indicated that the items converged on one common point.

3.10.1.3 Normality of Distribution

In general, describing and examining data is a central step which should take place before a researcher moves to the real analysis (Vogt, 2007). One of the important ways to examine data is normal distribution. Making a decision about inferential statistical techniques in research depends on normality of data.

Among the statistical summaries used to describe a distribution, the measure of skewness and kurtosis are the best known. In the present study, these measures were used to evaluate normality of data. “Skewness is the extent to which cases are clustered more at one or the other end of the distribution of a quantitative variable rather than in a symmetric pattern around its center” (Schutt, 2009, p.492). Kurtosis is a measure of how flat or pointy a graph of a distribution is (Vogt, 2007). According to George & Mallery (2005) a value between ± 2.0 for both Kurtosis and Skewness measures is acceptable. For the present study skewness and Kurtosis values for all constructs were between ± 2 , which is acceptable.

3.10.2 Strategies for Missing Data and Outliers

It is impossible to obtain complete data sets for all cases. To deal with missing data, based on the kind of statistics to be done it is possible to choose listwise or pairwise deletion. SPSS uses both listwise and pairwise deletion of the missing values. In this study listwise deletion was chosen to conduct regression statistics due to having the same number of cases to test the influence of independent variables on outcome variables of study. In listwise deletion a case with missing value for any variable is omitted from all data analysis.

Outliers (values that are substantially lower or higher than the other values in the data set) can have a dramatic effect on the correlation coefficient, particularly in small samples (Pallant, 2001). In the present study boxplot was used to check for univariate

outliers that appeared in the SPSS. Also, multivariate outliers were detected using Mahalanobis distance (Coakes, Steed & Ong, 2009) that was produced by multiple regression analysis. To reduce the effect of outliers on r (Pallant, 2001), it was decided to omit them from the regression analysis.

3.10.3 Statistical Techniques for Analyzing the Research Questions

In this study descriptive statistics such as percentage, frequency and mean were used to answer the first research question; therefore, the current status of researchers' familiarity and experience with open access which consisted of eight sub-questions was reported by using descriptive statistics.

The second research question of the study, regarding factors influencing acceptance of open access publishing with three sub-questions were answered by using seven-point Likert scale indicators. Based on justification by previous studies (Vogt, 2007; Morgan, 2004; Harwell & Gatti, 2001; McCall, 2001; Clason & Dormody, 2000) the Likert scale was considered as continuous variables in the present study. The primacy of proposed factors was ranked using mean scores of Likert scale items. In this study data was distributed normally, therefore, it was possible to use parametric statistics.

To determine the factors influencing acceptance of open access publishing, hierarchical multiple regression in two rounds was performed. One fundamental purpose of multiple regression is to predict the dependent variable with a set of independent variables (Hair, 2010). In hierarchical multiple regression variables or a set of variables are entered into steps (block), with each independent variable being assessed in terms of what it adds to the prediction of dependent variable, after the previous variables have been controlled.

When the hierarchical multiple regression was undertaken, the independent variables could be entered into equation in the order specified by the researcher based on theoretical grounds and could be also determined based on previous studies. In the present study, for some reasons it was decided that the entering of the variables be based on the strength of relationship between each factor and outcome variables that were determined by the Pearson correlation. The first reason was that the independent variables that had only a small association with the dependent variable could not explain much of the variance in dependent variable. These variables which probably did not improve the prediction were added to the regression model at the end (Burns & Burns, 2008). The second reason was the utilization of a theoretical framework which was not exactly used by previous studies on open access. The third reason, the proposed factors of this study were similar to the preliminary proposed factors of the UTAUT (before confirming and validating the UTAUT model). However, since the same measurement was not used it was not rational to use the same order, especially considering that previous studies on open access, found some of these factors insignificant. The fourth reason was due to the fact that the order of entry of the preliminary proposed factors of the UTAUT was tried as a trail, but there was not any difference in the value of R Square. The fifth reason was that previous studies used the strength of associations to make decisions regarding the order of entry in hierarchical multiple regressions. Reed-Knight, Lewis & Blount (2011) used the bivariate relationship between the predictors and the outcome variables in addition to theory so as to guide the order of variables entry in their study. Also Liu & Norcio (2009) while undertaking their study determined the order of entry in a hierarchical multiple regressions based on correlation analysis. Therefore, in the present study variables were entered in multiple regressions in a sequence based on the strength of associations (i.e. from strong to weak).

Furthermore, in the present study besides the direct influence of demographic variables, their moderation roles were also examined. A moderator or the moderating variable is variable that has a strong effect on the relationship between an independent variable and a dependent variable. The presence of a moderating variable modifies the original relationship between the independent and the dependent variables (Sekaran, 2006).

Regarding the justification to use seven point Likert scales it should be said that in rating scales when a researcher decreases the number of positions, that means there could be very few choices. The way around this is to create a larger scale than a five-point scale, for example seven-point scale (Cohen, Manion & Morrison, 2007).

3.11 Summary of Chapter 3

This chapter has described the research design employed in conducting the empirical study for this thesis. The chapter includes the sections on methodology, population, sampling, instrumentation, pretesting, piloting, distribution of questionnaire and data analysis. The following chapter presents the results for this study.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 Introduction

This study was designed to identify the factors influencing intention to use and the usage of open access journals among researchers of medical schools at public medical universities of Iran. It also presents a picture of the current situation regarding familiarity and experience with open access among them. In this chapter the findings of study are first presented and then discussed in light of the previous studies conducted by other researchers. The chapter first presents a brief report of the preliminary interviews conducted in the design of questionnaire and also to support already formulated framework of the study, followed by the findings of the main study which was conducted by using questionnaires.

4.2 Preliminary Interviews

The main purpose of these interviews was to find out whether there were any new items to be added to the preliminary questionnaire which was redesigned based on previous studies. Also it was intended to find out whether interviews supported the proposed factors in the theoretical framework of study. Semi-structured in-depth interviews were conducted with 27 researchers at public medical schools of three universities in order to find out what factors motivate/hinder them in using open access publishing.

Interviews were structured around four topical areas: 1) familiarity with open access, 2) general perception of open access journals, 2) previous experiences with open access journal, (3) if they had previous experiences, and what incentive or disincentive

they faced, and 4) if they had no previous experiences, what was the reason, and what conditions motivated them to use the system. These question areas were targeted to gather data on different aspects of the researchers' perception of open access journals.

Out of 27 researchers, 14 were familiar and 13 were not familiar with open access journals. Interviewees who were not familiar were helped by the interviewer to understand the concept of open access at the beginning of each interview. Generally, all of the unfamiliar interviewees declared that they knew some journals that charged authors, when it was explained that open access journals had a publishing cost. Out of 27 researchers, 11 had publishing experience with open access journals while 16 did not. Also, of the 27 researchers, 23 had used these journals as readers.

There are several stages of analyzing interview transcripts such as generating natural units of meaning, classifying, categorizing and ordering these units of meaning, structuring narratives to describe the interview content, interpreting the interview data (Cohen, Manion & Morrison, 2007). Due to the quantitative nature of this study, interview data was analyzed more concisely. Each interview was transcribed and then each transcript was analyzed in order to categorize themes. The data from each transcript was grouped by topic, combining similarities, and identifying the incentives and disincentives in using open access journals. The interview data was analyzed deductively based on the research framework. The transcripts were categorized based on six topics on attitude, anxiety, performance expectancy, social influence, facilitating conditions and effort expectancy. The six areas are presented below with sample of supporting statements.

Attitude: Attitudes and overall perception of researchers about open access is an important factor that may influence them to use/not use the system. Some of the sample comments made were:

Case 17 *“Open access is good idea and necessary to improve knowledge”.*

Case 12 *“With considering the mentioned limitation of open access, I support the idea of open access; it is useful to improve and develop knowledge in world”.*

Case 4 *“I do not like this method in which author should pay to make the work accessible”.*

In general, open access, or the idea of free access for all potential readers was supported by a majority of researchers. Some of the researchers had a negative attitude towards open access journals due to author charges as well as the low quality of these journals.

Anxiety: Concerns of researchers regarding issues around open access may negatively influence them in using system. Some of the sample comments on anxiety made were:

Case 2 *“When open access journals charge author, therefore they will accept and publish all paper with any quality”.*

Case 9 *“Open access journals should not ask money to publish. This system is a kind of marketing for more benefits”.*

Case 15 *“Overall, charge of author is a barrier for authors in publishing.*

Case 10 *“One negative aspect of author charge is misconception about that publishing is only because of paying”.*

Case 25 *“Quality of peer-review in open access journals is low”.*

Case 19 *“Open access journals do not have enough impact factors so their publishers make them free to increase readership and therefore obtain citation and impact factor.*

Case 3 *“High use of Internet and low band width is a barrier to enjoy benefit of this system”.*

Case 4 *“There is some problem in paying publishing fee by means of our credit cards”.*

The concerns with author-pays, low quality control (peer-reveiw) and lack of impact factor in these jouranls, are the key concepts that represent the reported comments. It seems both researchers who published in open access journals and who did not published, had some concerns regarding open access.

Performance expectancy: Using open access journals may help researchers to improve in job performance. Some of the sample comments on performance expectancy made were:

Case 17 *“For dissemination of knowledge and making it visible, for me it is so good to use different tools and option”.*

Case 9 *“Some old papers despite having interesting idea have not received enough attention because of invisibility, now open access make these kinds of works visible and the idea is known by other researchers”.*

Case 21 *“Open access journals are accessible for larger audience anywhere”.*

Case 24 *“Publishing in high quality open access journals like BMC has positive influence on my citation and h-index”.*

Sample comments are regarding fast dissemination, visibility, larger readership, more citation and obtaining higher h-index. These attributes are among the probable benefits of publishing in open access journals.

Social influence: Well-known editorial board members of open access journals, top reviewers in these journals and publishing articles by superior authors in these journals might influence researchers to publish through this channel. These features represent social influence. The following are three quotations from some of the researchers interviewed:

Case 9 *“To make open access journals acceptable, top persons of the field should send paper to these journals and also these journals should have top reviewers”.*

Case 19 *“If in each field top researchers to be editorial board of open access journals and also they publish in these journals, it is possible to improve quality of these journals”.*

Case 21 *“If a top person publishes in an open access journal, all will have access to his/her work, and authority of that open access journal improve”.*

Facilitating condions: In order to use open access journals, the existence and fulfillment of some requirements is essential. Some of the sample comments on facilitating conditions made were:

Case 17 *“To consider publishing in open access journals for carrier benefits, can promote usage of these journals among academic community”.*

Case 14 *“Awareness about open access and its advantages by means of workshop is useful in promotion open access”.*

Case 21 *“I did not use because I was not so familiar with open access”.*

Case 13 *“University pay subscription of open access journals such as BMC, therefore researchers of university can publish in high quality open access journals”* [institutional membership].

Awareness about system and its advantages, institutional membership and considering these journals for carrier benefits are the key concepts obtained of above comments.

Effort expectancy: Ease of using open access journals might influence researchers’ intention to use and use of these journals. Researchers assert that such topics as free access and easy access are of importance to them.

Case 17 *“Free and fast access, it is the best condition. I and most of our colleagues believe that others should have free access to our”.*

Case 18 *“Easy access is an advantage of open access journals”*.

After conducting transcript analysis, three new indicators, “open access reach to higher h-index”, “to pay publishing fee of high quality open access journals through institutional membership” and “problem with credit card to pay publishing fee” emerged to be added the questionnaire. It should be noted that the item “problem with credit card” was later dropped due to low loading after conducting factor analysis on measurements. Transcripts were categorized under six topics: attitude, anxiety, performance expectancy, social influence, facilitating conditions and effort expectancy. Therefore, the theoretical framework of study as presented at pages 16 and 128 was supported by the emergence of similar themes to the structure of study.

4.3 Results from Main Study

The main study was conducted through a survey to investigate the current status of familiarity and experience with open access as well as the factors influencing acceptance of open access publishing among Iranian medical researchers. The quantitative findings from the research questionnaire are presented in this section.

4.3.1 Response Rate

Overall, out of 270 questionnaire distributed by personal delivery among the target sample, a majority of 89.62% returned. While out of 1500 questionnaire sent out by means of e-mail, only 8.33% returned. Table 4.1 show the number of returned questionnaires through e-mail and personal delivery three types of universities.

Table 4.1: Returned Questionnaires

Type of university	Returned questionnaires		Total
	E-mail	Personal delivery	
Type One	73	138	211
Type Two	42	85	127
Type Three	10	19	29
total	125	242	367

In total, 367 questionnaires were returned, out of which, 125 questionnaires were returned through e-mail and 242 by means of personal delivery. Out of the 367 returned questionnaires, 211 were from Type One universities, 127 from Type Two universities and 29 from Type Three universities. The highest number of returned questionnaires was through personal delivery in Type One universities and the lowest number was by means of e-mail in Type Three universities. Although, electronic survey have the potential to reach greater numbers of participants (Cohen, Manion & Morrison, 2007), the response rate for Internet survey in this study was lower compared to the personally delivered paper-based surveys. The low response rates for e-mail surveys could be due to researchers not checking their e-mails for several days, lack of time to check all received e-mails or having other priorities.

Additionally it should be noted that the percentage of distributed questionnaires through personal delivery and e-mail account, was based on stratified sampling methods. Based on this kind of sampling each type of university was represented exactly in proportion to its size in the population from which the sample was drawn.

4.3.2 Respondents' Demographic Profile

The characteristics of researchers within the medical schools of public medical universities of Iran based on gender, age, academic rank, field of study and type of university as are presented in Table 4.2.

Table 4.2: Demographic Profile of Respondents

Major characteristics		Frequency	Percentage
Gender (n=365)	Male	260	71.2
	Female	105	28.8
Age group (n=365)	26-35	44	12.1
	36-45	203	55.6
	46-55	94	25.8
	56-65	22	6.0
	65-75	2	.5
Field (n=361)	Clinical	181	50.1
	Basic Science	180	49.9
Academic rank (n=365)	Full Professor	21	5.8
	Associate Professor	95	26.0
	Assistant Professor	192	52.6
	Lecturer	57	15.6
Type of university (n=367)	Type One	211	57.5
	Type Two	127	34.6
	Type Three	29	7.9

The majority of researchers 260 (71.2%) who responded to the survey were males. It should be noted that 76.17% out of 5970 target population were male; therefore the proportion of male respondents was justifiable. A considerable number of researchers (203 or 55.6%) were in the age range between 36-45 years. The lowest number of researchers based on age groups was on two categories of 56-65 with 22 (6%) researchers and 65-75 with 2(0.5%) researchers. All researchers' academic backgrounds were related to biomedical sciences, including clinical/basic science. As for the 'field of study, the proportion for both clinical/basic science was the same. As regards to the academic rank of researchers, the majority was at Assistant Professor Level (52.6%) and a minority was Full Professors (5.8%). As mentioned in the previous chapter, medical universities in Iran were

ranked in three types. More than half (57.55) of researchers were from medical schools of Type One universities. Only 29 (7.95%) of researchers were from Type Three universities. The researchers' institutions were public medical universities and their related hospitals or clinics.

4.3.3 ICT Background of Facilities

The data on researchers' ICT background and facilities such as Internet access and supporting staffs, their access to computer and Internet and finally possession of e-mail, personal Websites and weblogs are presented in following sub-sections.

4.3.3.1 Internet Connectivity

In order to find out more about researchers' Internet connectivity, they were asked to mark one of the two options (yes and no) on whether they had connectivity. Table 4.3 shows the results for this question. A significant number 306 (85.2%) of researchers mentioned that relatively high speed Internet connectivity was provided, while a minority of 53 (14.8%) indicated that it was not provided.

Table 4.3: Internet Connectivity

Internet connectivity	Response	Frequency	Percentage
	Yes	306	85.2
Relatively high speed Internet connectivity has provided	No	53	14.8
Total		359	100

4.3.3.2 Supporting ICT Staff

In order to explore whether there was specific staff to assist researchers with difficulties in the system, a statement with two response options was provided and

researchers were asked to mark the proper response. As the data in Table 4.4 indicates, a total of 250 (70%) marked a “yes” option and 107 (30%) marked a “No” option.

Table 4.4: Availability of Specific Staff for Assistance

Assistant staff	Response	Frequency	Percentage
Availability of staff for assistance	Yes	250	70.0
	No	107	30.0
Total		357	100

4.3.3.3 Access to ICT

In order to examine the current status of access to ICT, researchers were asked to mark the option if they had access to computer, Internet as well as e-mails, personal Websites and weblogs. Table 4.5 indicates results for this issue.

Table 4.5: Crosstabulation of ICT Access and Type of University

ICT access	Type of university				
	Type One (n=211)	Type Two (n=127)	Type Three(n=29)	Total (n=367)	Total (%=100)
Access to Internet	209	123	29	361	98.4%
Access to PC	203	117	26	346	94.3%
I have email	204	119	27	350	95.4%
I have website	22	7	1	30	8.2%
I have weblog	10	9	0	19	5.2%

A great majority of researchers had access to computers, Internet, and had e-mail accounts while only 8.2% of them had personal websites and 5.2% had weblogs. As data of table 4.5 shows, there is no wide gap in accessing to Internet and PC as well as having e-mail among researchers based on three types of universities. Also considering the number of researchers in each type of university, there is no wide gap between three types of

universities in terms of having website and weblog. However, in general, low number of researchers has website and weblog.

4.3.4 Familiarity and Experience with Open Access

The familiarity of medical researchers with terms, initiatives and services of open access and their experience with open access is elaborated in the subsequent seven sub-sections.

4.3.4.1 Familiarity with Terms, Initiatives and Services of Open Access

Thirteen terms, initiatives and services that are well-known in the biomedical area or in general, were presented to the researchers and were asked to tick if they were familiar with the provided list. Table 4.6 shows the frequency and percentage distributions of familiarity with these terms which are ordered from highest to lowest.

Table 4.6: Familiarity with Terms, Initiatives and Services of Open Access (n=367)

Terms, initiatives, and services	Frequency	Percentage
Pub Med Central(PMC)	174	47.4
Open access Journals	156	42.5
Bio Med Central(BMC)	137	37.3
Iranian open access journals	115	31.3
Directory of Open Access	80	21.8
Public Library of Science(PLoS)	77	21
Electronic Thesis and Dissertations	69	18.8
Author-pays model	62	16.9
Pre and post print	53	14.4
Self-archiving	45	12.3
Creative Commons	40	10.9
Institutional repository	37	10.1
Subject based repository	25	6.8

As shown in Table 4.6, the highest familiarity was with PubMed Central (47.4%) and the researchers' lowest familiarity (6.8%) was with subject-based repositories. Apparently, a majority of researchers were unaware that PubMed Central is a subject-based repository.

Although the health area in Iran is the first sector that provided open access to scholarly journals and is the most popular domain that had a majority of 41 out of 55 Iranian open access journals on 19 March 2010 based on data was available on DOAJ, only 31.33% of the medical researchers stated their familiarity with Iranian open access journals. Despite the reputation of terms such as PubMed Central, BMC, and PLoS in the biomedical area and open access journals and DOAJ in general, researchers showed low familiarity with these terms. The researchers were academic staff and some of them even had supervisory roles, and they were expected to be familiar with electronic thesis/dissertation (ETDs) databases, but they showed low familiarity with it. The overall level of familiarity with terms, initiatives and services of open access among medical researchers was less than 50%. In general, in all 13 terms, initiatives, and services of open access, the number of researchers familiar with the subject was less compared to the unfamiliar ones. It can be concluded that there was low familiarity with terms, initiatives and services of open access among researchers responding to this study.

This finding was in line with several previous studies (Tarrago & Molina, 2008; Hess et al., 2007; Ghane, 2006; Schroter & Tite, 2006; Wang & Su, 2006; Beer, 2005; Ouya & Smart, 2005; Schroter, Tite & Smith, 2005; Pelizzari, 2003) that reported low familiarity with open access terms, initiatives and services. A possible explanation for the low familiarity perhaps is that the open access movement's terms and initiatives emerged in developed countries, such as the United Kingdom and the United States and, consequently it is mainly authors in these countries who are aware and familiar with these

terms which originated from their native language (Tarrago and Molina, 2008). Moreover, it could also be that scientists and scholars were too busy with their research work to know what open access was all about (Suber, 2004).

4.3.4.2 Way of Knowing about Terms, Initiatives and Services of Open Access

Researchers were asked to indicate how they knew about these terms and initiatives of open access. They were asked to mark more than one option if necessary. Table 4.7 show results of this question.

Table 4.7: Way of Familiarity with Terms and Initiatives of Open Access (n=367)

Options	Frequency	Percent
I discovered them on Internet	262	71.4
I discovered them in my discipline literature	127	34.6
By colleagues	111	30.2
Others (please specify)	24	6.5
Specified (Workshop)	15	4.1

A majority of researchers (71.4%) indicated that they discovered them on Internet, follow by 34.6% and 30.2% respectively who found them in their discipline literature and through colleagues. In addition, a small percentage marked the “others” option, of this group 4.1% pointed out that they had been informed about the provided list in workshops. Unfortunately “workshops” as an option was not included in the survey questionnaire. It should be mentioned that due to the possibility of marking more than one option, the responses indicate a rather cascading hierarchy of preference rather than one option being the most preferred when compared to others.

The results suggested that using the Internet could be the best way to create awareness about open access among researchers. This finding was rather different from findings by Coonin & Younce (2010) who reported that 43.4% of the researchers became

aware of open access publishing through colleagues, 39.3% via searching the Internet, 33.3% through their professional societies and 20.1% through their institution and institution's library. However, the finding of this study regarding awareness through colleagues was in line with the findings of Nariani & Fernandez (2010) who reported that recommendation of colleagues was one way to know about open access journals.

4.3.4.3 Current Status of Experience with Open Access

In terms of experience, the present study briefly explored three issues; first, experience with open access services as author and reader, second, submitting an article to open access journals and third, self-archiving a pre/post-print in an archive.

In order to find out whether researchers had experience with open access services, they were asked to mark the options if they had used the services before as author or reader. Table 4.8 shows the results of this query.

Table 4.8: Experience with Open Access Services (n=367)

Open access services	Use as	Frequency	Percentage
Open access journals	author	100	27.2
	reader	214	58.3
Iranian open access journals	author	68	18.5
	reader	139	37.9
Directory of Open Access Journals(DOAJ)	author	15	4.1
	reader	65	17.7
Bio Med Central(BMC)	author	66	18
	reader	163	44.4
Public Library of Science(PLoS)	author	21	5.7
	reader	66	18
PubMed Central	author	121	33
	reader	263	71.7

Numbers in bold represent usage as readers, in all six categories, open access journals (214), Iranian open access journals (139), DOAJ (65), BMC (163), PLoS (66) and

PubMed Central (263) the number of researchers who had used these services to access information was more than that of the researchers who had used these services as authors.

It can be concluded that open access services are used more as an accessing media rather than publishing ones. This finding was in line with the findings of several prior studies (Gul, Shah & Baghwan, 2010; Minish-Majanja & Cloete, 2010; Hess et al., 2007; Mann et al., 2008; Tarrago & Molina, 2008; Beer, 2005) that reported the use of open access journals as being more for accessing than a publishing channel. One possible explanation for this result was that most of the researchers were readers of research findings but only some of them were providers of it. Furthermore the ease of access to free content was extremely convenient for researchers, which was likely to be one of the reasons for high access to open access content.

Table 4.9 indicates the frequency and percentage scores of responses regarding a manuscript to open access journals. The results indicated that almost half (47.7%) of the researchers had not submitted manuscripts to open access journals. One possible reason for low manuscript submission to open access journals was the low familiarity with open access, which found in the present study.

Table 4.9: Manuscript Submission to Open Access Journals

Manuscript submission	Frequency	Percentage
Submitted	192	52.3
Not-submitted	175	47.7
Total	367	100.0

4.3.4.4 Funds Used to Cover Publishing Costs in Open Access Journals

Researchers were asked to indicate if they had published in open access journals, how they obtained funds to cover publishing costs. It should be noted that respondents could mark more than one option. The results for this question are presented in Table 4.10.

Table 4.10: Funds to Cover Publishing Cost in Open Access Journals

Options	Frequency	Percentage
It was free	64	34.4
Personal funds	51	27.4
Institutional funds	31	16.7
Research grant	31	16.7
Mixed of options	9	4.8
Total	186	100.0

The findings indicate that a total of 186 or 50.7% of the researchers had published in open access journals. About 34.4% of these researchers had published in open access journals which are free of charge. Approximately 27.4% used personal funds to cover publishing cost. Both research grants and institutional funds were used to cover publishing costs of open access journals by 16.7% of the researchers in each case. This lack of financial support from research grant and institutional funds may be one reason for low submission to open access journals in addition to low familiarity.

Similar to this study, Coonin & Younce (2010) found that among the respondents who had published in open access journals, 26.9% said they had paid a publishing fee, 31% said their funding agency or institution paid for it. Also Swan and Brown (2004) found that overall, 42% of the researchers had financial support in some way and only 4% of the authors paid through personal budgets. The comparison of results for three studies indicated that respondents of Swan and Brown (2004) had more financial support and used less of their personal budget to pay publishing fee. As regards payment of publishing fee by authors Schroter and Tite (2006) reported that over half (56%) of the respondents thought they would have to make a contribution or pay the full cost of an author charge. However, in the present study, researchers were asked who paid the publishing fee, and not who should pay it.

4.3.4.5 Experience of Archiving Pre/Post-print

Researchers were asked to indicate whether they had any pre/post-print archiving experience in a publicly accessible website. Table 4.11 indicates the results for this issue.

Table 4.11: Archiving Experience

Archiving pre/post print	Frequency	Percentage
Archiving post-print in publicly accessible Website(n=359)	60	16.7
Archiving pre-print in publicly accessible website(n=360)	16	4.4

The results indicate that only 4.4% of the researchers had pre-print experience. Also, only 16.7% of the researchers had post-print archiving experience. The findings of this study indicated that archiving pre/post-print in publicly accessible websites was not a widespread practice among researchers. Low archiving experiences of researchers matched with their low familiarity with the terms such as pre/post-print, self-archiving, institutional repository, and subject-based repository. This result was expected, because there were no institutional repositories for the studied medical universities based on the Directory of Open Access Repository (DOAR)¹ and Registry of Open Access Repository (ROAR)² at the time this research was carried out (2009).

It should be noted that automation software was provided by a majority of medical universities to archive the outputs of their academic staff in their accounts in university

¹ . Directory of Open Access Repositories (DOAR) is a project to list and categorize academic open access research repositories. OpenDOAR: Frequently Asked Questions, URL: <http://www.opendoar.org/faq.html> [Viewed April 15, 2010].

² . Registry of Open Access Repositories (ROAR) aims to promote the development of open access by providing timely information about the growth and status of repositories throughout the world. It started in 2004 by Tim Brody and hosted by university of Southampton. Registry of Open Access Repositories (ROAR), URL: <http://roar.eprints.org/> [Viewed April 15, 2010].

websites. However, archiving was not mandatory and more important these archives were not based on metadata-tagging protocol in order to make them interoperable in a seamlessly searchable archive.

Archiving of post-print was more common than pre-prints. A possible explanation for this was that, researchers may have had concerns to archive their work, before officially publishing it in a journal. Similar to this study, Swan and Brown (2005) found that post-prints were deposited more frequently than preprints. However, the proportion of researchers, who had self-archived in their study was quite high (49%), compared to this study (16.7%). Additionally, several studies (Coonin & Younce, 2010; Rowlands, Nicholas & Huntingdon, 2004; Pelizzari, 2003) reported low archiving in open access repository. However, this study did not include a questionnaire item regarding archiving venues such as website of researcher, department website, institutional repository, etc.

4.3.4.6 Willingness to Archive in Institutional Repository

Respondents were asked whether they would archive their output in institutional repository, if their university set up such a facility in the future. For the purpose of clarification, a short definition of institutional repository was provided in the questionnaire. Table 4.12 shows the frequency and percentage results regarding this topic.

Table 4.12: Willingness to Archive

Willingness to archive	Response	Frequency	Percentage
If your university set up an institutional repository, would you deposit your work in it?	Yes	257	71.0
	No	31	8.6
	I don't know	74	20.4
	Total	362	100.0

Despite, low familiarity of researchers with terms such as self-archiving and institutional repository, a majority of them (71%) expressed their willingness to deposit

their works into their institutional repository, if it was provided by their respective universities. The provided definition in the questionnaire regarding institutional repository was probably effective in identifying its characteristics for researchers and promoting them to archive in the future. Only 8.6% % of the researchers declared that they would not archive in the future. This suggests that there were good prospects for the future development of universities' institutional repositories. Like the present study, Swan & Brown (2005) found that a majority of researchers (81%) would willingly archive copies of their articles in an open access archive if it was a mandate from their employer or research funder. Rowlands, Nicholas & Huntingdon (2004) indicated that more than half (55%) of the respondents said that they might deposit their work in the future while 15% said that they did not deposit and would not do it in the future too. Pelizzari (2003) found that only 6.4% of the respondents expressed their willingness to participate in an open access archive without any condition, but a majority (61%) of the respondents indicated that they would archive if the conditions they requested were fulfilled.

4.3.4.7 Voluntary/Mandatory Use of Open Access

Researchers were asked to indicate whether publishing in open access journals or archiving in institutional repository should be voluntary or mandatory. The results are presented in Table 4.13.

Table 4.13: Voluntary/Mandatory Use of System

Voluntary/mandatory use	Response	Frequency	Percentage
Publishing in open access journals should be n=364	Voluntary	358	98.4%
	Mandatory	6	1.6%
Archiving in open access archive should be n=360	Voluntary	314	88.3%
	Mandatory	42	11.7%

A larger majority of the researchers 358 (98.4%) believed that publishing in open access journals should be voluntary. Similarly, a majority of researchers 314 (88.3%) believed that archiving in an institutional repository should be voluntary. In terms of voluntariness and compulsoriness of archiving, researchers almost had the same ideas. However universities can promote use of open access among researchers through publicizing its advantages or to consider publishing in open access journals and archiving in institutional repositories for career benefits.

4.3.5 Factors Influencing Acceptance of Open Access Publishing

Before conducting any statistical analysis on a Likert scale measurement to answer the second research question and its sub-questions, the validity, reliability and normality of these items was evaluated. After conducting these assessments, 51 statements on a seven-point Likert scale were used to measure acceptance level of open access publishing in eight dimensions including attitude, performance expectancy, facilitating conditions, effort expectancy, anxiety, concerns with author-pays and intention. The mean score was utilized to indicate ranking of factors, hierarchical multiple regression was used to determine the influential factors in the acceptance of open access journals and multiple regression analysis was used to determine the moderating roles of demographic variables. The results for assessment of quality of data are presented in following sections.

Validity (Construct Validity): An exploratory factor analysis was used to test construct validity through convergent validity. The various dimensions in the acceptance of open access publishing were included in the research framework. These dimensions were identified based on the literature related to each construct which was included in the framework of the study. The results of factor analysis are presented in Table 4.14.

Table 4.14: Factor loading (validity)

Indicators	Attitude	PE	EE	SI	FC	Anxiety	CAP	Intention
Attitude Q7	.828							
Attitude Q6	.796							
Attitude Q5	.786							
Attitude Q4	.732							
Attitude Q2	.651							
Attitude Q3	.651							
Attitude Q1	.527							
PE Q6		.825						
PE Q5		.819						
PE Q7		.767						
PE Q4		.759						
PE Q1		.617						
PE Q2		.604						
PE Q3		.526						
EE Q1			.833					
EE Q2			.832					
EE Q3			.825					
EE Q5			.807					
EE Q6			.769					
EE Q4			.749					
SI Q2				.833				
SI Q3				.821				
SI Q5				.790				
SI Q1				.732				
SI Q8				.724				
SI Q6				.691				
SI Q4				.686				
SI Q7				.660				
FC Q6					.787			
FC Q7					.784			
FC Q5					.759			
FC Q4					.752			
FC Q8					.721			
FC Q10					.719			
FC Q9					.719			
FC Q1					.696			
FC Q2					.687			
FC Q3					.670			
Anxiety Q8						.816		
Anxiety Q5						.809		
Anxiety Q7						.807		
Anxiety Q6						.726		
Anxiety Q9						.671		
Anxiety Q4						.543		
Anxiety Q3						.536		

Table 4.14, continued

Indicators	Attitude	PE	EE	SI	FC	Anxiety	CAP	Intention
Anxiety Q1							.801	
Anxiety Q2							.725	
Anxiety Q10							.561	
IntentionQ1								.960
IntentionQ2								.885
IntentionQ3								.855
Kaiser-Meyer-Olkin(KMO)				.833				
Eigenvalue	3.599	3.538	3.871	4.436	5.334	3.812	1.604	2.435
% of variance	51.421	50.538	64.515	55.447	53.339	54.457	53.454	81.179

PE (Performance Expectancy), EE (Effort Expectancy), SI (Social Influence), FC (Facilitating Conditions), CAP (Concerns with Author-Pays)

Overall, 71 seven point Likerts scale statements composed of seven constructs were used for factor analysis. Bartlett's Test of Sphericity was significant, $\chi^2 (1275) = 9307.69$, $p < .0001$, and Kaiser's measure of sampling adequacy was .833. According to Kaiser (1974) KMO value > 0.8 was meritorious. Both tests indicated that the data was suitable to carry out the factor analysis.

In the present study, a loading of .5 was used as the cutoff point in factor loading. According to Hair et al. (2010) loading $\pm .50$ or greater were considered particularly significant. Out of 71 indicators, overall 51 measures that loaded above 0.5 in eight constructs were retained. Factor loading indicates the strength of the relationship between the item and the latent construct and thus, is used to ascertain the convergent validity of the scales.

A principal components extraction method was used for exploratory factor analyses. Using varimax rotation, seven items were extracted in attitude, seven items in effort expectancy, eight items in social influence, seven items in performance expectancy, ten items in facilitating conditions, and three items in intention. Anxiety construct was loaded in two factors; seven items were loaded in the first factor that was called anxiety

and three items that were about concerns with author-pays were loaded in the second factor. Due to the importance of these three items, a decision on retaining them as a different construct which was called concerns with author-pays was made. Items in each construct explained a total variance of over .50 for each factor. According to Netemeyer, Bearden & Sharma (2003) the number of factors extracted should account for 50% to 60% of the variance in the items and that was necessary for any one factor to be meaningful. Therefore, convergent validity for the measurements of this study was met.

Reliability of Factors: For this study, the Cronbach alpha reliability test for the 51 Likert scale statement was performed using eight sections (attitude, performance expectancy, anxiety, concerns with author-pays, social influence, facilitating conditions, effort expectancy and intention to use) which were completed by 367 respondents. The results for Cronbach alpha are presented in Table 4.15.

Table 4.15: Cronbach Alpha Values

Factors	N. of items	Cronbach's alpha	N
Attitude	7	.833	354
Performance Expectancy	7	.818	353
Anxiety	7	.858	355
Concerns with Author-Pays	3	.562	365
Social Influence	8	.883	352
Facilitating Conditions	10	.902	348
Effort Expectancy	6	.886	360
Intention to use open access journals	3	.882	342
Overall alpha		.828	

The resulting Cronbach's alpha value for seven variables was over .80. According to Gliem & Gliem (2003) alpha .80 is good and for Vogt (2007) an alpha of .70 or higher is often considered satisfactory for most purposes. Only, one variable (concerns with author-pays) which had only three items, obtained an alpha of .56. Although an alpha value of .56 is poor according to Gliem & Gliem (2003), the interpretation of alpha depends on the

number of items. The greater the number of items the higher the alpha coefficient needed to indicate adequate internal consistency. For a three-item scale an alpha coefficient of .5 might be regarded as quite sufficient to consider (Bradley, 1994). Therefore, because of Cronbach's alpha reliability coefficient none of the questionnaire items were deleted from their respective sub-scales.

Normality of Distribution: Kurtosis and skewness tests were used to evaluate the normality of measurements in order to do parametric statistics. According to George & Mallery (2005) a value between ± 2.0 for both kurtosis and skewness measures was acceptable. In the present study, as the data in Table 4.16 indicates, kurtosis and skewness for Likert scale factors showed that the condition of normality was satisfactory.

Table 4.16: Normality of Distribution (Kurtosis and Skewness)

Factors	Kurtosis	Skewness
Attitude	-.410	-.329
Performance Expectancy	-.150	-.284
Anxiety	-.271	-.073
Anxiety with Author-pays	-.456	-.066
Social Influence	-.314	-.238
Facilitating Conditions	-.390	-.611
Effort Expectancy	-.373	-.561
Intention to use open access journals	.218	-.610
Use of open access journals	-1.393	.544

4.3.5.1 Primacy of the Proposed Factors

In order to explore the primacy of proposed factors, researchers were asked to indicate their level of agreement or disagreement with 51 statements on a seven-point Likert scale. The number of cases, mean scores, rank and maximum/minimum for each factor are presented in Table 4.17. The first section of table shows independent variables (IVs) and the second section indicate dependent variables (DVs) of the present study.

Table 4.17: Primacy of Factors based on Mean Scores

	Rank	Variable	No of items	Mean	Min/Max
Independent variables (IVs)	1	Facilitating conditions	10	5.98	1-7
	2	Effort expectancy	6	5.88	1-7
	3	Performance expectancy	7	5.42	1-7
	4	Attitude	7	5.26	1-7
	5	Concerns with author-pays	3	4.89	1-7
	6	Social influence	8	4.46	1-7
	7	Anxiety	7	4.27	1-7
Dependent variables (DVs)		Intention to use open access journals	3	5.15	1-7
		Use of open access journals	1	1.76	0-5

Based on mean scores of the factors, the most important factors were ranked as facilitating conditions, effort expectancy, performance expectancy, attitude, concerns with author-pays, social influence and anxiety. Due to the agreement of a majority of researchers with all seven factors, at a descriptive level, these factors were incentives for researchers in using the system. It should be noted that in this the negative end of anxiety and concerns with author-pays was assessed, therefore these factors based on mean their scores were relatively important barrier in acceptance of open access journals.

Out of the 51 statements, 10 were regarding facilitating conditions, eight about social influence, seven statements were used to determine attitude, seven statements dealt with performance expectancy, seven were concerned with anxiety, six assessed effort expectancy, three were related to author charge, and three statements evaluated intention to use open access journals. In addition, use of open access journals was measured with one ratio indicator.

The findings for each variable are explained in the text and in the tables that follow indicating user responses on a seven-point Likert scale next to each statement. The mean

score was used to rank the statements for each factor. The mid-point of seven-point Likert scale was identified as being 4.00. Therefore, if the mean score was below 4.00 it was classified as being of low priority. A value between 4.01 and 5.00 was classified as relatively important. Mean score between 5.01 and 6.00 was classified as important and a value between 6.01 and 7.00 was classified as highly important.

4.3.5.1.1 Facilitating Conditions

The facilitating conditions in this study are defined as the degree to which a researcher believes that the existence of requirements (organizational and technical infrastructure) influences acceptance of open access journals. In order to measure this variable, researchers were asked to indicate the level of agreement or disagreement with 10 Likert scale statements. Table 4.18 indicates mean scores for 10 indicators of facilitating conditions.

Table 4.18: Facilitating Conditions

Rank	Indicators	N	Mean
1	Provision of high speed Internet connectivity to use open access	361	6.09
2	Having necessary knowledge to use open access system	362	6.06
3	To be enough good quality open access journal to publish in	362	6.05
4	Supporting open access journals by evaluation committees	359	6.04
5	Considering open access journals by academic reward system	360	6.03
6	Paying publishing fee of open access journals by university	359	5.99
7	To have sufficient ICT skill to use open access channel	360	5.98
8	Awareness the advantages of open access by university	360	5.96
9	Paying publishing fee through institutional membership	359	5.90
10	Existence of specific staff to assist with system difficulties	361	5.78
Overall mean			5.98

The overall mean for the 10 statements that measured the facilitating conditions was 5.98 (the highest mean score among seven factors), which was evaluated and regarded as an important factor. All 10 indicators had their mean scores over the cutoff point of 4.00. The mean score for the first five statements was over 6.01 which indicate that these

cases were highly important in using the system. The other five statements had their mean score over 5.01, which was a sign of importance of these indicators. In general the mean score for the 10 statements were close to each other, which suggested that the majority of researchers had the same opinions about the importance of this factor. The statements that high speed Internet connectivity influenced researchers in the use of open access journals, obtained the highest mean score of 6.09. Also the statement that the existence of a specific person/s to assist with system difficulties could influence acceptance of open access journals obtained a mean score of 5.78, which was the lowest mean score among the 10 indicators.

The findings of this study indicated that Internet connectivity as a first priority and knowledge of open access as a second priority were two highly important facilitating conditions in using open access journals. Also the existence of sufficient ICT skills as well as specific staff to assist with system difficulties were two important conditions in the use of system. The results suggest that these facilitating conditions were essential in the use of open access journals. Thus, it seems that in order to fully achieve the benefits of open access, facilitating and promotional requirements should be fulfilled by respective universities.

These findings were inline with the findings of Park (2007) which indicated that researchers supported positive influence of technological advantages on the intention to adapt open access publishing. Also this finding was consistent with the findings of Hess et al. (2007) which reported the importance of technical requirements such as IT-infrastructure, Internet access, necessary software and existence of sufficient knowledge to publish in open access journals. Furthermore this finding was in line with the findings of Dulle, Minish-Majanja & Cloete (2010) that reported insufficient searching skills and inadequate online publishing skills as a barrier in the use of open access. Also the findings

of Goodman (2004) emphasized the importance of computer availability, computer literacy, and the knowledge of how to use search engines effectively in order to use open access. Moreover these findings support findings of several former studies (Barbour & Patterson, 2006; Wang & Su, 2006; Ouya & Smart, 2005; Beer, 2005; Bjork, 2004) which reported lack of information technology such as availability of Internet connectivity or low speed of Internet and computer availability as hampering the use of open access.

Although the findings from this study indicated that according to 85.2% of the researchers, relatively high speed Internet was provided. However, due to highly importance of provision of high speed Internet according to researchers in this study, fulfillment of this condition is essential. It should be noted that although Internet usage in developing countries increased since 1998 to 2009, its usage is still lower than in developed countries and the world at large (based on data available online at <http://www.itu.int>). Therefore, technical and personal requirements needed to be met in order to undertake open access publications.

Moreover, results from the present study indicated that over 94% of the researchers had access to computers, Internet, and also had e-mail accounts, while only 8.2% of researchers had personal websites and 5.2% had weblogs. A possible explanation for this low percentage could be lack of enough computer skills.

The findings of the study indicated that publishing in open access journals should be considered by evaluation committees and academic reward system for career benefits as both would motivate researchers in the use of the system. These findings were similar to the findings by Kingsley (2008) and Park & Qin (2007) which showed that career benefits were one of important factors in the acceptance of open access publishing.

Results of this study also suggested that the existence of high quality open access journals was an incentive in the acceptance of these journals. However, in general, quality

was a more important factor than being Open Access. However, probably if a journal was of high quality and at the same time was of an open access model, then it would be adapted by more researchers.

The outcome of this study in the table 4.18 also showed that the payment of publishing fee by universities was a motivation in using the system (mean score of 5.99). Furthermore, although this system was named author-pays, but infact, it was expected that authors' institutions, grant bodies or somebody other than the author, should pay the publishing fee. This finding was comparable with prior studies (Wang & Su, 2006; Swan & Brown, 2004) which reported that authors should not pay publishing fees. For the respondents of Swan & Brown (2004) if a fee had to be paid, it should come from their research grant and according to respondents of Wang & Su (2006) it should come from funding bodies, institutions of researchers and for other few respondents it should be paid by government. Also Schroter, Tite & Smith (2005) reported that for some respondents, charges would be acceptable if grant agencies and universities agreed to support the authors. However, the financial support of authors depended upon the keenness of institutions and grant awarding bodies to allow their funds to be used for this purpose. Although open access journals may provide free and easier access to full texts of scholarly outlet which is very attractive for the medical researchers in Iran as readers they may be less interested in publishing through these journals due to high publishing fees of the most high quality ones as well as lack of financial support. The author-pays model was rather accepted in those countries, where the publishing fee was not paid directly by authors. For many researchers in developing countries like Iran, however, this model may be less acceptable because of conducting research often without substantial grant funding. For instance, a finding of this study indicated that out of 186 researchers who published in open access journals, only 62 had financial support. Furthermore, the payment amount of

publishing fee sometimes was unaffordable for both institutions and authors in developing countries.

The results (mean score of 5.90) of the study indicated that institutional memberships with high quality open access publishers like BMC and PLoS was a motivation for researchers in using the system. However, researchers' requests were the main drive in initiating institutional memberships with open access publishers. The institutional memberships with open access publishers could be organized on a trial basis before making long-term decisions.

The results (mean score of 5.96) of study suggested that awareness about open access and its advantages was important for researchers understand and learn how to publish their works through this way. Several previous studies (Tarrago & Molina, 2008; Ghane, 2006; Foster & Gibbons, 2005; Schroter, Tite & Smith, 2005; Suber, 2004; Swan & Brown, 2004; Rajashekar & Jayakanth, 2004) suggested that lack of awareness was one of the reasons for not publishing in these journals. However, it was argued that open access and its ability needed to be fully backed by policy makers in the scholarly publishing field. Then, they (policy makers) could introduce, create awareness and support it by means of workshops or providing promotional conditions such as considering it for career benefits and facilitating conditions such as ICT facility.

4.3.5.1.2 Effort Expectancy

Effort expectancy in this study was defined as the degree of ease, associated with the use of open access journals. In order to examine the importance of effort expectancy on acceptance of open access journals, researchers were asked to indicate the level of agreement and disagreement on six statements concerning this variable. Table 4.19 shows the ranking of statements based on their mean scores.

Table 4.19: Effort Expectancy

Rank	Indicators	N	Mean
1	Free availability	363	6.20
2	Easy access for developing countries	363	6.18
3	Ease of access	360	6.06
4	Ease of electronic submission	363	5.72
5	Ease of recognition these journals	363	5.58
6	Ease of publishing	363	5.56
Overall mean			5.88

Overall the mean for effort expectancy was 5.88 (the second highest mean score among all factors), which was regarded as an important factor. The mean scores for all the indicators were over the cutoff point of 4.00. The first three indicators obtained mean scores of over 6.00, which was a sign of high importance and the other three obtained mean scores of over 5.01 which indicated that these measures were important according to researchers. The mean scores of indicators were quite close to each other and there was only a small gap between the highest (6.20) and the lowest (5.56) mean scores.

Based on the over all mean score for effort expectancy, it can be concluded that ease of using the system was important in the acceptance of open access journals. This finding was in line with the findings of Dulle, Minish-Majanja & Cloete (2010) which identified effort expectancy at a descriptive level as a positive factor in the acceptance of open access.

The results show that the highest mean score, 6.20 was for the statement that free availability of articles for all readers via the web was one of the main reasons that motivated researchers to use open access journals. This result supported findings of other previous studies (Dulle, Minish-Majanja & Cloete, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Park & Qin, 2007; Nicholas, Jamali & Rowlands, 2006; Wang & Su, 2006; Barbour & Patterson, 2006; Schroter, Tite & Smith, 2005) which pointed out the importance of ease of access and free access to full texts of articles in open access journals.

Also, this finding was in line with findings of Tarrago & Molina (2008) and Swan & Brown (2004) which showed that access of all readers to open access journals was a main reason to publish in these journals. However, this finding was inconsistent with the findings of Schonfeld & Housewright (2010) which found that free online accessibility had the lowest priority for respondents in their journal selection in which to publish.

Easy access to research findings for researchers in developing countries with mean score of 6.18 was the second priority of effort expectancy. This result suggested that easy access of researchers in developing countries to open access materials was highly important motivation for researchers of the present study in acceptance of open access publishing. This finding was in agreement with findings of Hess et al. (2007) which suggested that a great majority 92% of respondents agreed with easy access to research results for researchers in developing countries as an advantage for open access publications. Similarly, the findings of Mann et al. (2008) found that 94% of the respondents agreed that open access publishing would be helpful in granting better access to developing countries. Also respondents to Ouya & Smart (2005) study stated that open access was important in terms of benefits to the global scientific community and the world in general.

Ease of electronic submission with mean score of 5.72 and ease of recognizing suitable open access journals with mean score of 5.58 were two important incentives for researchers in using the system. However, electronic submission was an attribute that was common in both open access and subscription-based electronic journals.

The statement that ease of learning about how to publish in open access journals influenced researchers to use these journals obtained a mean score of 5.56. Although this was the lowest mean score, it still was an important motivation for researchers to use the

system. This finding was similar to the finding by Hess et al. (2007) which concluded that it was easy to learn about how to publish in open access journals.

Also in this study, the indicators that represented effort expectancy from the point of view of researchers as readers (free availability, easy access and ease of access) obtained higher precedence than the indicators that represented researchers' role as authors (ease of electronic submission, ease of recognizing open access journals and ease of publishing). Besides, this finding supports other findings of the present study where it found that researchers used open access services more for accessing than publishing purpose. An explanation for this result could be that likely accessing to open access media was more easier than publishing through this channel. According to Dulle, Minish-Majanja & Cloete (2010) designing user friendly open access platforms for ease of publishing could be efficient in this regard. Generally, the results of the present study suggested that ease of use associated with open access could motivate researchers to use the system.

4.3.5.1.3 Performance Expectancy

The performance expectancy in this study was defined as the degree to which a researcher believed that using open access would help him or her to improve in job performance. Seven statements on a seven-point Likert scale were used to assess the performance expectancy. The data in Table 4.20 show the mean scores of researchers' response regarding performance expectancy.

Table 4.20: Performance Expectancy

Rank	Indicators	N	Mean
1	Faster and wider dissemination	365	5.94
2	Greater exposure	365	5.84
3	Indexing in search engines	362	5.79
4	Larger readership	364	5.55
5	Higher H-index	360	5.14
6	More citation	365	5.06
7	To obtain copyright	360	4.61
Overall mean			5.42

The overall mean score of the seven statements for performance expectancy was 5.42 (the third important factor), which indicated that performance expectancy was an important factor for researchers. All indicators had their mean scores over the cutoff point of 4.00. The first six indicators obtain mean scores over 5.01, which indicated these measures were important for researchers. There is a wide gap between the highest (5.94) and the lowest (4.61) mean scores. To obtain a copyright for the work in an open access system was regarded as relatively important.

The highest mean score of 5.94 was for the statement that faster and wider dissemination through the Web was the main reason to use open access journals. It can be concluded that this attribute of open access was important for researchers in using the system. This finding was similar to the findings of several previous studies (Coonin & Younce, 2010; Nariani & Fernandez, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Barbour & Patterson, 2006; Wang & Su, 2006; Ouya & Smart, 2005; Schroter, Tite & Smith, 2005; Swan & Brown, 2004; Krichel & Warner, 2002) that reported outstanding ability of open access in terms of fast and wide dissemination of research materials.

One of the findings of the present study indicated that greater exposure to open access journals was an important motivation (with mean score of 5.84) for researchers in

using this media. This finding was in line with some studies (Park, 2007; Warlick & Vaughan, 2007; Ouya & Smart, 2005; Scaria, 2003; Johnson, 2000) whose respondents reported that greater visibility of open access outlets had encouraged them to use the system.

Publishing in open access means an article would be indexed and therefore would be accessible via search engines. This feature of open access was important (with mean score of 5.79) for researchers and could be an incentive in using these journals. However, a key point for efficient indexing of open access material was the success of the OAI-Protocol for Metadata Harvesting (Bjork, 2004). Open access outputs that use OAI-Protocol for Metadata Harvesting are retrievable web wide through search engines. Google, for example, has an indexing and retrieval system that makes it possible for anyone to find and retrieve information for users all over the world (Barbour and Patterson, 2006). However, as mentioned by Brody (2006) open access increases the use of research papers by increasing awareness which was possible through indexing in open access services. Also Lawrence (2001b) emphasized that only making an article online would not greatly improve access to that article; it must be indexed for better result.

In this study a larger readership of open access journals was an important (with mean score of 5.55) motivation to use these journals. This finding supports findings of previous studies (Nariani & Fernandez, 2010; Qiu, 2010; Mann et al., 2008; Tarrago & Molina, 2008; Hess et al., 2007; Ghane, 2006; Wang & Su, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2004) which indicated that respondents agreed about the potential of open access publications to reach a larger readership. However, a larger readership was the result of indexing open access outlets by search engines. Hence more visibility and free access lead to more readerships and therefore more citations. Furthermore, although an expert audience was an important factor for researchers in choosing a journal to publish in;

open access journals gave equal access for both expert and public readers to access scholarly outputs. This feature of open access was also in line with gap 10/90 that is imbalance in health research funding as well as The Millennium Development Goal (achieve universal primary education).

The h-index is used to calculate the impact and quality of individual scientists' research output (Meho, 2007). The result of the present study showed that to reach higher h-index as an incentive to publish in open access journal was important (with mean score of 5.14) for researchers. Also more citations were an important (5.06) reason for researchers in using system. Although more citations is one of the advantages of open access publishing (Norris, Oppenheim & Rowland, 2008; Brody, 2006; Eysenbach, 2006; Hajjem, Harnad & Gingras, 2005; Lawrence, 2001b), it did not mean that only being open access was enough to get citations. According to Swan (2010) a research work, in order to receive more citations should have the quality, relevance, originality and influence; otherwise it would get little or no attention from other researchers, even if they can be readily accessed. Moreover, considering that more citations lead to a higher impact factor, and then this finding was in line with the findings of some previous studies (Nariani & Fernandez, 2010; Coonin & Younce, 2010; Schroter, Tite & Smith, 2005) which reported that the impact factor was one of the most common considerations of the researchers in choosing a journal in which to publish. In general, authors were more concerned with the impact factor of the journal than being open access (Balaram, 2003). On the other hand, several other studies (Mann et al., 2008; Hess et al., 2007; Swan & Brown, 2004; Schroter, Tite & Smith, 2005) found that the low impact of open access journals had been a main reason for not publishing in these journals. In contrast, Tarrago & Molina (2008) reported that the impact factor of open access journals was a reason for some researchers to publish in open access journals.

Obtaining copyright of work, achieved the lowest primacy with mean score of 4.61. This advantage of open access journals was a relatively important reason for researchers to use these journals. The low priority associated with obtaining copyright in this study, was similar to the findings of Warlick & Vaughan (2007) which indicated that the retention of a copyright was an incentive for only a minority of respondents. Also findings of Coonin & Younce (2010) proved that retaining a copyright was not an important factor in deciding to publish in an open access journal. It was considered important by only 16.9% of the respondents. Probably, retaining a copyright would be considered important if the researchers were informed about its benefits.

4.3.5.1.4 Attitude

Attitude in this study was defined as the overall perception as well as positive and negative reaction of researchers toward open access system. Seven statements on a seven-point Likert scale were used to measure this factor. Out of the seven statements, three statements measured positive or negative attitudes towards open access and four statements measured the perception of researchers about open access. The data in Table 4.21 indicate mean scores of researchers' feedback on their attitudes towards open access.

Table 4.21: Attitude towards Open Access

Rank	Indicators	N	Mean
1	Open access is good idea	365	5.69
2	Greater visibility for work	365	5.56
3	Increase readership	364	5.53
4	I like working with the	365	5.48
5	Is valuable use of time	361	5.29
6	Offer greater impact for	362	4.85
7	Offer proper peer-review	360	4.41
Overall mean			5.26

The statement that using open access is a good idea, obtained the highest mean score of 5.69. The lowest mean score of 4.41 was for the statement that open access offers proper peer-review. It should be noted that the two indicators (greater visibility for work/increase readership) of the attitude factor were common with performance expectancy. However, in this section, the perception of researchers regarding these indicators was asked. In performance expectancy, respondents were asked to what extent these indicators were a motivation to use open access.

The overall mean score for attitude was 5.26, which was the fourth important factor. The results show that researchers had positive attitudes towards open access. Similar to this finding were several other previous studies (Dulle, Minish-Majanja & Cloete, 2010; Mann et al., 2008; Hess et al., 2007; Warlick & Vaughan, 2007; Ghane, 2006; Wang & Su, 2006; Rowlands, Nicholas & Huntingdon, 2004) which reported positive attitudes of respondents towards open access.

All statements had their mean scores above the cutoff point of 4.00. The first five indicators obtained mean score over 5.01, which was a sign of agreement of researchers about these measures. The other two indicators obtained mean scores over 4.01; hence the results suggested that researchers were relatively in agreement with them. There was somehow a gap between the highest (5.69) and two the lowest (4.85, 4.41) mean scores.

There were two indicators which directly asked about the researchers' attitude towards open access. The first one was, "using open access is a good idea" obtained the highest primacy with mean score of 5.69 and the second one, "I like working with open access system" get an important measure of attitude with mean score of 5.48. The comparison between the two mean scores suggested that open access in terms of thinking about it obtained a little bit more attention of researchers than the idea of working with the system itself.

The researchers agreed that open access provides greater visibility for one's research work. The result (mean score of 5.56) suggested that researchers recognized the role of open access in increasing the visibility of scholarly articles. This result was in line with the findings of several previous studies (Park, 2007; Warlick & Vaughan, 2007; Eysenbach, 2006; Ouya & Smart, 2005; Scaria, 2003; Johnson, 2000) which reported that open access increased visibility of research works via the Internet.

The notion that open access increases readerships was agreed upon by researchers. The result (mean score of 5.53) suggested that researchers acknowledged the role of open access in achieving larger readerships due to free access via the Internet. This finding was consistent with other findings of previous studies (Qiu, 2010; Mann et al., 2008; Hess et al., 2007; Ghane, 2006; Barbour & Patterson, 2006; Wang & Su, 2006; Schroter, Tite & Smith, 2005) which confirmed that reaching a broad readership was one of the important attributes of open access publications.

Using open access made valuable use of the time was agreed upon by the researchers. The result (mean score of 5.29) suggested that using open access saved time. Thus, researchers in their role as authors enjoy fast diffusion of their published work and in their role as readers had access to the most up to date research findings from other researchers all over the world.

Open access offers greater impact on one's work as a measure of attitudes was relatively agreed (mean score of 4.85) upon by researchers. The result suggested that although the majority of respondents thought open access offers greater impact, the idea was not fully accepted by all researchers. Some researchers thought open access materials get more citation while some had different view. An explanation for this was that when researchers consider the journals' impact factor principle alone, the fact was that most open access journals had not reached a high rating in their impact factor. On the other hand, due

to free access to all potential readers, open access journals expected to benefit from higher citation frequencies over time (Swan & Brown, 2004) which leads to higher impact factor. Similarly, regarding the citation rate of open access materials, a number of studies (Hess et al., 2007; Ghane, 2006) found that for respondents, open access publications had a higher citation rate. Also respondents for a study conducted by Ouya & Smart (2005) believed that open access would improve the impact of journals. However, most of the open access journals are new or only recently converted to the open access model; therefore, new open access journals with no or low impact factors would need to do more to reassure authors in this regard (Schroter, Tite & Smith, 2005).

In this study, the notation that open access journals offer proper peer-review was relatively agreed (with mean score of 4.41) upon by researchers. The result suggested that open access journals with poor quality control would need to do more to improve the class of their peer-review processes in order to encourage authors to use these journals. In summary, as stated by several earlier studies (Coonin & Younce, 2010; Warlick & Vaughan, 2007; Nicholas, Jamali & Rowlands, 2006; Wang & Su, 2006) conducting peer-review in open access journals is essential to ensure and improve the quality research outputs.

Findings of this study indicated that while researchers had positive attitudes towards open access, they had low publishing through this media. This finding was in line with the findings of some previous studies (Tarrago & Molina, 2008; Hess et al., 2007; Warlick & Vaughan, 2007; Beer, 2005; Schroter, Tite, & Smith, 2005) which indicated positive attitudes towards open access publishing, but low experience with open access journals.

4.3.5.1.5 Concerns with Author-pays

The concerns with author-pays in this study were defined as the degree of worries regarding author-pay that influence (hinder) acceptance of open access journals by researchers. In order to measure this variable, researchers were asked to indicate their level of agreement or disagreement within the three statements in this regard. The results are presented in Table 4.22.

Table 4.22: Concerns with Author-pays

Rank	Indicators	N	Mean
1	Charge of author	366	5.52
2	Misunderstanding by colleagues that publishing is only because of charge	366	4.82
3	Commercial vision	365	4.35
Overall mean			4.89

In general the mean score for this variable was 4.89, which was the fifth important factor out of seven. Result suggests that this factor was relatively important as a hindrance (factor) in the acceptance of open access system. All three indicators obtained a mean score over the cutoff point of 4.00. Only charge of author was evaluated and regarded as the important concern due to its mean score of over 5.01. The other indicators were evaluated and regarded as relatively important due to their mean scores of over 4.01. There was a gap between highest the (5.52) and lowest the (4.35) mean scores.

The highest mean score of 5.52 was for the statement that to have concerns with charge of author in open access journals was an obstacle in using open access journals. out of the three indicators, the worry about author charges was the most important concern for researchers in using open access journals. The result suggested that a majority of researchers considered author-pays as disincentive in the acceptance of open access journals. This finding was in line with the findings of several prior studies (Nariani & Fernandez, 2010; Schonfeld & Housewright, 2010; Tarrago & Molina, 2008; Park & Qin,

2007; Schroter & Tite, 2006; Nicholas, Jamali & Rowlands, 2006; Schroter, Tite & Smith, 2005; Rowlands, Nicholas & Huntingdon, 2004) which indicated that researchers were anxious about the author-pays aspect. Finding of this study in facilitating conditions section indicated that financial support for researchers was an important (with mean score of 5.99) incentive in publishing through open access journals. Considering such a result along with the result of concerns with author-pays (mean score of 5.52) measure which indicated the worry of researchers regarding author-pays, it can be concluded that to reduce this worry of researchers, they should be financially supported. However, researchers did not consider this indicator as a highly important concern for them. A possible explanation for this result could be that some researchers were able to publish in high quality open access journals despite the author-pays. This explanation was in agreement with the findings of Schroter, Tite & Smith (2005) where many respondents said they would probably continue to submit to journals they considered to be of high quality even if they charged authors. Also, this finding was in line with a statement by Bjork (2004) that in author charges models researchers may pay to top-level journals in its field. However, the quality of peer-review in open access journals was still questionable for some authors and institutions to spend big amounts of money to publish in these journals.

According to some researchers, the publishing fee in open access journals cause misunderstanding by some colleagues; for them (colleagues) acceptance of a paper in open access journals was only because of payment not its quality. This concern was a relatively important (with mean score of 4.82) concern for those might publish in open access journals. This finding was in line with finding of Schroter & Tite (2006) which reported that people thought anyone could publish if was able to pay. Also the finding was similar to finding of Fang & Zhu (2006) who argued that publishing fees lower academic standards and result in a great deal of low quality research papers. One possible

explanation for this result was that, the low familiarity with open access as well as lack of experience with high quality open access journals caused misconceptions in this regard. As there was lack of publicity for open access and its advantages as well as little knowledge of the research community about open access, most researchers mistook open access low quality journals that published papers only to earn money. Hence this media was regarded as an inferior dissemination channel for low quality papers, which is not a reasonable generalization about open access.

The idea that open access journals had commercial vision due to a publishing fee, was relatively important (4.35) concern to researchers. This concern obtained the lowest priority comparison to the other two concerns. Therefore, researchers were more worried about the author-pay aspect than the commercial vision of open access journals and misconception of colleagues due to publishing fees. These outcomes mean that a deal to solve author-pays would accelerate the use of open access among researchers at various universities.

4.3.5.1.6 Social Influence

The social influence in this study was defined as the degree to which a researcher perceives that important others influence him or her in using open access journals. In order to investigate this variable, researchers were asked to indicate their level of agreement or disagreement with eight seven-point Likert scale statements about this factor. The results are shown in Table 4.23.

Table 4.23: Social Influence

Rank	Indicators	N	Mean
1	Top editorial board	362	5.01
2	Superior's article in open access	359	4.81
3	Recommendation of co-publishing	359	4.54
4	Recommendation of grant body	358	4.36
5	Recommendation of important	356	4.36
6	Recommendation of superiors	357	4.33
7	Peer's article in open access journal	356	4.31
8	Recommendation of peers	357	3.91
Overall mean			4.46

The social influence with a mean score of 4.46 was the second lowest mean score among the seven factors in the present study. The result suggested that this factor was relatively important in the acceptance of open access journals. Another study with this view was that of Dulle, Minish-Majanja and Cloete (2010) who identified social influence as a positive factor that could probably facilitate acceptance of open access.

Out of eight indicators of social influence, only influence of top editorial board was regarded as important. The next six indicators with mean scores over 4.01 were regarded as relatively important. The last indicator with a mean score lower than the cutoff point of 4.00 was assessed as of low importance. There was a gap between the highest (5.01) and the lowest (3.91) mean score. It seems that influence of top editorial board in open access journals had more importance than the other groups. The recommendation of peers had the lowest importance for researchers in using open access journals.

The highest mean score of 5.01 was for the statement that employment of the top editorial board members in open access journals had influence on the use of these journals. The result suggested that the reputation of editorial board membership in open access journals was an important reason in convincing researchers to use these journals. For instance PLoS which is one of the established open access publishers used millions of

dollars of its initial grant funding to include several Nobel laureates on its editorial board (Bjork, 2004). It should be noted that editorial board in traditional journals is more eminent than open access ones (Mann et al., 2008).

The finding suggested that a published article of a top researcher in a certain open access journal, was relatively important (with mean score of 4.81) reason for researchers to use these journals. Similarly, the recommendation of researcher's co-publishing colleagues had a relative influence (with mean score of 4.54) on the use of open access journals. Also the recommendation of grant-awarding bodies as a motivation to use open access journals was relatively important (with mean score of 4.36) according to researchers. However, probably due to lack of grant-awarding bodies in Iran, this result was relatively important motivation among researchers not highly important.

Furthermore, the recommendation of people who were important to the researchers with mean score of 4.36 and also the recommendation of superior at the field with mean score of 4.33, as reason to use open access journals, were relatively important reason in using these journals. Also, the peer's article in certain open access journals as a reason to use these journals was considered relatively important for researchers. The lowest mean score of 3.91 was for the statement that the recommendation of peers influences researchers to use open access journals. It seems that the recommendation of peers was not an important motivation in using these journals.

However, the recommendation of grant-awarding bodies, superior/important people's recommendation, peer's article in a certain open access journals and recommendation of peers, were relatively important motivations to use these journals. These findings were somewhat in line with several prior studies which pointed out the role of colleagues in the use of open access. According to Lawrence (2001b) to hear about open access from a trusted colleague was influential. On the other hands, Mann et al. (2008)

stated that the low use of open access among colleagues could hinder further diffusion of open access publishing. Gul, Shah & Baghwan (2010) emphasized the importance of the role of colleagues in promoting open access awareness compared to funding bodies. Schonfeld & Housewright (2010) found that peers' networks remained among the most important factors for faculty in learning about and being encouraged to try new electronic research resources. Recommendations by peers to use a resource and awareness by peers about a resource were key drivers in motivating faculty members to try a new resource. Nariani & Fernandez (2010) found that one of the reasons to publish in open access journals was reading of these journals by their peers as well as the recommendation of their colleagues.

In comparative terms the primacy levels of sub-scale for social influence indicated that the influence of top editoril board members and top researchers' articles in certain open access journals were more important than the the influence of peers. It seems that the recommendation of co-publishing colleagues was even more important than the recommendation of grant awarding bodies and superiors. The peers had the lowest influence in comparsion to other measures of social influence. This result was comparable with the findings of Dulle, Minish-Majanja & Cloete (2010) who reported that the influence of researchers' peers was less important in contrast with the other social influence indicators. These outcomes implied that well-kown editorial board members, superior's practise and co-publishing colleagues stood a better chance of accelerating the acceptance of open access at respective universities than the recommondation from top researchers and peers.

4.3.5.1.7 Anxiety

Anxiety in this study was defined as the concerns that may cause an obstacle to the acceptance of open access journals. In order to examine this factor, researchers were asked

to indicate the level of agreement or disagreement with seven statements regarding their concerns in using open access journals. The data in Table 4.24 show the mean scores for the seven indicators of anxiety.

Table 4.24: Anxiety

Rank	Indicators	N	Mean
1	Low indexing in journals by	364	4.97
2	Plagiarism and misusing of	363	4.54
3	Lack of guarantee for	364	4.27
4	Vanity publishing	363	4.18
5	Inferior peer review	364	4.17
6	Lack of prestige	364	4.14
7	Negative effect on career	364	3.64
Overall mean			4.27

In this study anxiety as a factor that hampered the acceptance of open access journals had the lowest over all mean score of 4.27 among seven factors of the study. A mean score of over 4.01 indicated that this factor was relatively important and researchers agreed that the mentioned worries relatively hindered the use of open access journals. The mean score of the first six indicators was over the cutoff point of 4.00, which means that they were evaluated as relatively important as a hindrance. The negative effect of publishing in open access journals on career benefits had a mean score lower than 4.00; hence it was assessed as of low importance concern. There was a wide gap between the highest (4.97) and the lowest (3.64) mean scores. This suggested that while the low indexing of open access journals was a cause of worry for researchers, the negative effects of publishing in open access journals on career benefits among the medical researchers had the lowest importance concern.

Low indexing of open access journals by popular databases such as ISI was a concern that could hinder the use of open access. This indicator obtained the highest primacy with mean score of 4.97, and was considered a relatively important cause of worry

among researchers. Indexing in popular databases is a main reason for selecting a journal in which to publish. The result of this study suggested that a majority of researchers had concerns about low indexing of open access journals in ISI databases. This result was comparable with findings of Bjork et al. (2010) which proved that the proportion of fully open access journals was clearly lower in the ISI databases. Bjork (2004) believed that the low indexing of open access journals in commercial indexing services was one of the major drawbacks of these journals. Beer (2005) suggested that open access journals needed to be indexed within the ISI databases. According to Nariani & Fernandez (2010) respondents wanted their articles in open access journals to be immediately indexed in STM databases. As observed by Beer (2005), generally due to their career promotion, researchers were going to publish in an open access journal if it was indexed in ISI. Besides, as mentioned by Guedon (2001) the use of SCI and ISI by university administrations as a decision support tool had become one of the strongest barriers to the success of open access journals, since it tended to strongly favor old established journals. According to Bjork (2004), it was very difficult to get new journals accepted in ISI or SCI before they had established a reputation, and being outside the 'core literature' of ISI or SCI made it very difficult to get good submissions and establish a reputation.

Matters of plagiarism and misuse of research work in open access system was relatively of a significant (with mean score of 4.54) worry for researchers. This finding was similar with findings of prior studies (Prosser, 2004; Wang & Su, 2006; Beer, 2005; Pelizzari, 2003) which reported authors' concerns regarding possibility of plagiarism and the ease of copying their paper. However, as mentioned by Prosser (2004) the same tools that allowed a paper to be found and plagiarized assisted in detecting the plagiarism. Since the full text of the paper was freely available to all, it was in fact easier to detect plagiarism than it would be if the paper was only available to a limited number of subscribers.

The lack of guarantee for long-term availability and stability of open access journals as a concern in using these journals was relatively important with a mean score of 4.27. This finding was in line with findings of prior studies (Hess et al., 2007; Mann et al., 2008) that reported respondents' concerns regarding lack of guarantee for long-term availability of open access journals. However, in the biomedical area, as Zerhouni (2004) stated, the existence of PubMed Central plays a key role in reducing concerns about stability of open access. Since open access articles would be permanently archived in PubMed Central, they would be available whatever the future status of the original journal in which they were published.

Vanity publishing or poor quality research being published for a fee in open access journals as a hindrance in the use of open access journals was a relatively important (with mean score of 4.18) concern for researchers. The result suggested that vanity publishing or poor quality research was an obstacle in the use of open access journals. This finding was like that one of Schroter, Tite & Smith (2005) which highlighted respondents' concern on leading open access publishing to vanity publishing and a flood of non peer-reviewed papers on the Internet.

Inferior peer-review and low quality of most open access journals was a barrier in and source of relatively worry (with a mean score of 4.17) for researcher in using these journals. It can be concluded that researchers had relative concerns regarding the quality control or peer-review of open access journals. This was in line with findings of prior studies (Ghane, 2006; Schroter, Tite & Smith, 2005) which found poor quality control of open access journals was a reason for not publishing in these journals. However, the existence of low quality open access journals caused misconceptions about these journals especially among low familiar researchers and prevented them from using this system as a publishing channel. For instance, if journals only conduct simple review or grammatical

editing especially for papers from non-English countries and publish them as the open access, it implies a kind of commercial vision; generalizing of this perception about open access probably would damage the acceptance of this system in scientific community especially among low familiar members. However, quality of journals was more important than being open access for researchers when they wanted to publish their work. Schroter, Tite & Smith (2005) reported that despite charging authors, many respondents said they would probably continue to submit to journals they considered as high quality publications.

The relative lack of prestige in open access journals was another concern in using these journals among the researchers. This suggests that researchers were relatively worried (mean score of 4.14) about the low prestige of open access journals. This finding was rather comparable with some previous studies (Warlick & Vaughan, 2007; Wang & Su, 2006; Anderson, 2004; Swan & Brown, 2004) that reported the lack of prestige of open access journals as an incentive for authors to publish their articles in these journals. Meanwhile, Tarrag & Molina (2008) found that for 41% of respondents, the prestige of an open access journal was reason to publish in that journal. However, in order to make an open access journal as prestigious as conventional journals Suber (2004) suggested inviting eminent scholars to submit their new and excellent research work to open access journals. For Bjork (2004) one way to build the prestige of newly established journals was the reputation of the editor and the constitution of the editorial board. Another way was to attract initial substantial papers from leading academics. However, most of the open access journals were young and new; they needed time to achieve suitable reputation and prestige among scholars. For instance, the prestige of a journal depends on several factors such as the impact factor of a journal, quality of published articles, reputation of editorial board and indexing in special databases which could be achieved during years. Although prestige of journals is considered much more important than being open access, it was not in

conflict with being open access; hence many prestigious journals had recently offered an open access option in order to be used by interested researchers.

The lowest mean score of 3.64 was for the statement that there was negative effect of publishing in open access journals on the researchers' career benefits. The results suggested that publishing in open access journals did not have negative influences on career benefits of researchers. This was consistent with findings of prior studies (Nariani & Fernandez, 2010; Ghane, 2006) which showed that a majority of respondents disagreed with negative effects of publishing in open access journals on their career promotion. This finding was inconsistent with findings of some previous studies (Mann et al., 2008; Hess et al., 2007) where respondents believed that publishing in open access journals had negative influences on their career benefits. Schonfeld & Housewright (2010) reported that for a majority of respondents, traditional publishing channels continue to dominate the dissemination means due to the career benefits of these journals. It should be noted that, high quality open access journals not only did not have negative influences on career promotion but also influence it positively. However, due to career promotion, academic staff members are generally reluctant to test in ways that might negatively affect their career advance.

4.3.5.1.8 Intention to Use Open Access Journals

The intention to use open access journals in this study was defined as the researchers' aim to publish in open access journals in the future. In order to determine the intention to use open access journals, researchers were asked to indicate their level of agreement or disagreement on three seven-point Likert scale statements concerning this variable. The results are presented in Table 4.25.

Table 4.25: Intention to Use Open Access Journals

Rank	Indicators	N	Mean
1	To publish in next 18	347	5.27
2	To publish in next 12	349	5.18
3	To publish in next 6	353	4.91
Overall mean			5.15

The highest mean score was 5.27, came from a statement that indicated intention to use open access journals in the next 18 month. This was followed by a mean score of 5.18 for the statement that showed intention to use open access journals in the next 12 months. The lowest mean score of 4.91 was for the statement that indicated intention to publish in open access journals in the next six month.

Overall mean for intention to use open access journals was 5.15, which indicated a fair intent of researchers to use these journals in the future. There was no wide gap between the highest (5.27) and the lowest (4.91) mean scores. However, the comparative mean scores for the statements indicated that researchers had stronger intentions to publish in open access journals in next 12 and 18 months than it in the near future (within six months). Although near half (47.7%) of the researchers had no experience with these journals, it seems, they intended to use these journals in the near future. This implies that there were relatively good prospects for future development of open access in such universities.

4.3.5.1.9 Use of Open Access Journals

Use of open access journals in this study was defined as the self-reported manuscript submission to open access journals by researchers. Use of open access journals was measured with a six-point ratio indicator. Researchers were asked to indicate number

of times of manuscript submission to open access journals. The results are shown in Table 4.26.

Table 4.26: Use of Open Access Journals

Options	Frequency	Percentage
Never	175	47.7
Once	31	8.4
Twice	35	9.5
Three times	13	3.5
Four times	60	16.3
Five times	53	14.4
Total	367	100.0
Mean=1.76 SD=1.983 Minimum/ Maximum=0-5		

A majority 175 (47.7%) of researchers never submitted a manuscript to open access journals, 31 (8.4%) had submitted one time, 35 (9.5%) had submitted two times, 13 (3.5%) had submitted three times, 60 (16.3%) had submitted four times and 53 (14.4%) had submitted articles to these journals five times. Overall mean was 1.76 which implied the low level of dissemination through this channel.

Another evidence of low level of use of open access journals as a publishing channel was the small number of open access papers that were archived in PubMed Central. In total, 5206 articles out of nearly 2,000,000 archived articles in PubMed Central belong to Iranian health researchers (based on data available online on 26 April 2011 at www.ncbi.nlm.nih.gov/pmc), which was only 0.26%. It should be noted that this proportion belonged to all health sector researchers in Iran and not only medical ones.

This result is in line with findings of a number of studies (Dulle, Minish-Majanja & Cloete, 2010; Tarrago & Molina, 2008; Nicholas, Jamali & Rowlands, 2006; Schroter & Tite, 2006; Schroter, Tite & Smith, 2005; Swan & Brown, 2005, Rowlands, Nicholas & Huntingdon, 2004) that reported low level in the use of open access journals. An explanation for the low usage of open access journals was probably that, nearly half of

researchers were clinical academic staff members who were busy with clinical and educational activities than the research work. Furthermore, publishing through this media as justified by Dulle, Minish-Majanja & Cloete (2010) needed someone with something to publish, enough online publishing skills and also sufficient familiarity with potential open access publishers. Moreover, it was probably due to the lack of familiarity with open access and its advantages as well as author charge that the level of use were so low.

4.3.5.2 Factors Influencing Acceptance of Open Access Journals

Hierarchical multiple regression was used to evaluate the theoretical framework of the study. The proposed framework consists of two dependent variables (intention to use and use of open access journals). Regression analysis conducted in two rounds in order to test the influence of independent variables on each dependent variable. The hierarchical multiple regression has the ability to explore if there is a possible effect of demographic variables control on still variables (constructs) and was able to predict a significant amount of the variance in the outcome (Pallant, 2007). Multiple regression is an extraction of bivariate correlation. The result of regression is an equation that represents the best prediction for dependent variable from several independent variables. Hierarchical multiple regression was suitable for both outcome variables and could indicate unique contribution of each of the predictors, collective contribution of predictors, significant predictors of each outcome and a significant test of each step of the hierarchy.

Furthermore, a number of assumptions such as non-metric variables, sample size, outliers, multicollinearity and singularity, normality and linearity, homoscedasticity, independence of error and order of variables entry underpin the use of regression. The results for fulfillment of the regression assumptions for this study are presented in the following sections.

Non-metric variables: Multiple regression requires that the dependent variable be continuous and the independent variables can be either continuous or categorical. If it is categorical [non-metric], these variables must be coded as dummy variables. In contrast, the dependent variable must be measured on continues scale (Coakes, Steed & Ong, 2009). In using dummy variables, the underlying assumption is that the regression models for the different dummy variables differ only in the intercepts but have the same slope coefficient. The regression coefficients for the dummy variables represent differences between means for each group of respondents formed by a dummy variable from the omitted group (Hair et al., 1998). Therefore, before regression analysis take place, the demographic variables which are non-metric should be transformed to dummy variables. Table 4.27 indicates the list of dummy coded variables.

Table 4.27: Dummy Variables for Demographic Factors

No. of Dummy Variables	Factor	Group	Frequency
1	Gender (n=365)	Male (1) Female (0)	260 105
5	Age (n=365)	Younger (26-45) (1) Older (above 46) (0)	247 118
1	Field of study (n=361)	Clinical (1) Basic science (0)	181 180
4	Academic rank (n=365)	High (Full Professors and Low(Assistance and	116 249
3	Type of university	One (1) Two and three (0)	211 156
2	Familiarity (n=367)	Familiar (1) Un-familiar (0)	156 211
2	Experience (n=367)	Submitted (1) Un-submitted (0)	192 175

The demographic data for this study are categorical variables such as gender, field of study and type of university as well as ordinal variables such as age groups and academic rank. Gender was coded as a dummy variable with 1 for male and 0 for female. Age was

grouped into younger (26-45 years) coded 1 and older subjects (46 years and above) coded 0, in order to explore the bigger picture of whether there were any differences between younger subjects and older subjects. The field of study was categorized into only two groups that were coded as 1 for clinical and 0 for basic science researchers. Academic rank was coded as 1 for Full and Associate Professors and 0 for Assistant Professors and Lecturers. Type of university was grouped into two groups of Type One that was coded as 1, and Type Two and Type Three that was coded with 0. Familiarity and experience were already coded as 0 for un-familiar/un-submitted groups and 1 for familiar/submitted groups.

Sample size: The number of cases that were needed for regression was that the minimum requirement is to have at least five times more cases than independent variables (Coakes, Steed & Ong, 2009). The present study had 14 predictors (seven predictor and seven demographic variables) for intention to use and 14 predictors (eight predictor and six demographic variables) for use of open access journals, therefore with 367 cases; the assumption required for testing regression was met.

Outliers: Extreme cases have considerable impact on the regression solution and should be deleted or modified to reduce their influence. Univariate outliers can be detected during data screening and multivariate outliers can be detected using statistical methods such as Mahalanobis distance (Coakes, Steed & Ong, 2009). In the present study, boxplot was used to check for univariate outliers. Any scores that SPSS considered as outliers appeared in a boxplot; therefore to reduce the effect of outliers on r , it was decided on to omit them from regression analysis. Since each section of the questionnaire was independent, it was

possible to remove the section that contained outliers and use other sections of the questionnaire.

Also Mahalanobis distance was used to check the multivariate outliers through multiple regression analysis. Multivariate outliers are cases with an unusual combination of scores on two or more variables. For the present study, 367 cases were screened for multivariate outliers. Mahalanobis distance was evaluated for each case using χ^2 with a degree of freedom equal to the number of predictors (14 independent variables) at a probability estimate of $p < .01$. From the statistical table for Chi Square with $p = .01$, the critical value is: $\chi^2(14) = 29.1$. As mentioned earlier this study had two dependent variables, therefore, mahalanobis distance statistic was evaluated in two rounds. Two cases (108, 185) for intention and two cases (161, 185) for use appeared to be outliers with the value higher than the critical chi-square values in the data set. After omitting the outlier cases, the remaining were used for further analysis with regression testing. (See Appendix F for Critical values of Chi Square).

Multicolinarity and singularity: Multicollinearity refers to the high correlations among the independent variables, whereas singularity occurs when perfect correlation exist among independents variables. These problems affect the interpretation of any relationships between the independent and the dependent variables, and they can be detected by examining the correlation matrix, squared multiple correlations and tolerances (Coakes, Steed & Ong, 2009). SPSS provides some measures of whether there is collinearity in data via Variance Inflation Factor (VIF) and tolerance statistics. According to Pallant (2007), there were commonly used the cutoff points for determining the presence of multicollinearity, such as tolerance value of less than .10, or VIF value of above 10. Field (2005, citing Allison, 1999) indicated that tolerance should exceed .40. The data in Table

4.28 and 4.29 show the tolerance and VIF values for collinearity Statistics of the present study.

Table 4.28: Collinearity Statistics of Constructs on Intention

IVs for Intention	Collinearity Statistics	
	Tolerance	VIF
Attitude	.525	1.904
Facilitating conditions	.649	1.540
Effort expectancy	.641	1.559
Performance expectancy	.538	1.857
Anxiety	.834	1.198
Social influence	.870	1.150
Author-pays	.818	1.222

Table 4.29: Collinearity Statistics of Constructs on Use

IVs for Use	Collinearity Statistics	
	Tolerance	VIF
Intention	.824	1.213
Attitude	.494	2.023
Performance Expectancy	.528	1.894
Effort Expectancy	.647	1.546
Anxiety	.831	1.203
Social influence	.875	1.142
Author-pays	.820	1.220
Facilitating Conditions	.638	1.567

As data of tables show tolerance values for predictors of intention ranged between .525-.870 and for predictors of use was between .494-.875; both fell in an acceptable range. This was also supported by the VIF values, which ranged for intention between 1.150-1.904 and for use ranged in 1.142-2.033; both below the cutoff point of 10. Therefore it can be concluded that there was no multicollinearity within the present data.

Normality: As indicated in Table 4.16 the measure of kurtosis and skewness was used to examine the normality of data distribution. In both measures, an acceptable value between ± 2.0 for independent and dependent variables was found.

Assessment of linearity and homoscedasticity: Linearity means that the residuals should have a straight-line relationship with predicted dependent variable scores. Homoscedasticity means the variance of residuals about predicted dependent variable scores should be the same for all predicted scores (Pallant, 2001). In order to verify whether the dependent variable had a linear relationship with the independent variables, a useful way was to examine a scatter plot of residuals and a dependent variable. A residual plot is used in multiple hierarchical regression. A residual value is the difference between observed value of the response variable and the estimated value based on the regression equation (Kazmier, 2003). Screening of the assumption for multivariate (collective effect of the variate) was made by examining standardized residuals scatter plots between predicted intention/use and error of predictions. Figures 4.1 and 4.2 show the scatter plot to assess linearity and homoscedasticity in the present study.

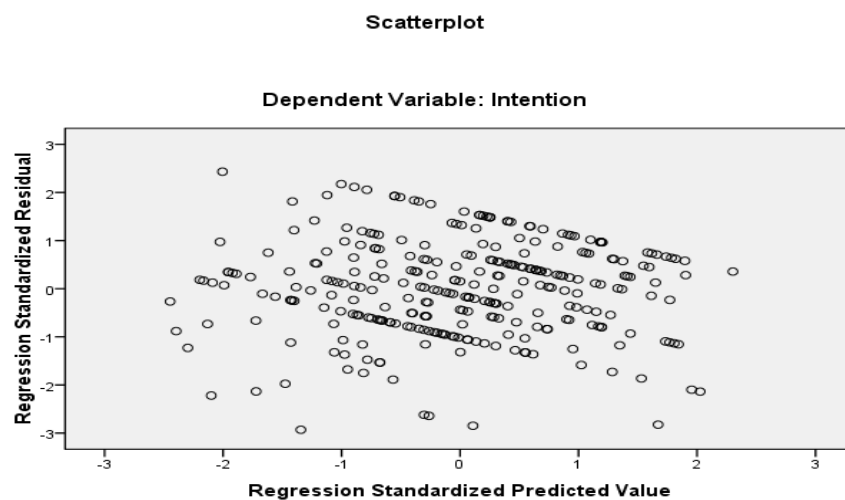


Figure 4.1: Assessment of Linearity and Homoscedasticity for Intention

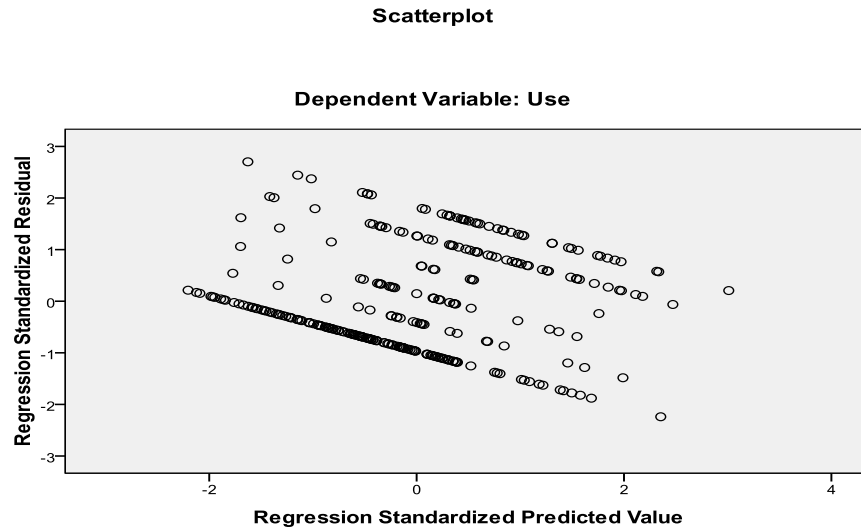


Figure 4.2: Assessment of Linearity and Homoscedasticity for use of Open Access journals

As Figures 4.1 and 4.2 show the residuals had a linear relationship with predicted dependent variable scores and that the variance of the residuals was the same for all predicted scores (Coaches, Steed & Ong, 2009). Additionally, both plots indicated that data are homoscedastic because the residuals plot was approximately equal in width with all values of the predicted dependent variables.

Independence of error: Multiple regression assumes that the residuals or errors in the prediction are independent and there is no serial correlation. The assumption of independent errors was tested through Durbin-Watson statistics. This statistics determines whether the assumption of independent errors is acceptable or not. The value of Durbin-Watson ranges from 0 to 4. As a general rule of the thumb, the residuals are not correlated if the Durbin-Watson statistics is approximately 2, and an acceptable range is 1.00-3.00 (Field, 2005). The Durbin-Watson value for intention was 1.948 and for use was 1.805; both fell within the acceptable range and close to 2. As such it can be concluded that there was no violation for regression assumptions.

Order of variables entry: In hierarchical multiple regression, the independent variables are entered into equation in an order specified by the researcher based on theoretical grounds. Pearson correlation (two-tailed) was first conducted in order to examine the strength of the correlation between all predictor variables and the two dependent variables of study so as to determine the order of entering predictors once hierarchical multiple regression was employed. The results of Pearson correlation indicated that seven predictors that were based on the strength of their relationship with intention to use open access journals from the strongest to the weakest was attitude, facilitating conditions, effort expectancy, performance expectancy, anxiety, social influence and author-pays. Also the order of the strength of relationship for demographic variables with intention to use open access journals from the strongest to the weakest was experience, type of university, familiarity, gender, age academic rank and field of study. Also the results of Person correlation indicated that the order of variables from the strongest to the weakest for use of open access journals were intention, attitude, performance expectancy, effort expectancy, anxiety, social influence, author-pays and facilitating condition. Meanwhile the order of importance for demographic variables were academic rank, familiarity, type of university, field of study, gender and age. (See Appendix D for results of Pearson Correlation).

4.3.5.2.1 Hierarchical Multiple Regression for Intention

An eight step hierarchical multiple regression (baseline model with outlier removed, n=301) was used to assess amount of additional variance in intention score as was explained by adding predictors variables to the equation. The collective contribution was assessed in the final model. Demographic variables were entered as a block into the regression equation. Controlling for demographic variables, the seven predictor variables were entered one at a time in the order of: attitude, facilitating conditions, effort

expectancy, performance expectancy, anxiety, social influence, author-pays. Both demographic and predictor variables were entered into the regression model based on their strength of relationship with the outcome determined by Pearson Correlation. Table 4.30 displays the standard beta coefficient (β), R Square (R^2) and the squared semipartial correlation (R^2 change).

Table 4.30: Baseline Regression: Standardized Beta Coefficients from Hierarchical Multiple Regression Analysis of Intention

Predictors	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
Experience	.310	.247	.259	.261	.260	.253	.259	.262
Type of university familiarity	-.156	-.128	-.164	-.166	-.163	-.165	-.167	-.167
Gender	.050	.039	.030	.032	.039	.037	.038	.036
Demo Age	.034	.042	.065	.067	.069	.073	.077	.078
Academic rank	.034	.038	.047	.051	.061	.061	.061	.060
Field	-.078	-.075	-.043	-.042	-.054	-.049	-.054	-.056
Attitude	.029	.037	.030	.027	.035	.028	.034	.035
Facilitating Conditions		.277	.225	.231	.292	.264	.258	.258
Effort Expectancy			.188	.203	.210	.217	.203	.203
Performance expectancy				-.032	-.016	-.013	-.018	-.012
Anxiety					-.109	-.094	-.104	-.100
Social influence						-.086	-.090	-.081
Concern with Author-pays							.081	.083
								-.031
R^2	.118	.190	.220	.221	.228	.234	.240	.241
R^2 Change	.118	.072	.030	.001	.007	.007	.006	.001

Beta coefficients are regression coefficient transformed to a standardized value with a mean of 0 and a standard deviation of 1. A standard regression coefficient allows for direct comparison of relative effect of each of the predictors on outcome. R^2 is a measure of how much of variability in the dependent variable is accounted for by the predictors. It represents the combined effect of the entire variables in the prediction. R^2 change shows how much of this overall variance of the outcome is accounted for by a given predictor variable after another variable(s) has been taken into account (Pallant, 2007). In hierarchical multiple regression, the R^2 change represents the unique contribution.

Unique contribution: The significance of incremental partitioning of the variance between each predictor variables and intention was assessed at each step of the hierarchy through R^2 Change. As Table 4.31 indicates, demographic variables are displayed in order of strength (experience, type of university, familiarity, gender, age, academic rank and field of study), and were entered first as a block into the analysis. At the end of step one, with demographic variables in the equation, the proportion of variance added to intention to use open access journals was 11.8%, $F(7, 294) = 5.627$ at $p < .001$, $R = .344$, $R^2 = .118$. As a matter of control for demographic variables, after step two, attitude added a significant proportion of variance to intention, accounting for 7.2% of unique contribution with, $F(8, 293) = 8.598$ at $p < .001$, $R = .436$, $R^2 = .190$. After step three, the facilitating conditions were added to the equation, accounting for 3% of unique contribution with $F(9, 292) = 9.163$ at $p < .001$, $R = .469$, $R^2 = .220$.

The magnitude on the improvement of predictive power with the addition of next five steps was very small. With effort expectancy at the end of the fourth step, it accounted only for 0.01% of unique contribution with $F(10, 291) = 8.251$ at $p < .001$, $R = .470$, $R^2 = .221$. Performance expectancy in step five accounted for 0.07% of the unique contribution with $F(11, 290) = 7.768$ at $p < .001$, $R = .477$, $R^2 = .228$. Also with addition anxiety at step six, it accounted for 0.07% of unique contribution with $F(12, 289) = 7.369$ at $p < .001$, $R = .484$, $R^2 = .234$. At the end of step seven with the addition of social influence, unique contribution was 0.06% with $F(13, 288) = 6.995$ at $p < .001$, $R = .490$, $R^2 = .240$. With addition of author-pays at the end of step eight, unique contribution was only 0.01% with $F(14, 287) = 6.502$ at $p < .001$, $R = .491$, $R^2 = .241$. Although the addition of predictors in each step improved the R^2 , the improvement with the addition of attitude and facilitating conditions was far better than other steps.

Collective contribution: In this study, step eight illustrates a complete model of the hierarchical multiple regression analysis for intention whereby all predictor variables and demographic variables were included in the analysis. Based on the results, the multiple R^2 was .241, which means that the total contribution by a combined set of independent variables accounted for approximately 24.1% of the variance of intention to use open access journals, $F(14, 287) = 6.502$ at $p < .000$, $R = .491$, $R^2 = .241$. Although variables helped to explain the variance in intention to use open access journals, only 24.1% of the variance in intention was explained by these independent variables considered in this study and still leaves 75.9% unexplained. In other words, there are other additional variables that are important in explaining researchers' intention to use open access journals that were not considered in this study (Sekaran, 2006).

Significant variables of intention: Table 4.31 indicates Unstandardized Coefficients (B), Standardized Coefficients (β), Std. Error and t values for 14 predictor variables of intention.

Table 4.31: Summary of Hierarchical Regression for Intention

Model	B	Std	β	t
Step 8	2.103	.741		2.839
Constant				
Experience	.664	.141	.262	***4.715
Type of university	-.428	.140	-.167	** -3.045
Familiarity	.094	.139	.036	.680
Gender	.216	.148	.078	1.458
Age	.164	.157	.060	1.048
Academic rank	-.155	.167	-.056	-.928
Field of study	.088	.136	.035	.645
Attitude	.371	.102	.258	***3.632
Facilitating conditions	.328	.103	.203	**3.178
Effort expectancy	-.018	.096	-.012	-.190
Performance expectancy	-.158	.111	-.100	-1.429
Anxiety	-.114	.080	-.081	-1.431
Social influence	.098	.065	.083	1.513
Concern with author-pays	-.040	.073	-.031	-.551

Note: $n=301$; $R^2=.241$; Adjusted $R^2=.204$, *** $p < .001$; ** $p < .01$

In multiple regression the model takes the form of an equation that contains a coefficient (β) for each of the predictors. The beta values indicate the individual contribution of each predictor to the model. The standardized beta value indicates the number of standard deviations that the dependent variable will change as a result of one standard deviation change in the predictor. The standardized beta values provide a better insight into importance of a predictor in the model. It explains the relationship between intention and each predictor. If the value is positive, it means there is a positive relationship between the predictor and dependent variable whereas a negative coefficient represents a negative relationship (Field, 2005).

When all the variables were entered into the equation in step 8, out of seven predictor variables only attitude and facilitating conditions yielded significant relationships with intention. Also, out of seven demographic variables only experience and type of university had significant relationship with intention. The standardized regression coefficients (β s) are indices of direct effects of each predictor variables on intention to use open access journals. As can be seen in Table 4.31, the results indicate that experience accounted for the largest direct effect on intention, with beta weight of .262 at $p < .001$, ($t=4.715$), followed by attitude ($\beta=.258$, $t=3.632$) at $p < .001$, facilitating conditions ($\beta=.203$, $t=3.178$) at $p < .01$ and type of university ($\beta=-.167$, $t= -3.045$) at $p < .01$. Therefore, the significant predictors of intention in their order of importance were: experience, attitude, facilitating conditions and type of university.

The variables (gender, age, field of study, academic rank, familiarity, performance expectancy, social influence, anxiety and concerns with author-pays) that had p-values greater than .05 did not make any significant unique contribution to the prediction of intention to use open access journals (Pallant, 2007). It was evident that personal

characteristics (gender and age), as well as professional status (academic rank and field of study) had little impact on intention to use open access journals.

Attitude, experience and facilitating conditions had positive β values indicating that they had positive relationships with intention to use open access journals while type of university had negative β values indicating negative relationship. The beta= .262, for experience, meant that for any one unit increase in experience, intention would increase by .262 units. So, as the previous experience in using open access journals increased the intention to use these journals increase. The beta = .258, for attitude, implied that for any one unit increase in attitude, intention to use open access journals would increase by .258 units. It means that the researchers, who had positive attitude, also had more intention to use open access journals in the future. The beta = .203, for facilitating conditions, would mean that for one unit increase in facilitating conditions, intention to use open access journals would increase by .203 units. Type of university had been coded as either 0 or 1, with 1= Type One universities and 0= Type Two and Type Three universities. The beta coefficient of type of university is negative (-.167), this would mean researchers in universities Type Two and Type Three had more intention to use open access journals.

The adjusted value (adjusted $R^2=.204$) was close to the observed value of R^2 indicating that the cross validity of this model was good. The difference for the final model was small (.241-.204=4%). This shrinkage means that if the model were derived from the population rather than the sample, it would account approximately for 4% less variance in intention.

Significance tests: The F-ratio was used to test how well the predictor variables collectively correlated with intention to use open access journals. F change is F ratio for test of R^2 change. Therefore, F-ratio for change in R^2 was used to assess the significance of

added variables. Especially the F-ratio is a measure of how much the model has improved the prediction as a result of fitting the model in relation to the level of inaccuracy of the model (Field, 2005). Table 4.32 indicates multiple regression R, F-ratio and F change for intention to use open access journals.

Table 4.32: The Multiple Regression R, F-ratio and F change for Intention

Model	R	F	F Change
Step 1	.344	*** 5.627	5.627
Step 2	.436	*** 8.598	26.044
Step 3	.469	*** 9.163	11.268
Step 4	.470	*** 8.251	.255
Step 5	.477	*** 7.768	2.505
Step 6	.484	*** 7.369	2.530
Step 7	.490	*** 6.995	2.161
Step 8	.491	*** 6.502	.303

n= 301; ***<.001

As can be seen in Table 4.32, from initial model to step eight, there were improvements in prediction for each model with large F-ratio (greater than 1) and were highly significant ($p < .001$). The result can be interpreted as meaning that each of the models significantly improved the ability to predict the outcome variable. Furthermore, F-ratio test revealed that, the multiple regression was significantly different from zero at the end of each step. This implies that it is most unlikely that the coefficient for the predictor variables could be zero in the population, rendering it possible for the results to be generalized to the population.

4.3.5.2.2 Hierarchical Multiple Regression for Use of Open Access Journals

In the second round of regression analysis, the influence of eight predictor and six demographic variables on the use of open access journals was tested. A nine step hierarchical multiple regression (baseline model with outlier removed, $n=300$) was used to

assess how much additional variance in the use score was explained by adding predictor variables to the equation. The Table 4.33 displays the standard beta coefficient (β), multiple R^2 and the R^2 change.

Table 4.33: Baseline Regression: Standardized Beta Coefficients from Hierarchical Multiple Regression Analysis of Use

Predictors	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	Step9
Academic rank	.183	.188	.174	.179	.180	.181	.182	.186	.168
Familiarity	.159	.134	.130	.126	.124	.123	.120	.124	.122
Type of university	.036	.076	.089	.088	.088	.086	.101	.101	.124
Demo Field of study	.027	.018	.026	.023	.025	.023	.010	.010	.018
Gender	-.065	-.070	-.061	-.062	-.062	-.061	-.076	-.077	-.093
Age	-.065	-.066	-.055	-.059	-.060	-.060	-.061	-.058	-.068
Intention		.289	.227	.228	.225	.222	.246	.248	.266
Attitude			.199	.172	.168	.159	.173	.174	.180
Performance expectancy				.042	.037	.042	.066	.056	.064
Effort expectancy					.023	.025	.049	.034	.083
Anxiety						-.030	-.013	-.034	-.025
Social influence							-.207	-.214	-.200
Concerns with Author-pays								.075	.077
Facilitating conditions									-.124
R^2	.061	.142	.177	.179	.179	.180	.219	.223	.223
R^2 Change	.061	.081	.035	.001	.000	.001	.039	.005	.010

Unique contribution: R^2 change represents a unique contribution of each of the predictor variables in variance of outcome (use of open access journals) at each step of the hierarchy. Demographic variables were entered as a block in the first step of regression analysis in their order of strength (academic rank, familiarity, type of university, field of study, gender and age), hence, the proportion of variance added to the use of open access journals in this step was 6.1%, $F(6, 294) = 3.170$ at $p < .01$, $R = .247$, $R^2 = .061$. As a control for demographic variables, after the second step, intention added a significant proportion of variance to use, accounting for 8.1% of unique contribution with $F(7, 293) = 6.943$ at $p < .001$, $R = .377$, $R^2 = .142$. After step three, with attitude added to the equation, accounted for 3.5% of unique contribution with $F(8, 292) = 7.876$ at $p < .001$, $R = .421$, $R^2 = .177$.

The magnitude of improvement of predictive power with addition of next three steps was very small. For instance, performance expectancy was at the end of the fourth step accounting for 0.01% of unique contribution with $F(9, 291) = 7.026$ at $p < .001$, $R = .422$, $R^2 = .179$. Effort expectancy in step five had no unique contribution with $F(10, 290) = 6.319$ at $p < .001$, $R = .423$, $R^2 = .179$. Anxiety in step six accounted for 0.01% of unique contribution with $F(11, 289) = 5.757$ at $p < .001$, $R = .424$, $R^2 = .180$. At the end of step seven with the addition of social influence, unique contribution was 3.9% with $F(12, 288) = 6.711$ at $p < .001$, $R = .467$, $R^2 = .219$. Also with the addition of author-pays at the end of step eight, unique contribution was only 0.05% with $F(13, 287) = 6.342$ at $p < .001$, $R = .472$, $R^2 = .223$. Finally at the end of step nine, with the addition of facilitating conditions, unique contribution was 1% with $F(14, 286) = 6.203$ at $p < .001$, $R = .483$, $R^2 = .223$. Although the addition of predictors in eight steps improved R^2 , the improvement with addition of intention, attitude and social influence was fairly better than other steps.

Collective contribution: The completion of step nine demonstrates a complete model of the hierarchical multiple regression analysis in which all predictor and demographic variables were included in the analysis. Based on the results, the multiple R^2 was .223, which means that the total contribution by the combined set of independent variables accounted for approximately 22.3% of the variance of use of open access journals, $F(14, 286) = 6.203$ at $p < .001$, $R = .483$, $R^2 = .223$. Although variables helped to explain the variance in the use of open access journals, only 22.3% of the variance in outcome was explained by the collective contribution of independent variables considered in this study and still leaves 77.7% unexplained. It seems however, there are other factors that are important in the use of open access journals that were not considered in this study.

Significant variables in the use of open access journals: In a nine step hierarchical regression analysis, when all the variables were entered into the equation, seven variables which are academic rank, familiarity, type of university, intention, attitude, social influence and facilitating conditions showed their significant influence on the use of open access journals. Table 4.34 indicates coefficient B, β , Std. Error and t values for 14 predictor variables of use.

Table 4.34: Summary of Hierarchical Regression for Use

Model	B	Std	β	t
Step 9 Constant	-1.906	1.184		-1.610
Academic rank	.727	.261	.168	**2.785
Familiarity	.492	.217	.122	*2.264
Type of university	.499	.224	.124	*2.228
Field of study	.070	.214	.018	.329
Gender	-.406	.234	-.093	-1.733
Age	-.293	.246	-.068	-1.191
Intention	.424	.091	.266	***4.659
Attitude	.407	.166	.180	*2.443
Performance expectancy	.160	.177	.064	.901
Effort expectancy	.194	.152	.083	1.281
Anxiety	-.055	.126	-.025	-.440
Social influence	-.370	.102	-.200	***-3.606
Concern with author-pays	.155	.115	.077	1.343
Facilitating conditions	-.313	.164	-.124	*-1.907

Note: n=301; $R^2=22.3$; Adjusted $R^2=.195$, *** $p<.001$; ** $p<.01$; * $p<.05$

As can be seen from Table 4.34, the results indicate that intention accounted for the largest direct effect on use, with beta value of .266 at $p<.001$, ($t=4.659$), followed by social influence ($\beta=-.200$, $t=-3.606$) at $p<.001$, attitude ($\beta=.180$, $t=2.443$) at $p<.05$, academic rank ($\beta=.168$, $t=2.785$) at $p<.01$, type of university ($\beta=.124$, $t= 2.228$) at $p<.05$, facilitating conditions ($\beta=-.124$, $t=-1.907$) at $p<.05$, familiarity ($\beta=.122$, $t=2.264$) at $p<.05$. Therefore, significant predictors of use in their order of importance were intention, social influence, attitude, academic rank, type of university, facilitating conditions and familiarity. The other variables (gender, age, field of study, performance expectancy, effort expectancy, anxiety and concerns with author-pays) that had p-value greater than .05 did not make significant unique contribution to the prediction of use of open access journals.

As the data in Table 4.34 indicate, intention, academic rank, attitude, type of university and familiarity had positive β values, indicating their positive relationships with use of open access journals while social influence and facilitating conditions had negative β values indicating their negative relationships. The beta= .266, for intention, would suggest that for one unit increase in intention, use of open access journals would increase by .266 units. It means that the researchers, who had more intentions to publish in open access journals in future, would publish more in these journals. The negative beta = -.200, for social influence, would mean that for one unit increase in social influence, use of open access journals would decrease by .200 units. Social influence negatively affected the outcome variable. It means that the researchers, who thought social influence was important as an influential factor, published less through open access channels than those who thought the contrary. The beta = .180, for attitude, meant that for one unit increase in attitude, use of open access journals would increase by .180 units. Therefore, researchers who had more positive attitudes towards open access journals used them more. The beta = .168, for academic rank, would mean that for one unit increase in academic rank, use of open access journals would increase by .168 units. Academic rank was coded as either 0 or 1, with 1= Full and Associate Professor and 0= Assistant Professor and Lecturer. The beta coefficient of academic rank is positive, it means researchers who were Full Professors or Associate Professors had submitted manuscripts to open access journals more than Assistant Professors and Lecturers. Type of university was coded as either 0 or 1, with 1 = Type One universities and 0=Type Two and Type Three universities. The beta coefficient of type of university is positive (.124), this suggests that researchers in Type One universities had used open access journals more than researchers in Type Two and Type Three universities. The negative beta = -.124, for facilitating conditions, would mean that for one unit increase in facilitating conditions, use of open access journals would decrease

by .124 units. Facilitating conditions negatively influenced the outcome variable. It means that the researchers, who thought facilitating conditions were more important, published less through this channel than those who believed the contrary. Familiarity was coded as either 0 or 1, with 1 = familiar and 0=unfamiliar. The positive beta coefficient for familiarity (.122) means that researchers who were familiar with open access journals used them more than those who were not familiar with them.

The adjusted value (adjusted $R^2=.195$) was close to the observed value of R^2 indicating that the cross validity of this model is good. The difference for the final model was small ($.223-.195=2.8\%$). This shrinkage means that if the model were derived from the population rather than the sample, it would account for approximately 2.8% less variance in the use of open access journals.

Significance tests: The F-ratio was used to test how well the predictor variables collectively correlated with the use of open access journals. Table 4.35 show the multiple Regression R, F-ratio and F change for use of open access journals.

Table 4.35: The Multiple Regression R, F-ratio and F change for Use

	R	F	F Change
Step 1	.247	**3.170	3.170
Step 2	.377	***6.943	27.840
Step 3	.421	***7.876	12.505
Step 4	.422	***7.026	.358
Step 5	.423	***6.319	.148
Step 6	.424	***5.757	.289
Step 7	.467	***6.711	14.289
Step 8	.472	***6.342	1.720
Step 9	.483	***6.203	3.635

n= 301; ***p<.0001; **p<.01

As shown in Table 4.35, from the initial step to the ninth step, there were improvements in prediction for each model with large F-ratio (greater than 1) and was significant at $p<.01$ for the first step, highly significant at $p<.001$ level for the other eight steps. It can be

concluded that the model significantly improved the ability to predict the outcome variable. Moreover, the F-ratio test revealed that, the multiple regression results was significantly different from zero at the end of each step. This implies that it is most improbable that the coefficient for the predictor variables could be zero in the population, hence suggesting it was possible for the results to be generalized to the population.

4.3.5.2.3 In/significant Factors in Acceptance of Open Access Publishing

Hierarchical multiple regression was conducted in two rounds to test the influence of construct and demographic variables on outcome variables. In the first regression test the influence of seven construct and seven demographic variables on intention to use open access journals were examined. In the second regression analysis test the influence of eight construct and six demographic variables on the use of open access journals were examined. Discussions regarding the results of both hierarchical multiple regression tests are presented under each predictor. Furthermore, different multiple regression tests were used to evaluate the moderating role of demographic variables between construct variables (factors) and outcomes.

Facilitating Conditions: Results of hierarchical multiple regression test indicated that the facilitating conditions ($\beta = .203$, $p < .01$) had significant influence on intention to use open access journals. Also facilitating conditions ($\beta = -.124$, $p < .05$) had a significant influence on the use of open access journals. The results of regression suggested that the facilitating conditions were significant predictor of intention to use and use of open access journals. Facilitating conditions positively manipulated intention while it negatively influenced the self-reported use of these journals. A possible explanation for these results could be that the existing facilitating conditions were not enough to encourage the researchers to use the

system, but by providing essential requirements they may intend to use this channel in the future. This finding confirmed the finding from prior studies in different domains (Al-Shafi, Weerakkody & Janssen, 2009; Jong & Wang, 2009; Wills, Debuse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008; Al-Gahtani, Hubona & Wang, 2007; Wu, Tao & Yang, 2006) that facilitating conditions were a significant factor in intention to use technology. The finding of this study regarding intention to use was not in line with findings of Kaba, N'Da & Mbarika (2008) which indicated that facilitating conditions had no significant impact on the intention to use mobile technology in Guinea. The finding from this study regarding the significant influence of facilitating conditions on intention was different from findings of Dulle & Minishi-Majanja (2011), while the finding about the significant influence of facilitating conditions on the use of open access journals was similar. However, universities play a significant role in supporting their researchers through facilitating factors such as providing open access policy, awareness about open access and its advantage, providing financial support, setting up institutional repositories and considering open access journals for career benefit.

Effort Expectancy: Based on the findings of hierarchical multiple regression, effort expectancy was an insignificant factor in predicting intention to use and use of open access journals. The finding of hierarchical multiple regression regarding intention to use was consistent with the finding of (Wu, Tao & Yang, 2006; Al-Gahtani, Hubona & Wang, 2007; Carter & Schaupp, 2008; Mann et al., 2008; Al-Shafi, Weerakkody & Janssen, 2009) which indicated that effort expectancy was not a significant predictor of intention; but this finding was different from some studies that found effort expectancy construct was strong predictor of intention (Louho, Kallioja & Oittinen, 2006; Bandyopadhyay & Fraccastoro, 2007; Debuse, Lawley & Shibl, 2008; Wills, El-Gayar & Bennett, 2008; Dulle & Minishi-

Majanja, 2011). Also the finding of this study about insignificant influence of effort expectancy on the use of open access journals was comparable to the finding of Dulle & Minishi-Majanja (2011) in this regard. An explanation for these results of the present study could be that researchers had easy access to subscription-based databases in universities' campuses; therefore ease of use in open access system or effort expectancy was not an important factor in acceptance of open access journals. Probably this factor could be more important for researchers who do not have access to subscription-based databases.

Performance Expectancy: Based on findings of hierarchical multiple regression analysis, performance expectancy had not a significant influence on intention to use and use of open access journals. This finding was in line with the finding of Al-Shafi, Weerakkody & Janssen (2009) which indicated that performance expectancy had no significant influence on the adoption and diffusion of e-government services. This finding was inconsistent with several previous studies (Venkatesh & Davis 2000; Venkatesh et al., 2003; Louho, Kallioja & Oittinen, 2006; Wu, Tao & Yang, 2006; Al-Gahtani, Hubona & Wang, 2007; Bandyopadhyay & Fraccastoro, 2007; Carter & Schaupp, 2008; Debuse, Lawley & Shibl, 2008; Mann et al., 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009; Dulle & Minishi-Majanja, 2011) which reported that performance expectancy was consistently a strong predictor of intention. A probable explanation for these results of the study could be that performance expectancy represented advantages of open access for researchers; lack of deep familiarity of researchers with these advantages could be a reason for insignificance of this factor on acceptance of open access publishing. It can be concluded that, performance expectancy did not have enough authority to encourage researchers in the acceptance of open access journals. However, despite all that many researchers had not published through open access media, a majority of them intend to publish in this media in

the future. This means that the future acceptance of open access depends on publicity advantages of this system for the researchers.

Attitude: The results from hierarchical multiple regression analysis in this study indicated that attitude ($\beta = .258$, $p < .001$) was significant predictor of intention to use open access journals and also use of open access journals ($\beta = .180$, $p < .05$). Therefore, it can be concluded that attitudes had an optimistic influence on intention to use and use open access journals. These findings were consistent with findings of previous studies (Jong & Wang, 2009; Louho, Kallioja & Oittinen, 2006) which indicated that attitudes had an influence on intention to use technology.

Additionally, previous studies (Dulle & Minishi-Majanja, 2011; Mann et al., 2008; Park, 2007) on open access indicated that attitudes had an influence on intention to use open access publishing. On the other hand this finding was in contrast with the findings of Venkatesh et al. (2003) which indicated that attitudes toward using technology were insignificant. The results suggested that attitudes of researchers were not a barrier in the acceptance of open access publishing in Iran. However the researchers who had more positive attitudes towards open access had more intention to use these journals and also used these journals before. Therefore there should rather be a focus on improving attitudes of researchers towards these journals. Attitude is one of the factors that could help policy makers of scholarly communications, to formulate a better scholarly publishing policy.

Concerns with Author-pays: Result of hierarchical multiple regression analysis indicated that, the concerns about author-pay were not a significant predictor of use and intention to use open access journals. A possible reason for these results could be that although charging authors and related issues were important for researchers, they would be ready to

pay for high quality open access journals that had career benefits for them. In Iran the journals that were indexed by PubMed and Thomson ISI or published by open access publishers like BMC and PLoS were highly supported by publishing committees of medical universities for career benefits; therefore, some of the researchers probably were interested to publish through these journals, despite charging them.

Social Influence: The result of hierarchical multiple regression analysis for this study indicated that social influence had no significant influence on intention to use open access journals. This finding was consistent with a number of previous studies (Al-Shafi, Weerakkody & Janssen, 2009; Debusse, Lawley & Shibl, 2008; Louho, Kallioja & Oittinen, 2006; Chismar & Wiley-Patton, 2003) which showed that social influence was insignificant in the prediction of intention to use technology. This finding was in line with findings of previous studies on open access (Dulle & Minishi-Majanja, 2011; Mann et al., 2008; Park, 2007) that showed social influence had not been an influential predictor in intention to use open access publishing. On the other hand, this finding was different from the several technology acceptance studies (Venkatesh & Davis 2000; Wu, Tao & Yang, 2006; Bandyopadhyay & Fraccastoro, 2007; Carter & Schaupp, 2008; Kaba, N'Da & Mbarika, 2008; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009) which suggested that there was a direct effect of social influence on intention. Also, the result of hierarchical multiple regression indicated that social influence ($\beta = -.200$, $p < .001$) was a significant predictor of the use of open access journals. The result suggests that, with increasing social influence, use of open access journals decreases. Therefore, social influence negatively manipulates the use of open access journals. However, different societies considered different values for social influence. This finding was similar to

finding of Dulle & Minishi-Majanja (2011) which indicated that social influence had a significant influence on the use of open access publishing.

However, without well-known editorial boards, top reviewers and expert editors, open access journals will remain with a low prestige that can never generate enough impact factor to convince superior researchers in the domain to publish their high quality papers through this channel.

Anxiety: The result of hierarchical multiple regression analysis indicated that anxiety appeared to be insignificant for use and intention to use open access journals. This finding confirmed findings of Venkatesh et al. (2003) and Louho, Kallioja & Oittinen (2006) that anxiety had no significant impact on intention to use. Also Schaper & Pervan (2004) in their proposed model believed that anxiety had no significant impact on intention. The justification for this finding could be that researchers understand that open access journals are a media that is used in scholarly communication for both high and low quality journals. For example, the quality of papers published in open access journals such as BMC and PLoS was highly acceptable for most of the researchers in medical area, despite the existence of some low quality open access journals in this domain. Furthermore, although the number of ISI indexed open access journals are not as much as subscription-based journals, most of the high quality open access journals were indexed and archived in PubMed Central and PubMed, which are valuable databases for researchers in the medical area. Despite the researchers' concerns, open access is already a growing movement; otherwise, publishers would not be in a hurry to create open access journals if they did not think there was a growing market for it. Hence reducing the concerns of researchers about open access might change the minds of those other investigators who are unaware of, or indifferent to the opportunities that this system offers (Hubbard, Hodgson & Fuchs, 2011).

Intention to Use Open Access Journals: The result of hierarchical multiple regression analysis indicated that intention to use open access journals ($\beta = .266$, $p < .001$) was a significant predictor of the use of open access journals. It can be concluded that the researchers who had the intention to use open access journals in the future had used these journals more than those who thought the contrary. This finding was consistent with findings of several previous studies (Chau & Hu 2001; Chismar & Wiley- Patton 2003; Davis, Bagozzi & Warshaw 1989; Sheppard, Harwick & Warshaw 1988; Venkatesh et al., 2003, cited in Schaper & Pervan, 2004) as well as findings of some other studies (Al-Gahtani, Hubona & Wang, 2007; Wills, El-Gayar & Bennett, 2008; Jong & Wang, 2009; Dulle & Minishi-Majanja, 2011) which showed the influence of intention to use on the acceptance of technology.

Gender: The results of hierarchical multiple regression analysis in this study indicated that gender of researchers did not have significant influence on intention to use and use of open access journals. This finding was different from the finding of Park (2007) where change in intention regarding open access publishing for male group was greater than female group. Also this finding was different from the finding of Al-Shafi, Weerakkody & Janssen (2009) that gender was significant predictor of usage behavior contradicted this study.

Age: The results of hierarchical multiple regression tests indicated that younger and older age groups did not have a significant influence on intention to use open access journals. This finding confirmed the result of Park (2007) that showed age was not a significant predictor of behavioral intention in using open access. Also, findings from hierarchical multiple regression analysis in this study indicated that younger and older age groups did not have a significant influence on the use of open access journals. Similar to this finding,

Al-Shafi, Weerakkody & Janssen (2009) indicated that younger and older age groups did not have a significant influence on the use of e-government services in Qatar.

Academic rank: Finding of hierarchical multiple regression analysis in this study indicated that academic rank was not a significant predictor of intention. Influence of academic rank on use of open access journals was significant ($\beta = .168$, $p < .01$). The result indicated that Full and Associate Professors used open access journals more than Assistant Professors and Lectures. One possible explanation for this result could be that due to their experience, Full and Associate Professors had more articles to submit to journals. Furthermore, possibly Full and Associate Professors were in a better economic condition to submit papers to open access journals that publish by charging authors.

Field of study: Results of hierarchical multiple regression analysis showed that the field of study did not have a significant influence on the use and intention to use open access journals. Although it was expected that the field of study would be an influential predictor of intention and use due to more chances of basic science researchers to do research, the result of multiple regression was inconsistent with this probability. However, both clinical and basic science researchers were academic staff members and needed to do research for their carrier benefits.

Type of university: In this study finding from hierarchical multiple regression analysis indicated that the type of university had a significant influence on the use and intention to use open access journals. The beta coefficient for type of university ($\beta = -.167$, $p < .01$) shows that researchers in Type Two and Type Three universities had more intention to use open access journals to publish their works. The beta coefficient for type of university ($\beta =$

.124, $p < .05$) showed that the use of open access journals in Type One universities was more than Type Two and Type Three universities. One explanation for this result perhaps is that researchers in Type One universities knew about the open access earlier, started to use it. They later noticed that there were some difficulties (high publishing fee, low peer-review in some of these journals which were not considered for carrier benefit) in using system; therefore, they had less intention to use it in the future. In contrast, researchers in Type Two and Type Three universities had recently acquainted themselves with the new publishing option and wanted to try it in the future.

Familiarity: Result of hierarchical multiple regression analysis indicated that familiarity did not have a significant influence on intention to use open access journals. However, the influence of familiarity on use of open access journals was significant ($\beta = .122$, $p < .05$). Therefore, familiarity/un-familiarity of researchers had influenced their use of open access journals. This finding was consistent with situational awareness, which holds that situational awareness (familiarity) appears to be linked to performance (Klein, 2000). It was also supported by the finding of Dulle & Minishi-Majanja (2011) which indicated that awareness had a significant influence on intention to use open access publishing.

Experience: In this study, findings from hierarchical multiple regression analysis indicated that experience ($\beta = .262$, $p < .001$) had a significant influence on intention to use open access journals. The result suggests that previous experience of researchers with open access journals had a significant influence on their intention to use these journals in the future. This finding was inconsistent with findings of Carter & Schaupp (2008) that showed that e-filing experience in a previous year did not influence on the intention to use an e-file system in the future.

4.3.5.2.4 Summary of Hierarchical Multiple Regression Analysis

Table 4.36 shows the significant variables in acceptance of open access publishing based on two rounds of hierarchical multiple regressions.

Table 4.36: Significant Factors in Acceptance of Open Access Publishing

Predictor(IVs)	DVs	Beta
Experience	Intention	***.262
Attitude	Intention	***.258
Facilitating	Intention	** .203
Type of university	Intention	**-.167
Intention	Use	***.266
Social influence	Use	***-.200
Attitude	Use	*.180
Academic rank	Use	** .168
Facilitating	Use	*-.124
Type of university	Use	*.124
Familiarity	Use	*.122

***p<.0001; **p<.01; *p<.05

Hierarchical multiple regressions were used to assess the ability of seven predictor variables (attitude, facilitating conditions, effort expectancy, performance expectancy, anxiety, social influence, author-pays) to predict intention of researchers to use open access journals, after controlling the influence of demographic variables (experience, type of university, familiarity, gender, age, academic rank and field of study). Demographic variables explained 11.8% of the variance in intention of researchers to use open access journals. Seven constructs explained 12.3% of the variance in intention, after controlling demographic variables. The total variance explained and explored by the model as a whole was 24.1%, $R^2=.24.1$, $F(14,287) = 6.502$, $p<.001$. In the final model (step 8) only four variables were statistically significant, with experience recording a higher beta value ($\beta=.262$, $p<.001$), followed by attitude ($\beta=.258$, $p<.001$), facilitating conditions ($\beta=.203$, $p<.01$) and type of university ($\beta=-.167$, $p<.01$).

Also in order to test the ability of eight predictor variables (intention, attitude, performance expectancy, effort expectancy, anxiety, social influence, concerns with author-pays and facilitating conditions) to predict use of open access journals, the control

for the influence of demographic variables (academic rank, familiarity, type of university, field of study, gender and age) was done. Six demographic variables explained 6.1% of the variance in the use of open access journals. Also eight predictor variables explained 16.2% of the variance in the use of open access journals, after controlling demographic variables. The total variance explained by the model as a whole was 22.3%, $R^2=22.3$, $F(14,286) = 6.203$, $p<.001$. In the final regression model, seven variables were statistically significant, with intention recording a higher beta value ($\beta= .266$, $p<.001$), followed by social influence ($\beta= -.200$, $p<.001$), attitude ($\beta= .180$, $p<.05$), academic rank ($\beta= .168$, $p<.01$), facilitating conditions ($\beta= -.124$, $p<.05$), type of university ($\beta= .124$, $p<.05$) and familiarity ($\beta=.122$, $p<.05$). Figure 4.3 shows the significant factors on intention to use and also use of open access publishing with beta values based on two rounds of hierarchical multiple regressions.

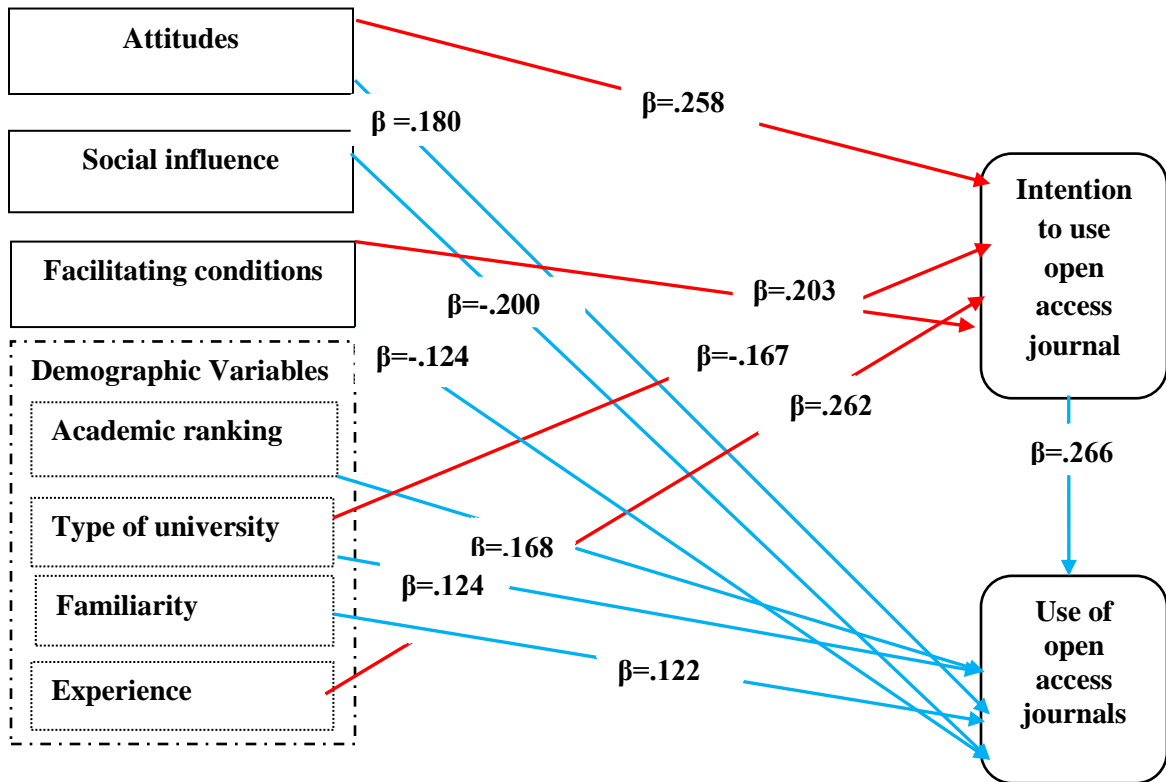


Figure: 4.3 Visual Diagram of Significant Factors in Acceptance of Open Access Publishing

4.3.5.3 Moderating Role of Demographic Variables

Besides exploring the direct influence of demographic variables on outcome variables, their moderating function was also investigated. Moderation means that the effect of one variable on another is different depending on a third variable. There are several ways to test the effects of moderator, but the most commonly used procedure is through the use of multiple regression (Jex, 2002 citing Cohen & Cohen, 1993). An interaction in multiple regression is referred to as a moderating relationship. It is needed to see whether the interaction is a predictor of scores on the dependent variable. In order to test the moderating role of demographic variables through regression, first, data should be centered on continuous independent variables. It means that for each independent variable, each score should be subtracted from the mean of the scores on that variable. So anyone whose score is at the mean will have a centered score of zero. Second, the centered scores on each of the two independent variables are multiplied together to give an ‘interaction’ score for each respondent. Third, the centered predictors and the interaction scores are entered into multiple regression analysis. The interaction is significant if the regression coefficient for interaction scores is shown to be significant (Foster, Barkus & Yavorsky, 2006 citing Howell, 2002). In the present study demographic variables were already considered in a dummy format and coded 0 and 1. Therefore, the centering was only conducted on predictor variables. Then the centered predictors and demographic dummy variables were used to create an interaction term. According to Reis & Judd (2000) when moderator variable is dichotomous, it is necessary to run separate regression tests at each level of the moderator variable.

A series of multiple regression tests were conducted to find out whether interaction of proposed factors and demographic variables on outcome variable is significant or not. It should be noted that experience was only demographic variable for intention to use open

access journals; therefore the interaction of this demographic variable with factors was only created for intention. Also, in this study, intention to use open access journals besides being an outcome variable, was also used as an independent variable for use of open access journals, therefore, interactions of this factor with demographic variables for use of open access was also created. Table 4.37 indicates the interactions of seven factor and seven demographic variables on intention to use open access journals.

Table 4.37: Interaction of Factors and Demographic Variables on Intention to Use Open Access Journals

Interaction	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Attitude*Type	.128	.150	.067	.851	.395
Attitude*Experience	-.036	.125	-.020	-.288	.773
Attitude*Age	.208	.163	.076	1.275	.203
Attitude*Gender	.022	.173	.013	.126	.900
Attitude*Field	.043	.146	.020	.294	.769
Attitude*Ranking	.289	.158	.110	1.825	.069
Attitude*Familiarity	.028	.152	.012	.183	.855
FC*Gender	-.055	.212	-.027	-.257	.797
FC*Age	-.297	.190	-.101	-1.564	.119
FC*Field	.060	.179	.025	.335	.738
FC*Ranking	-.122	.197	-.039	-.617	.538
FC*Type	-.032	.182	-.014	-.177	.859
FC*Familiarity	-.380	.184	-.138	-2.069	.039
FC*Experience	.137	.172	.054	.793	.428
SI*Age	-.168	.141	-.076	-1.191	.235
SI*Gender	.098	.149	.071	.658	.511
SI*Field	-.131	.127	-.079	-1.030	.304
SI*Ranking	.009	.139	.004	.068	.946
SI*Type	.198	.128	.124	1.545	.123
SI*Familiarity	.007	.129	.004	.056	.956
SI*Experience	-.133	.124	-.084	-1.077	.282
PE*Gender	-.107	.182	-.055	-.588	.557
PE*Rank	.271	.175	.101	1.552	.122
PE*Field	.177	.165	.075	1.072	.285
PE*Age	-.002	.176	.000	-.012	.990
PE*Type	.160	.171	.077	.940	.348
PE*Experience	.191	.162	.086	1.182	.238
PE*Familiarity	-.022	.171	-.009	-.131	.896
EE*Gender	.134	.182	.070	.738	.461
EE*Rank	.126	.178	.044	.705	.482
EE*Field	.031	.164	.015	.188	.851
EE*Age	-.039	.179	-.014	-.217	.828
EE*Type	.052	.168	.025	.311	.756
EE*Experience	.241	.160	.107	1.502	.134
EE*Familiarity	-.027	.175	-.010	-.151	.880

FC (facilitating conditions), SI (social influence), PE (performance expectancy)

Table 4.37, continued

Interaction	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Anxiety*Gender	.178	.175	.106	1.015	.311
Anxiety *Rank	.108	.180	.037	.600	.549
Anxiety *Field	.248	.153	.126	1.621	.106
Anxiety *Age	.234	.170	.089	1.373	.171
Anxiety *Type	.291	.157	.157	1.855	.065
Anxiety *Experience	-.133	.152	-.071	-.872	.384
Anxiety *Familiarity	.038	.156	.018	.242	.809
Author-pays*Gender	-.094	.148	-.057	-.638	.524
Author-pays*Rank	-.064	.151	-.028	-.424	.671
Author-pays*Field	-.107	.140	-.063	-.767	.444
Author-pays*Age	-.185	.148	-.083	-1.249	.213
Author-pays*Type	.462	.139	.258	3.319	.001
Author-pays*Experience	.050	.136	.028	.370	.712
Author-pays*Familiarity	-.123	.147	-.056	-.839	.402

The results of multiple regression analysis indicated that the interaction of concerns with author-pays and type of university on intention to use open access journals was significant ($p < .001$). This result meant that the influence of concerns with author-pays on intention to use open access journals for researchers in Type One universities was higher than researchers in Type Two and Three. Also the results indicated that, the interaction of facilitating conditions and familiarity on intention to use open access journals was significant ($p < .05$). This means the influence of facilitating conditions on intention to use open access journals for the familiar researchers was higher than unfamiliar ones. The remaining interactions of intention to use open access journals were insignificant.

Table 4.38 indicates the interactions of eight factor and six demographic variables on use of open access journals.

Table 4.38: Interaction of factors and Demographic Variables on Use of open access journals

Interaction	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Attitude*Type	-.009	.225	-.003	-.039	.969
Attitude*Age	.199	.243	.050	.820	.413
Attitude*Gender	.005	.261	.002	.021	.983
Attitude*Field	.009	.225	.003	.041	.967
Attitude*Ranking	.189	.233	.050	.813	.417
Attitude*Familiarity	.295	.227	.084	1.302	.194
FC*Gender	-.024	.313	-.008	-.078	.938
FC*Age	.053	.281	.012	.189	.850
FC*Field	.129	.269	.037	.480	.632
FC*Ranking	.412	.285	.092	1.446	.149
FC*Type	-.276	.270	-.083	-1.025	.306
FC*Familiarity	-.251	.270	-.063	-.929	.353
SI*Age	.044	.205	.014	.214	.830
SI*Gender	.290	.217	.144	1.338	.182
SI*Field	-.033	.189	-.014	-.177	.860
SI*Ranking	.064	.199	.020	.320	.749
SI*Type	.154	.188	.067	.819	.414
SI*Familiarity	.314	.185	.126	1.700	.090
PE*Gender	-.268	.271	-.093	-.989	.323
PE*Rank	-.028	.254	-.007	-.108	.914
PE*Field	.071	.251	.020	.284	.777
PE*Age	.000	.260	.000	-.003	.997
PE*Type	-.080	.254	-.026	-.313	.754
PE*Familiarity	.153	.252	.041	.608	.544
EE*Gender	.074	.265	.027	.278	.781
EE*Rank	.357	.255	.087	1.402	.162
EE*Field	-.058	.244	-.019	-.239	.811
EE*Age	.176	.260	.043	.677	.499
EE*Type	.106	.245	.035	.434	.665
EE*Familiarity	.321	.252	.082	1.274	.203
Anxiety*Gender	-.215	.259	-.086	-.827	.409
Anxiety *Rank	.222	.261	.053	.851	.396
Anxiety *Field	.134	.232	.045	.576	.565
Anxiety *Age	.454	.249	.118	1.826	.069
Anxiety *Type	.283	.234	.103	1.212	.226
Anxiety*Familiarity	-.039	.229	-.013	-.170	.865
Author-pays*Gender	-.612	.214	-.254	-2.862	.004
Author-pays*Rank	-.077	.217	-.023	-.356	.722
Author-pays*Field	-.082	.208	-.032	-.394	.693
Author-pays*Age	.230	.216	.071	1.066	.287
Author-pays*Type	.073	.207	.028	.355	.722
Author-pays*Familiarity	-.232	.213	-.072	-1.091	.276
Intention* Gender	.100	.170	.060	.590	.556
Intention*Rank	.040	.148	.017	.268	.789
Intention*Field	-.092	.150	-.046	-.612	.541
Intention*Age	.242	.162	.089	1.499	.135
Intention*Type	-.007	.154	-.004	-.046	.963
Intention*Familiarity	.255	.143	.125	1.777	.076

FC (facilitating conditions), SI (social influence), PE (performance expectancy)

The results of multiple regression analysis indicated that interaction of concerns with author-pays and gender on use of open access journals was significant ($p < .01$). It means that influence of concerns with author-pays on use of open access journals for female researchers was higher than male ones.

The results of multiple regression tests in this study indicated that the gender of researchers had moderating role between one factor (concerns with author-pays) and one outcome variable (use of open access journals). This finding was in agreement with findings of prior studies (Venkatesh et al., 2003; Bandyopadhyay & Fraccastoro, 2007) that showed moderating role of gender between performance expectancy, effort expectancy, and social influence toward behavior intention. Also gender was a moderator of facilitating conditions towards usage behavior (Venkatesh et al., 2003). The finding of this study regarding the moderation role of gender was consistent with findings of Dulle & Minishi-Majanja (2011) which showed that gender moderated the influence of effort expectancy towards researchers' behavioral intention towards open access usage. It also moderated the effect of social influence towards open access usage. In contrast, this finding of present study was inconsistent with the findings of previous studies (Kripanont, 2007; Al-Gahtani, Hubona & Wang, 2007) which showed that constructs were not moderated by gender.

In the present study, age did not moderate interaction of constructs and outcome variables. This finding was inconsistent with some prior studies (Venkatesh et al., 2003; Schaper & Pervan, 2004; Al-Gahtani, Hubona & Wang, 2007; Bandyopadhyay & Fraccastoro, 2007; Kripanont, 2007; Dulle & Minishi-Majanja, 2011) that showed age as a significant moderator.

In this study experience did not moderate the interaction of constructs and outcome variables. This finding of the study was consistent with findings of Kripanont (2007) which

indicated that experience was not a significant moderator in his study. While this finding was inconsistent with some previous studies (Al-Gahtani, Hubona & Wang, 2007; Bandyopadhyay & Fraccastoro, 2007; Schaper & Pervan, 2004; Venkatesh et al., 2003) which reported that experience was a significant moderator of behavioral intention. Also this finding was inconsistent with findings of Dulle & Minishi-Majanja (2011) which indicated that experience was a significant moderator between effort expectancy and intention to use open access publishing. It also moderated the effect of social influence towards use of open access publishing.

4.3.6 Additional Comments by Researchers

Respondents were asked to add any additional comments if they wished. Out of 367 researchers only 19 wrote in the comments section at the end of the survey. Comments were categorized on following order:

Quality of peer-review: Quality of peer-review was one of important factors in choosing a journal to publish in. Regarding the quality of peer-review in open access journals one researcher wrote that:

“I emphasis that, some open access journals give so fast acceptance, despite papers have so many scientific error. These journals [with no or low peer-review] are not comparable with BMC journals that have so high scientific value”.

Quality: Quality of journal had an influence on researchers’ career benefits. For instance one researcher noted that:

“Some of the open access journals that were low quality and asked for a publishing fee did not have any career benefits for authors in Iran. While, despite the author charge,

publishing in open access journals such as PLOS and BMC, added to the value and validity of papers, and the authors enjoyed publishing benefit in these journals”.

Another researcher wrote that:

“One of the important factors to promote use of open access journals is planning to publish high quality papers in these journals. Although easy access and also access to full text are so important, accessing to valuable scientific papers that have new ideas is more important”.

Also, one other researcher again highlighted that:

“Most of BMC open access journals are almost excellent journals”.

The ranking of open access journals like subscription-based ones was offered by one researcher.

Charge of author: Now besides open access journals, some of the established subscription-based journals have an open access option for authors to make their paper accessible, if they pay the cost. One researcher wrote that:

“I was asked to pay about 3000\$, in order to make my paper open access, but because of the high amount of the asking price as well as doubts about the university contribution in this case, the offer was rejected”.

Generally, to pay huge amounts of money to make a work open access is almost unaffordable for most of the researchers and even research centers in developing countries.

Another researcher said:

“Unfortunately to pay for publishing still is not accepted by most of academic staff”.

Also one researcher mentioned that:

“There is negative thought and idea of some colleagues regarding these journals because of publishing fee. According to them poor papers that are not published in subscription based journals are submitted to open access journals [due to payment]”.

Facilities: In order to use of open access journals, some requirements are essential. One researcher wrote that:

“Accessing to scientific recourses [open access outlets] is depends on access of high speed Internet; therefore, in order to use these resources, scientific centers firstly should provide high speed Internet”.

Another researcher suggested that:

“In order to archive scientific outputs, enough facilities and venues should be provided. Furthermore, publicizing open access journal and its advantage is important to use the system”.

It seems this researcher emphasis on accessing open access materials than publishing through open access journals.

Out of 19 researchers who had provided comments, eight were in favor of crating awareness about open access. According to one researcher:

“There is lack of awareness about open access journal even among responsible persons. They should support this kind of journals. These journals are better than most of local and regional journals due to larger readerships”.

It should be noted that Iranian open access journals do not charge authors for publishing; this gives the impression that this researcher does not consider them as open access and only journals that charge authors are considered as open access. Another researcher noted that:

“In our country still open access is not accepted, therefore responsible persons should try to introduce this new system. In order to use open access, enough facilities such as archive should be provided, then it would be possible to use research findings in shortest time”.

The influence of awareness was obvious with the next two comments. Some two researchers were pleased because of their acquaintance with open access. In this study, one researcher noted that:

“I acquire useful information regarding open access”.

And another said that:

“Because of this study, I searched about open access and I found it interesting; therefore I am going to submit my paper to this kind of journals”.

Furhermore, one researcher who was familiar with this system mentioned that:

“Attention to this topic with considering increasing trend to open access journals is splendid”.

Additionally, some of the researchers had suggestions regarding awarness compoigns. One suggested that the awareness of academic staff and students about these journals should be prioritized. Another researcher said if there is a possibility to train others using open access system online, it would promote the use of this system. Likewise another researcher suggested that awarness about these journals should be emphasized through workshops.

Copyright limitation: Copyright limitation is a barrier in intention to archive in an open access archive. One researcher had concerns about copyright limitation for archiving. It is noted that:

“Some papers may have copyright limitation; therefore, it is not possible to archive these kinds of papers in university archive”.

However, as stated by Bjork et al. (2010) a majority of international publishers actually allowed the posting of some versions of published articles, sometimes after a delay, in such repositories. Awareness about this scenario may encourage researchers to archive in the future.

Problems with credit card and page number: Two different challenges in using open access journals that mentioned by a researcher. He wrote:

“One of the problems in submitting paper to this kind of journals is lack of easy access to international credit cards in Iran”.

The payment of publishing fees of open access paper was mainly done by using credit cards, but, due to embargo researchers in Iran may face with some difficulty in using international credit cards. Also he commented that:

“Some of these journals did not have page number; therefore, universities did not consider these kinds of journals for career benefits”.

However, there were two differences between open access journals and subscription-based journals that had print format too. Online-only open access journals instead of page number have a unique article number. Also as a replacement for issue numbers, each volume corresponds to a calendar year (based on data available online on 24 November 2010 at <http://www.biomedcentral.com>). Furthermore, it should be noted that journals' evaluation committee in Iran take into account the published papers in BMC and PLoS open access journals.

Publish with condition: A few researchers pointed out the conditions on which they were going to publish in open access journals. One said:

“Of the important factors for me in choosing a journal to publish a paper is high impact factor, fast publication, being special journal in my area, being open access and without author charge”.

It seems for this researcher being open to access is an encouragement feature of open access journals while author charge is not.

The other said:

“I will publish in open access journals if journal has impact factor”.

Also another researcher wrote:

“I will publish in open access journals only if it relevant my field”.

Summary of comments: Overall, researchers wrote some of their concerns and barriers that may prevent them to use the open access system. Comments were about quality of peer-review in open access journals, awareness about these journals, copyright, ICT, author charge and misconception about it, problem with credit card and lack of page numbers in these journals. Additionally, few researchers have condition to publish in these journals. Some researchers had suggestions to promote the use of open access journals. However, the suggestions implied that there were problems that were faced by respondents; therefore they gave some ideas to solve some of them.

4.3.7 Summary of Chapter 4

This chapter started with a concise report of preliminary interview and was followed with a descriptive statistics (frequency and percentage) of returned questionnaire, demographic profile of respondents as well as response to first research question and its sub-questions via descriptive statistics. Assessment of data quality through validity, reliability and normality of research measurement as well as response to second research

question started with the ranking based on mean score for seven independent variables (constructs) and two dependent variables, and was followed by use of hierarchical multiple regression. The hierarchical multiple regression procedure was used to evaluate the relative importance of independent variables in predicting dependent variables. The findings from two hierarchical multiple regression tests indicated that experience, attitude, facilitating conditions and type of university were the significant predictors of intention to use open access journals; also intention, academic rank, attitude, social influence, facilitating conditions, type of university and familiarity were the influential predictors of use of open access journals. Also findings of study regarding research questions were discussed in relation to findings of previous studies. In next chapter summary of findings, limitations of study, conclusion, recommendations and concluding statement are presented.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter begins with a summary of the research findings, followed by developing conclusions from the findings and recommendations for improving acceptance of open access publishing as well as recommendations for further research as a possible extension and reducing limitations of this study. Finally the concluding statement is made to wrap up the study.

The purpose of this study was to investigate the current status of familiarity and experience with open access among medical researchers of Iran and also to determine the factors that influence acceptance of open access publishing among them. In order to achieve the aim of the study, the researcher designed a conceptual framework based on review of the literature (Section 2.2.5.24 of Chapter 2) and used the survey approach to gather data. Hierarchical multiple regression analysis was used to investigate the medical researchers' perceptions regarding the proposed influential factors on acceptance of open access publishing (Chapter 3). The findings from the survey data indicated current status of experience and familiarity with open access as well as the factors that influence the use and intention to use open access journals (as representation of acceptance) among medical researchers. Also the findings of the study were discussed and linked with the findings of previous studies (Chapter 4). A summary of major findings, limitations of the study, conclusions, implications of study at both theoretical and practical levels and concluding statement were made (Chapter 5).

5.2. Summary of Major Findings

In general the familiarity of researchers with 13 terms, initiatives, and services of open access was rather low (in all categories less than 50%). Medical researchers showed the highest familiarity with PubMed Central (47.4%) and the researchers' lowest familiarity (6.8%) was with subject-based repositories. The researchers came to know these terms, initiatives, and services of open access through such ways as discovering on Internet (71.4%), find by discipline literature (34.6%) and through colleagues (30.2%).

The researchers used six open access services including open access journals, Iranian open access journals, DOAJ, BMC, PLoS and PubMed Central more as readers than authors. Near half (47.7%) of the researchers had not submitted any manuscripts to open access journals and the remaining 52.3% had submitted between one to five times. Out of 50.7% of the researchers who had published in open access journals, 34.4% did not pay publishing fee, 27.4% used personal funds and 33.4% used grant or institutional funds to pay publishing fee.

The medical researchers had low self-archiving experience; only 4.4% had pre-print practice and 16.7% had post-print archiving experience. The majority of researchers (71%) were keen to archive, if their respective universities set up an institutional repository. A majority of 98.4% of the researchers believed that publishing in open access journals and 88.3% thought that archiving should be voluntary.

Based on the mean scores, the factors in their order of importance were facilitating conditions with mean score of 5.98, effort expectancy with mean score of 5.88, performance expectancy with mean score of 5.42, attitude with mean score of 5.26, concerns with author-pay with means score of 4.89, social influence with mean score of 4.46 and anxiety with mean score of 4.27. Intention to use open access journals and use of

open access journals as signs of acceptance obtained mean score of 5.15 and 1.76 respectively.

Results of the hierarchical multiple regression analysis indicated that demographic variables (experience, type of university, familiarity, gender, age, academic rank and field of study) and constructs (attitude, facilitating conditions, effort expectancy, performance expectancy, anxiety, social influence and author-pays) combined together accounted for 24.1% of the variance in intention to use open access journals. The most important factors influencing intention to use open access journals were, experience with the highest beta value ($\beta = .273$, $p < .001$), followed by attitude ($\beta = .258$, $p < .001$), facilitating conditions ($\beta = .203$, $p < .01$) and type of university ($\beta = -.167$, $p < .01$). Also results of the hierarchical multiple regression analysis indicated that demographic variables (academic rank, familiarity, type of university, field of study, gender and age) and constructs (intention, attitude, performance expectancy, effort expectancy, anxiety, social influence, concerns with author-pays and facilitating conditions) combined together accounted for 22.3% of the variance in the use of open access journals. The most influential factors in the use of open access journals in their order of importance were, intention that recorded the highest beta value ($\beta = .266$, $p < .001$), followed by social influence ($\beta = -.200$, $p < .001$), attitude ($\beta = .180$, $p < .05$), academic rank ($\beta = .168$, $p < .01$), facilitating conditions ($\beta = -.124$, $p < .05$) type of university ($\beta = .124$, $p < .05$) and familiarity ($\beta = .122$, $p < .05$).

Furthermore, the influence of concerns with author-pays on use of open access journals was moderated by gender ($p < .01$). The influence of concerns with author-pays on intention to use open access journals was moderated by type of universities ($p < .001$). Also the influence of facilitating conditions on intention to use open access journals was moderated by familiarity ($p < .05$).

5.3 Limitations

The present study has the following limitations with regard to methodology and data analysis.

First, this study was conducted in one country and the sample was nationally representative, hence the results could be generalized to other countries with similar conditions.

Secondly, this study was limited to the academic staff in medical faculties of public medical universities as well as related hospitals and research centers, therefore generalization of the findings to the other groups in medical sectors in Iran or other disciplines should be carried out with caution.

Thirdly, this study was conducted only from the perspective of medical researchers with the assumption that they are both providers and consumers of scholarly outputs, therefore, the results could be generalized to other groups who play role in open access with caution.

Fourthly, in terms of the use of open access journals, self-reporting of manuscript submission to these journals by researchers was verified, the actual use measures by accessing real observed usage data such as log files was not possible to use in open access journals.

Fifthly, this study used a survey technique that was done in a cross-sectional study where data were taken once within the duration of this study.

Sixthly, the current study analyzed familiarity with regard to the terms, initiatives and services of open access at a descriptive level and familiarity was only included as a demographic variable in regression models.

Seventhly, this research was not specifically designed to evaluate the factors that related to self-archiving or institutional repositories due to lack of these kinds of archives in medical universities at the time of conducting this study.

Eighth, the factors in this study explained only 24.1% of the variance in intention and 22.3% in use of open access journals. It seems there were other additional factors that were important in explaining variance in acceptance of open access publishing.

Ninth, this study used only hierarchical multiple regression to determine the influential factors in acceptance of open access publishing.

Tenth, in order to use frequency of manuscript submission to open access journals as a measure of the use of open access journals in hierarchical multiple regression, five times and above was considered as just five times.

5.4 Conclusions

In this section conclusions regarding the research questions and sub-questions of study are presented.

5.4.1 Current Status of Familiarity and Experience with Open Access

Although, the health domain in Iran is the first sector that provided open access to scholarly journals and is the most popular area for open access journals with 41 journals out of 55 based on search on 19 March 2010 on DOAJ (it also increased to 59 journals based on 15 July 2011 search on DOAJ), findings of study suggested that in general there was low level of familiarity with terms, initiatives and services of open access. The Internet was the most popular channel to discover the terms, initiatives and services of open access by researchers.

Researchers used the open access services (open access journals, Iranian open access journals, DOAJ, BMC, PLoS and PubMed Central) more as an accessing media rather than publishing channel for their scholarly outputs. Based on the findings of study (47.7% of the researchers had no experience with open access journals), it can be concluded that researchers had low experience with these journals. Prior experience of researchers with open access journals can be considered as a sign of acceptance of these journals by researchers; therefore, it seems that nearly half of them had not accepted this media as a publishing channel for their articles. However, a majority of them intended to use this channel in the near future.

Of the researchers who published in open access journals, only one third of them had financial support while more than one fourth of them used personal budget to cover publishing cost. It can be concluded that there was lack of financial funds to publish especially in high quality open access journals.

Based on findings of this study it can be concluded that archiving pre/post-print in publicly accessible websites was not a widespread practice among researchers of the present study. Researchers had low archiving experience. Despite low familiarity of researchers with terms such as self-archiving, institutional repository as well as low archiving experience, it seems majority of them were keen to deposit their works into their institutional repository, if it was provided by their respective universities. Also, based on findings of this study it can be concluded that publishing in open access journals and archiving in an institutional repository should be voluntary.

5.4.2 Primacy of Proposed Factors on Acceptance of Open Access Publishing

The ranking of proposed factors on acceptance of open access publishing in their order of importance were facilitating conditions, effort expectancy, performance

expectancy, attitude, concerns with author-pays, social influence and anxiety. Based on the findings of this study, it can be concluded that the facilitating conditions or providing requirements, effort expectancy or ease of using system and attitude of researchers regarding open access were important, while social influence was relatively important factors in the acceptance of open access publishing. Anxiety and concerns with author-pays were relatively important barriers in the acceptance of open access journals.

5.4.3 Significant Factors on Acceptance of Open Access Publishing Hierarchical Multiple Regression

Figure 5.1 shows the significant factors influencing the acceptance of open access publishing in terms of intention to use and use of open access journals based on two rounds of hierarchical multiple regression analysis.

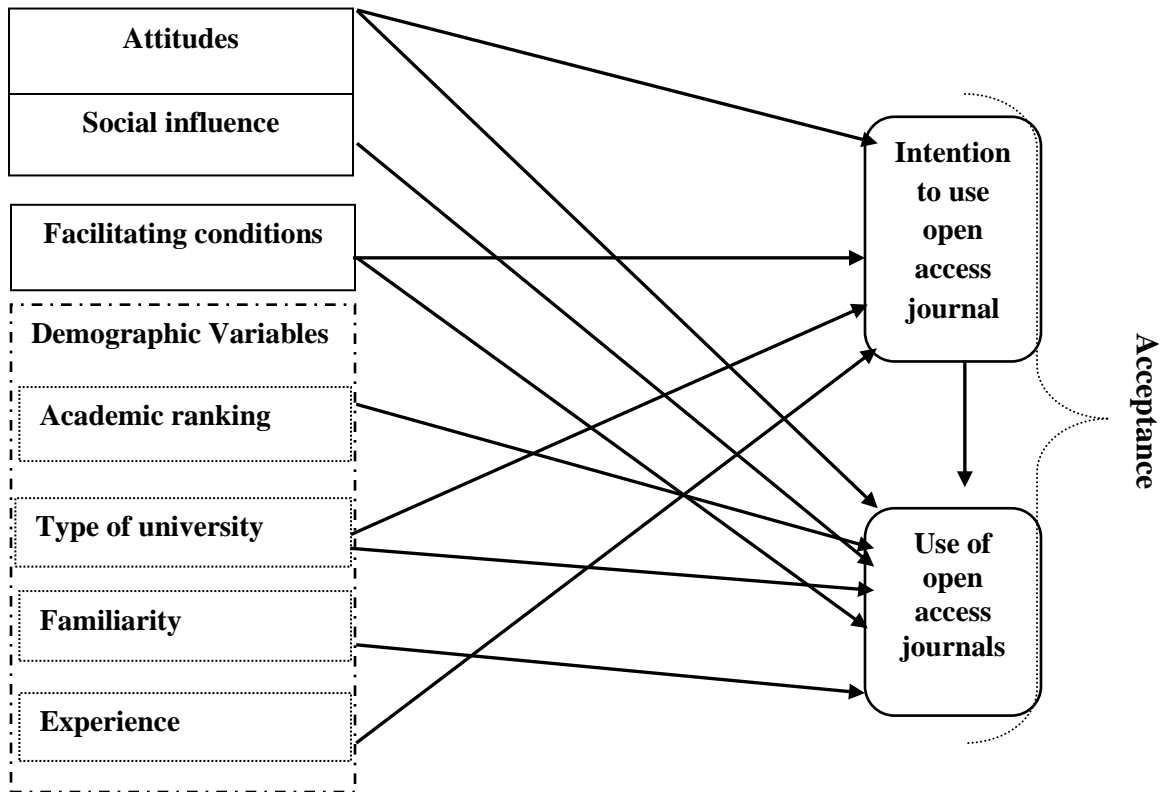


Figure: 5.1 Significant Factors in Acceptance of Open Access Publishing

As Figure 5.1 suggests, attitude, facilitating conditions, experience and type of university were significant regarding the intention to use open access journals. Also, attitude, social influence, facilitating conditions, academic rank, type of university and familiarity significantly manipulated self-reported use of open access journals.

Although the acceptance of open access journals depends on positive attitudes of researchers, it will be effective if it is linked with actual practice. Findings of this study indicated that while in general the researchers had positive attitudes towards open access, they had low publishing through this media. However, based on the findings of this study, the researchers who had positive attitudes towards open access, used these journals more and also had intention to use them in the future; therefore it can be concluded that attitude was not a major barrier in the acceptance of open access system by researchers in this study. However, it still was necessary to ensure the positive views of almost all of the researchers regarding this media in order to promote its usage as a scholarly communication channel.

Based on finding of this study it can be concluded that the researchers who thought facilitating conditions were important, had more intentions to use open access channels than those who believed the contrary. While the researchers who thought facilitating conditions were important as an influential factor, published less through open access channels than those who thought the contrary. Equal and free access to research finding is an agreeable idea for most of researchers, hence there is a need for researchers in developing and developed countries to have equal facilities to publish in open access journals. Access to ICT facilities, initiatives to awareness and more important equal access to research grants, institutional grants and grant bodies are among essential requirements to publish and share the research findings through an established open access journal.

The results suggested that the researchers, who had stronger intention to publish in open access journals in the future, published more in these journals.

The results revealed that, the researchers who had stronger intention to publish through open access journals in the future were those who already had published in these journals. Besides, the results of this study suggested that, the researchers who thought social influence was important published less through open access channel than those who thought the contrary.

The findings of this study suggested that while the researchers in Type One universities used open access journals more than researchers in Type Two and Type Three universities, the researchers in Type Two and Type Three universities had greater intentions to use these journals in the future.

The findings suggested that the previous experience of researchers in using open access journals influence their intention to use these journals in the future.

Based on findings of study it can be concluded that the researchers who were familiar with open access journals used them more than the researcher who were not familiar with them. Also the findings suggested that the researchers who were Full Professors or Associate Professors used open access journals more than Assistant Professors and Lecturers. This suggested that high rank researchers had more previous experience in open access publishing.

Based on findings it can be concluded that personal characteristics (gender and age), professional status (field of study), benefits of using system (performance expectancy), ease of using system (effort expectancy) and concerns about open access were not significant influential factor in acceptance of open access publishing. Therefore, it can be concluded that, the construct factors (performance expectancy and effort

expectancy) did not have enough authority to encourage researchers in the acceptance of open access journals in the present study.

5.4.4 Moderating Role of Demographic Variables on Outcome Variables

The results of multiple regression analysis suggested that the influence of concerns with author-pays on intention to use open access journals for researchers in Type One universities was higher than researchers in Type Two and Type Three universities. The influence of concerns with author-pays on use of open access journals for female researchers was higher than males. Also the influence of facilitating conditions on intention to use open access journals for familiar researchers was higher than unfamiliar ones.

5.5 Recommendations

Based on the results of this study, several recommendations are presented for future research as well as promoting acceptance of open access publishing.

5.5.1 Recommendations for Research

This study investigated the factors influencing the acceptance of open access publishing. However, it was not possible to address all issues in one study and may be some questions remained unanswered which could require some additional research. Further study is necessary for answering these questions. Following are some recommendations for future studies reflecting the limitations of this study. Also some topics that may be interesting to some of the readers are proposed.

Firstly, longitudinal evidence is necessary to better understand the influential factors in the acceptance of open access publishing. Such a research would allow a more specific identification of factors and of their effects across time.

Secondly, several groups have role in open access as a scholarly communication media, hence further research need to be done to determine the perspective of policy makers of scholarly communication, researchers in other sectors, librarians, editors of scholarly journals as well as funding bodies. Such a research would allow a more broad perspective about the system.

Thirdly, the sample of this study were academic staff members in medical schools at public medical universities, hence a further study need to be done using a more comprehensive sample of researchers in different fields.

Fourthly, this study used only hierarchical multiple regression to determine the most important factors. Further investigations should be conducted using such analysis as Partial least squares regression (PLS-regression) or Structural Equation Modeling (SEM).

Fifthly, in this study only 24.1% of variance in intention and 22.3% of variance in use of open access journals was explained by proposed factors. It seems that there were other additional variables that were important in explaining researchers' intention and use of open access journals that have not been considered in this study, therefore further research is necessary.

Sixthly, this study was a quantitative research; further research should be done using qualitative research to examine the factors that influence the acceptance of open access publishing.

5.5.2 Recommendations for Practice

Results of this study could be useful for several groups such as administrators of universities, publishers of scholarly journals (or editorial boards, reviewers and editors), policy makers of scholarly publishing, researchers in different fields and librarians.

The result of this study indicated that a majority of researchers showed their willingness to archive in institutional repository if their respective universities provided it; therefore, authorities of universities should make decisions regarding its setting up. If depositing papers are considered for career benefits, probably this practice should be specially promoted among the relevant researchers.

Findings of study indicated that facilitating conditions had a significant influence on acceptance of open access publishing among medical researchers. Following recommendations are made for stakeholders of open access publishing:

- a. Provision of high speed Internet connectivity by universities.
- b. Providing researchers with necessary knowledge to use open access system by universities, libraries and librarians.
- c. Publishing high quality open access journal by publishers of open access journals.
- d. Considering higher credit for published articles in open access journals with same quality of non-open access journals by policy makers of scholarly journals.
- e. Financial support of researchers by universities, institutions and funding bodies for publishing cost of open access journals.
- f. Providing researchers with sufficient ICT skill by universities.

- g. Publicizing the advantages of open access by universities, libraries and librarians by means of workshops, seminars and websites of universities/libraries.
- h. Supporting publishing fee of open access journals through institutional membership by universities, therefore the burden of publishing fees would not be on the shoulders of researchers, and both researchers and universities would enjoy advantages of open access.
- i. Providing specific staff to assist with system difficulties by universities.

The findings of this study revealed that attitudes of medical researchers had significant influence on acceptance of open access journals. Based on this finding it is recommended that:

- a. Policy makers of scholarly communications could use positive attitudes of medical researchers to formulate a better scholarly publishing policy.
- b. Publishers of scholarly journals should consider positive attitudes of researchers in order to publish new open access journals or transit to open access system.
- c. Universities, libraries and librarians should focus on improving attitudes of researchers towards these journals through awareness campaigns.

This study found that while performance expectancy or advantages of open access system for researchers was a positive factor according to medical researchers, it had no significant influence on acceptance of open access publishing. Therefore, in order to introduce the advantages of open access, awareness campaigns should be conducted

through seminars and workshops among researchers. Libraries and librarians can play a critical role in this case.

The findings of this study revealed that social influence significantly manipulated the use of open access journals; therefore it is recommended that:

- a. Publishers of open access journals should employ top and well-known editorial board members, reviewers and editors to influence researchers on submitting their high quality papers to these journals.
- b. Also it is recommended that open access journals should publish articles of top researchers in the fields to influence other researchers.

The findings of this study indicated that researchers had some concerns that hinder the use of these journals. Based on this result following recommendation are made:

- a. Publishers and editorial boards of open access journals should improve quality and acceptance standards of these journals in order to be indexed in popular data bases such as ISI, Pub Med or Medline.
- b. Publishers and reviewers of open access journals should improve quality of peer-review or quality control in these journals.
- c. Editors and referees of open access journals should provide prominent comments for accepted articles to increase academic and managerial acceptance of these journals as valid dissemination media for academic and research content; therefore they were not assumed as articles published only due to payment.
- d. Universities, institutions and funding bodies should support researchers financially by considering publishing cost for high quality open access journals in research grant.

5.6 Concluding Statement

The main aim of this research was to determine the factors influencing the acceptance of open access publishing among medical researchers in Iran. The findings of this study provided a description of the current status of open access among Iranian medical researchers. It also determined the significant factors in acceptance of open access publishing based on a theoretical framework derived from the UTAUT model, as well as inclusion of attitudes and anxiety. This study besides reducing study gap at the national level, adds to the literature on open access research from perspective of medical researchers in developing countries at international level.

APPENDICES

Covering letter – Acceptance of Open Access Publishing Survey 2009

Dear Sir/Madam,

I am a PhD candidate in library and information science at University of Malaya. This questionnaire is seeking for information from you as a reader and author of scientific literature. The general aim of study is to investigate the factors that influence acceptance of open access model among medical academic staff of public universities in Iran.

We appreciate the value of your time and idea and thank you for voluntarily contributing to the research data. The questionnaire contains 9 sections, most requiring only a tick, while offering opportunities for additional comment, if desired. To fill the questionnaire should take less than 15-20 minutes and may be informative for you too.

The findings of this survey will give a powerful voice to the academic staff to express their views and concerns. The results may help to shape the debate about new publishing models for key decision makers too.

Your answer to the questions will be combined with responses obtained from other participants for analysis purposes. What will appear in the report will be average numbers and trends about what people think or believe about open access. All information provided via this survey will be kept confidential and any data used in final report will be anonymous.

Thank you
Leila Khalili
Khalili1384@yahoo.com

If you are interested to receive the study results of this survey please write your e-mail address:

Questionnaire – Acceptance of Open Access Publishing Survey 2009

Section One:

1. Which of the following names, services or terms are you familiar with or do you have any previous experience with? Please tick in the relevant box. (you may tick more than one box in some row)

	I am familiar with		
Self – archiving			
Author-pays model			
Pre-print /post-print			
Creative Commons		I use them as author	I use them as a reader
Open access journals			
Iranian open access journals			
Institutional Repository (IR)			
Subject-based repository			
Directory of Open Access journals (DOAJ)			
Bio Med Central (BMC)			
Public Library of Science (PLoS)			
Pub Med Central (PMC)			
Electronic Thesis and Dissertations (ETDs)			

2. How did you know about them?

- Through colleague
 I discovered them on Internet
 I discovered them in my discipline literature
 Others (please specify)

3. How many times have you submitted a manuscript to an open access journal so far?

- Never
 Once
 Twice
 Three times
 Four times
 Five times

4. If you have published in open access journals, what funds were used to cover these expenses?

Research grant Institutional funds Personal funds It was free

others (please specify)

5. If your university set up an institutional repository, would you deposit your work in it? Yes No Don't know

6. Publishing in open access journals should be: Voluntary Mandatory

7. Publishing in institutional repository should be: Voluntary Mandatory

Key terms:

Open access journals use a funding model in which researchers are able to read, download, copy, distribute, and print articles and other materials free of charge from the internet. Open access publishers sometimes meet their costs by charging authors (usually through the author's funding body or employer), for the publishing services they provide. In other cases, open access journals are run by researchers themselves and the publishing costs are absorbed by their employers.

An institutional repository is a digital collection of scholarly materials that is managed by a research community, typically a university or a funding agency. Researcher can deposit materials in these repositories, subject to copyright, with the host institution providing the infrastructure for these materials to be organized, archived and disseminated. These repositories sit alongside the traditional publishing system and generally do not offer peer review in their own right.

As you read the following sections (two to eight), please indicate to what extent you agree or disagree with the following statements on open access. (Please tick one box in each row).

- If you “**strongly agree**” with the statement, please circle number “**7**”
- If you “**strongly disagree**” with the sentences, please circle number “**1**”

Section Two:

I perceive using publishing in open access journals:		Strongly Disagree				Strongly Agree		
1.	Offer proper peer-review	1	2	3	4	5	6	7
2.	Provide greater visibility for one’s work	1	2	3	4	5	6	7
3.	Offer greater impact for one’s work	1	2	3	4	5	6	7
4.	Increase readership	1	2	3	4	5	6	7
5.	Is valuable use of time	1	2	3	4	5	6	7
6.	Using the system is good idea	1	2	3	4	5	6	7
7.	I like working with the system	1	2	3	4	5	6	7

Section Three: Benefits of open access journals

Of the main reason(benefit) that may motivate me to use open access is:		Strongly Disagree				Strongly Agree		
1.	More citation and therefore high impact factors	1	2	3	4	5	6	7
2.	To reach higher H-index	1	2	3	4	5	6	7
3.	To obtain copyright of my work	1	2	3	4	5	6	7
4.	Larger readership(expert and public)	1	2	3	4	5	6	7
5.	Greater exposure within and beyond the scientific community through Web	1	2	3	4	5	6	7
6.	Faster and wider dissemination through Web	1	2	3	4	5	6	7
7.	Indexing in a free web database/search engines	1	2	3	4	5	6	7

Section Four: Anxiety in usage of open access journals

I have concern about		Strongly Disagree				Strongly Agree		
		1	2	3	4	5	6	7
1.	The idea of author charges without institutional support in open access journals	1	2	3	4	5	6	7
2.	Misunderstanding by my colleagues that I published in open access journal only because of paying	1	2	3	4	5	6	7
3.	Matters of plagiarism and misusing of my work in open access system	1	2	3	4	5	6	7
4.	Low indexing of open access journals by commercial publishers or popular databases such as ISI	1	2	3	4	5	6	7
5.	Inferior peer review, and low quality of most open access journals	1	2	3	4	5	6	7
6.	Negative effect of publishing in open access journals on my career benefit/promotion	1	2	3	4	5	6	7
7.	Vanity publishing (poor quality research being published for a fee in open access journal)	1	2	3	4	5	6	7
8.	A relative lack of prestige in open access journals	1	2	3	4	5	6	7
9.	Lack of guarantee for long-term availability and stability of open access journals	1	2	3	4	5	6	7
10.	Commercial vision of open access publisher when they charge	1	2	3	4	5	6	7

Section Five: Social influence on open access Journals

Main motive for publishing in an open access journal is:		Strongly Disagree				Strongly Agree		
		1	2	3	4	5	6	7
1.	The recommendation of my peers	1	2	3	4	5	6	7
2.	The recommendation of my superiors	1	2	3	4	5	6	7
3.	The recommendation of people who are important to me	1	2	3	4	5	6	7
4.	My peer's article in a certain open access journal	1	2	3	4	5	6	7
5.	A superior's article in a certain open access journal	1	2	3	4	5	6	7
6.	To have a top editorial board in these journals	1	2	3	4	5	6	7
7.	The recommendation of my grant-awarding body	1	2	3	4	5	6	7
8.	The recommendation of my co-publishing colleagues	1	2	3	4	5	6	7

Section Six: Facilitating conditions

	Facility and condition that may influence usage of system	Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7
1.	Having necessary knowledge to use open access system	1	2	3	4	5	6	7
2.	Having sufficient ICT skill to use open access channel	1	2	3	4	5	6	7
3.	Existence of specific staff to assist with system difficulties	1	2	3	4	5	6	7
4.	To publicize the advantages and potential of open access to information resources (sufficient awareness about open access) by university	1	2	3	4	5	6	7
5.	To pay publishing fee of open access journals by university	1	2	3	4	5	6	7
6.	To pay publishing fee of high quality open access journals by university through institutional membership	1	2	3	4	5	6	7
7.	To be enough good quality open access journal to publish in (such as BMC)	1	2	3	4	5	6	7
8.	Considering open access journals by academic reward system for career benefits	1	2	3	4	5	6	7
9.	Supporting open access journals with impact by evaluation committees of periodicals	1	2	3	4	5	6	7
10.	Provision of high speed Internet connectivity to use open access channel	1	2	3	4	5	6	7

Section Seven: Ease of Use with the system

The main reason that motivate me to use this system is:		Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7
1.	Free availability(ease of use) for all readers on	1	2	3	4	5	6	7
2.	Ease of access to readers (both expert and	1	2	3	4	5	6	7
3.	Easy access to research results for researchers in developing countries	1	2	3	4	5	6	7
4.	Ease of recognition of suitable open access journals	1	2	3	4	5	6	7
5.	Ease of electronic manuscript submission process in open access journals	1	2	3	4	5	6	7
6.	Ease of learning about how to publish in an	1	2	3	4	5	6	7

Section Eight: Intention to use open access journals

Your willingness to publish in open access journals in the future		Strongly Disagree			Strongly Agree			
1	I intend to use the system in the next 6 months	1	2	3	4	5	6	7
2	I predict I would use the system in the next 12 months	1	2	3	4	5	6	7
3	I plan to use the system in the next 18 months	1	2	3	4	5	6	7

**We welcome any additional comments you may wish to make.*

ICT facilities:

1. Relatively high speed Internet connectivity has provided to use open access channel.

yes No

2. Specific staff/s is available for assistance with system difficulties:

yes No

3. I have: Access to computer Access to internet E-mail

Personal website Weblog

Demographic Information:

1. Gender:

Female Male

2. Age:

26-35 36-45 46-55 56-65 Over 65

3. Field of study:

Clinical Basic science

4. Academic Rank:

Full Professor Associate Professor Assistant Professor Lecturer

5. Name of University (type):

Name of Iranian Medical Universities based on Three Types

Type	Row	Name of University
Type One (n=3398)	1	AHVAZ University of Medical Sciences
	2	IRAN University of Medical Sciences (not active since 2011)
	3	ISFAHAN University of Medical Sciences
	4	KERMAN University of Medical Sciences
	5	MASHHAD University of Medical Sciences
	6	SHAHID BEHESHTI University of Medical Science and Health
	7	SHIRAZ University of Medical Sciences
	8	TABRIZ University of Medical Sciences
	9	Tehran University of Medical Sciences
Type two (n=2096)	10	ARAK University of Medical Sciences
	11	ARDABIL University of Medical Sciences
	12	ARTESH University of Medical Sciences
	13	BABOL University of Medical Sciences
	14	BAGYATOLLAH AZAM University of Medical Sciences
	15	BIRJAND University of Medical Sciences
	16	GOLESTAN University of Medical Sciences
	17	GUILAN University of Medical Sciences
	18	HAMEDAN University of Medical Sciences & Health Services
	19	HORMOZGAN University of Medical Sciences
	20	KASHAN University of Medical Sciences
	21	KERMANSHAH University of Medical Sciences
	22	MAZANDARAN University of Medical Sciences
	23	QAZVIN University of Medical Sciences
	24	RAFSANJAN University of Medical Sciences
	25	SEM NAN University of Medical Sciences
	26	SHAHID SADOUGHI University of Medical Sciences and
	27	URMIA University of Medical Sciences
	28	ZAHEDAN University of Medical Sciences
29	ZANJAN University of Medical Sciences	
Type Three (n=476)	30	ILAM University of Medical Sciences
	31	BOSHEHR University of Medical Sciences
	32	FASA Faculty of Medical Sciences
	33	JAHROM Faculty of Medical Sciences
	34	KORDESTAN University of Medical Sciences & Health Services
	35	LORESTAN University of Medical Sciences
	36	SHAHED University
	37	SHAHREKOD University of Medical Sciences
	38	YASOJ University of Medical Sciences

Pearson Correlation Matrix of Independent and Dependent variables: IVs and Use

Variables	Use	PE	EE	Attitude	SI	FC	Anxiety	CAP	Intention	Gender	Age	Field	Academic rank	Type of university
Use	1													
PE	.193**	1												
EE	.148*	.370**	1											
Attitude	.274**	.637**	.351**	1										
SI	-.100	.220**	.209**	.203**	1									
FC	.019	.294**	.479**	.267**	.266**	1								
Anxiety	-.101	-.010	.025	-.199**	.053	.044	1							
CAP	.053	.210**	.259**	.097	.170**	.181**	.290**	1						
Intention	.281**	.188**	.203**	.321**	.156**	.238**	-.158**	.005	1					
Gender	-.022	-.006	.021	-.031	-.071	-.140*	.046	.006	.022	1				
Age	.011	.019	.039	-.039	.011	-.104	.043	-.033	-.023	.012	1			
Field	.031	.020	-.085	-.027	-.077	-.011	-.054	-.036	.024	.059	-.023	1		
Academic rank	.167**	-.056	-.023	.012	-.011	-.165**	.016	-.070	-.036	.137*	.393**	.137*	1	
Type of university	.085	-.035	-.010	-.095	.044	.117*	.010	-.011	-.133*	.019	.126*	-.027	.219**	1
Familiarity	.161**	.096	.143*	.039	.028	.056	-.013	-.013	.066	.103	.003	-.107	.041	.119*

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

a. Listwise N=301

PE (performance expectancy), EE(effort expectancy), SI (social influence), FC(facilitating conditions), CAP(concerns with author-pays)

Pearson Correlation Matrix of Independent and Dependent variables: IVs and Intention

Variables	Intention	PE	EE	Attitude	SI	FC	Anxiety	CAP	Gender	Age	Field	Academic ranking	Type of university	Familiarity
Intention	1													
PE	.173**	1												
EE	.182**	.375**	1											
Attitude	.340**	.623**	.343**	1										
SI	.126*	.229**	.215**	.191**	1									
FC	.220**	.299**	.482**	.260**	.272**	1								
Anxiety	-.159**	-.006	.027	-.200**	.056	.047	1							
CAP	.010	.209**	.258**	.097	.169**	.181**	.290**	1						
Gender	.036	-.015	.014	-.024	-.081	-.146*	.043	.006	1					
Age	-.036	.028	.045	-.045	.021	-.097	.046	-.033	.005	1				
Field	.031	.014	-.089	-.022	-.084	-.015	-.056	-.036	.064	-.028	1			
Academic rank	-.034	-.077	-.023	-.008	-.009	-.169**	.013	-.080	.144*	.382**	.145*	1		
Type of university	-.135*	-.013	-.008	-.077	.044	.122*	.013	-.002	.010	.134*	-.036	.212**	1	
Familiarity	.077	.108	.137*	.064	.017	.054	-.013	-.004	.103	.003	-.111	.042	.116*	1
experience	.290**	.120*	.114*	.219**	-.046	-.001	-.128*	.042	.024	-.061	.039	.170**	.090	.154**

List of Iranian Open Access Journals based on Latest Search on DOAJ

Row	Title	Subject	Publisher	Language	Year
1	Acta Medica Iranica	Medicine (General)	Tehran University of Medical Sciences(TUMS)	English	2003
2	Addiction and Health	Public Health	Kerman University of Medical Sciences	English	2010
3	Asian journal of Sports Medicine	Sports Medicine	TUMS	English	2010
4	Avicenna Journal of Medical Biotechnology	Medicine (General)	Avicenna Research Institute, Iranian Academic Center for Education, Culture and Research	English	2009
5	Behbood	Medicine (General)	Kermanshah University of Medical Sciences	Persian	2006
6	Bina Journal of Ophthalmology	Ophthalmology	Eye Bank of I.R. Iran	Persian	2008
7	Biomedicine International	Medicine (General)	Biomedicine International, Inc.	English	2010
8	DARU : Journal of Pharmaceutical Sciences	Therapeutics /Pharmacy and materia medica	TUMS	English	2000
9	Dental Research Journal	Dentistry	Isfahan University of Medical Sciences	English	2005
10	Electronic Physician	Medicine (General)	Electronic Physician	English	2009
11	Gastroenterology and Hepatology from Bed to Bench	Gastroenterology	Shahid Beheshti University	English	2008
12	Hepatitis Monthly	Gastroenterology	Tehran Hepatitis Center	English	2004
13	International Journal of Occupational and Environmental Medicine	Medicine (General)	National Iranian Oil Company (NIOC) Health Organization	English	2010
14	International Journal of Organ Transplantation Medicine	Surgery	Avicenna Organ Transplantation Institute	English	2010
15	International Journal of Preventive Medicine	Public Health	Isfahan University of Medical Sciences	English	2010
16	Iranian Biomedical Journal	Biology /Medicine (General)	Pasteur Institute of Iran	English	2001
17	Iranian Cardiovascular Research Journal	Cardiovascular	Shiraz University of Medical Sciences	English	2007
18	Iranian Journal of Basic Medical Sciences	Medicine (General)	Mashhad University of Medical Sciences	English	2007
19	Iranian Journal of Cancer Prevention	Oncology	Shahid Beheshti University of Medical Sciences	English	2008
20	Iranian Journal of Child Neurology	Neurology/Pediatrics	Iranian Child Neurology Society	English	2006
21	Iranian Journal of Clinical Infectious Diseases	Internal medicine	Shaheed Beheshti Medical University	English	2006
22	Iranian Journal of Endocrinology and Metabolism	Internal medicine	Shaheed Beheshti University of Medical Sciences	Persian	1999
23	Iranian Journal of Environmental Health Science & Engineering	Public Health	Iranian Association of Environmental Health (IAEH)	English	2004
24	Iranian Journal of Kidney Diseases	Urology	Iranian Society of Nephrology	English	2007
25	Iranian Journal of Medical Hypotheses & Ideas	Medicine (General)	TUMS	English/Persian	2007
26	Iranian Journal of Medical Sciences	Medicine (General)	Shiraz University of Medical Sciences	English	2001
27	Iranian Journal of Parasitology	Internal medicine	TUMS	English	2006
28	Iranian Journal of Pathology	Pathology	Iranian Society of Pathology	English	2006
29	Iranian Journal of Pediatrics	Pediatrics	TUMS	English/ Persian	2001
30	Iranian Journal of Pharmaceutical Research	Pharmacy and materia	School of Pharmacy, Shahid Beheshti University of Medical Sciences	English	2002
31	Iranian Journal of Pharmacology and Therapeutics	Therapeutics	Iran University of Medical Sciences and Health Services (IUMS)	English	2002

List of Iranian Open Access Journals based on Latest Search on DOAJ

Row	Title	Subject	Publisher	Language	Year
32	Iranian Journal of Public Health	Public Health	TUMS	English	2001
33	Iranian Journal of Reproductive Medicine	Gynecology and Obstetrics	Shahid Sadoghi University of Medical Sciences of Yazd	English	2003
34	Iranian Red Crescent Medical Journal	Medicine (General)	Iranian Hospital, Dubai	English	1998
35	Journal of Dental Research, Dental Clinics, Dental Prospects	Dentistry	Tabriz University of Medical Sciences	English	2007
36	Journal of Fundamentals of Mental Health	Psychiatry	Mashhad University of Medical Sciences	Persian	2006
37	Journal of Injury and Violence Research	Internal medicine	Kermanshah University of Medical Sciences	English	2009
38	Journal of Isfahan Medical School	Medicine (General)	Isfahan University of Medical Sciences	Persian	2006
39	Journal of Mazandaran University of Medical Sciences	Medicine (General)	Mazandaran University of Medical Sciences	Persian	1999
40	Journal of Medical Ethics and History of Medicine	Medicine (General)	TUMS	Persian, English	2008
41	Journal of Ophthalmic & Vision Research	Ophthalmology	Ophthalmic Research Center	English	2008
42	Journal of Paramedical Sciences	Medicine (General)	Shahid Beheshti University of Medical Sciences	English	2010
43	Journal of Periodontology & Implant Dentistry	Dentistry	Tabriz University of Medical Sciences	English	2009
44	Journal of Reproduction and Infertility	Medicine (General)	Avicenna Research Institute	Persian, English	2000
45	Journal of Research in Health Sciences	Public Health	Hamadan University of Medical Sciences	English	2005
46	Journal of Research in Medical Sciences	Medicine (General)	Isfahan University of Medical Sciences	English	2004
47	Journal of Tehran University Heart Center	Cardiovascular	TUMS	English	2007
48	Jundishapur Journal of Microbiology	Microbiology	Ahvaz Jundishapur University of Medical Sciences	English	2008
49	Jundishapur Journal of Natural Pharmaceutical Products	Therapeutics	Ahvaz Jundishapur University of Medical Sciences	English	2006
50	Koomesh	Medicine (General)	Semnan University of Medical Sciences	Persian	1999
51	Middle East Journal of Cancer	Oncology	Shiraz University of Medical Sciences	English	2010
52	Middle East Journal of Digestive Diseases	Gastroenterology	Iranian Association of Gastroenterology and Hepatology, Shiraz University of Medical Sciences	English	2010
53	Qom University of Medical Sciences Journal	Medicine (General)	Qom University of Medical Sciences	Persian	2007
54	Scientific Medical Journal	Medicine (General)	Ahvaz Jundishapur University of Medical Sciences	Persian	2006
55	Shiraz E Medical Journal	Medicine (General)	Shiraz University of Medical Sciences	English	2000
56	Strides in Development of Medical Education	Education	Kerman University of Medical Sciences	Persian	2004
57	Tanaffos : Journal of Respiratory Disease, Thoracic Surgery, Intensive Care and Tuberculosis	Internal medicine	Shaheed Beheshti University of Medical Sciences	English	2002
58	Tehran University Medical Journal	Medicine (General)	TUMS	Persian	2001
59	Urology Journal	Urology	Shaheed Beheshti University of Medical Sciences	English	2004

*Only the journal in the row of 55 has publishing fee

Critical Values of Chi Square

Chi Square Distribution Table							
d.f.	$\chi^2_{.25}$	$\chi^2_{.10}$	$\chi^2_{.05}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$	$\chi^2_{.001}$
1	1.32	2.71	3.84	5.02	6.63	7.88	10.8
2	2.77	4.61	5.99	7.38	9.21	10.6	13.8
3	4.11	6.25	7.81	9.35	11.3	12.8	16.3
4	5.39	7.78	9.49	11.1	13.3	14.9	18.5
5	6.63	9.24	11.1	12.8	15.1	16.7	20.5
6	7.84	10.6	12.6	14.4	16.8	18.5	22.5
7	9.04	12.0	14.1	16.0	18.5	20.3	24.3
8	10.2	13.4	15.5	17.5	20.1	22.0	26.1
9	11.4	14.7	16.9	19.0	21.7	23.6	27.9
10	12.5	16.0	18.3	20.5	23.2	25.2	29.6
11	13.7	17.3	19.7	21.9	24.7	26.8	31.3
12	14.8	18.5	21.0	23.3	26.2	28.3	32.9
13	16.0	19.8	22.4	24.7	27.7	29.8	34.5
14	17.1	21.1	23.7	26.1	29.1	31.3	36.1
15	18.2	22.3	25.0	27.5	30.6	32.8	37.7
16	19.4	23.5	26.3	28.8	32.0	34.3	39.3
17	20.5	24.8	27.6	30.2	33.4	35.7	40.8
18	21.6	26.0	28.9	31.5	34.8	37.2	42.3
19	22.7	27.2	30.1	32.9	36.2	38.6	42.8
20	23.8	28.4	31.4	34.2	37.6	40.0	45.3
21	24.9	29.6	32.7	35.5	38.9	41.4	46.8
22	26.0	30.8	33.9	36.8	40.3	42.8	48.3
23	27.1	32.0	35.2	38.1	41.6	44.2	49.7
24	28.2	33.2	36.4	39.4	42.0	45.6	51.2
25	29.3	34.4	37.7	40.6	44.3	46.9	52.6
26	30.4	35.6	38.9	41.9	45.6	48.3	54.1
27	31.5	36.7	40.1	43.2	47.0	49.6	55.5
28	32.6	37.9	41.3	44.5	48.3	51.0	56.9
29	33.7	39.1	42.6	45.7	49.6	52.3	58.3
30	34.8	40.3	43.8	47.0	50.9	53.7	59.7
40	45.6	51.8	55.8	59.3	63.7	66.8	73.4
50	56.3	63.2	67.5	71.4	76.2	79.5	86.7
60	67.0	74.4	79.1	83.3	88.4	92.0	99.6
70	77.6	85.5	90.5	95.0	100	104	112
80	88.1	96.6	102	107	112	116	125
90	98.6	108	113	118	124	128	137
100	109	118	124	130	136	140	149

Table from Ronald J. Wonnacott and Thomas H. Wonnacott,
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