Open Access Publishing and Scholarly Communication Among Greek Biomedical Scientists

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Abstract

Purpose: The purpose of this research is to study in what ways the open access publishing can improve the scholarly communtication among biomedical sciences in Greece over a period of about five years and provide new roles for health librarians to support open access.

Methods: The implementation of Critical Realism as research philosophy allowed the multi-level analysis of the research object; a mixture of research tools were used. Supplementary research methods were adopted to provide more accurate and reliable conclusions. The **Literature review** contributed to the identification of the open access publishing context and the relations which were forming and re-forming in it. Additionally, similar studies were found and the research gaps were identified as well. **Bibliometrics** demonstrated the participation of Greek scientists in world research could be evaluated. The research was conducted in five world databases (PUBMED, SCI, BIOMED CENTRAL, DOAJ, GOOGLE) for two different periods (2006-2007 and 2011). Publishers' aggrements provided information about the role of Greek biomedical publishers to the awareness of Greek biomedical scientists on journal related issues such as copyright. Additionally, and journal cost analysis presented publishers' subscription and open access policies and provided an approach of the costs requested for the access to journals. Web 2.0 offers new scholarly communication channels that seem to be cheaper and effective ones**.** The participation of Greek biomedical scientists in social networks such as ResearchGate, LinkedIn was analysed to evaluate the trends towards these new information sources. **Case study methodology** provided the qualitative and quantitative tools to explain the attitudes and awareness of Greek biomedical stakeholders about open access publishing and open access biomedical journals and also helped to the longitudinal study of the changes. A questionnaire survey among biomedical scientists took place in three phases (2007-early in 2010, September 2010 to May 2011). In addition, Greek biomedical publishers were interviewed in January and February 2010 .

Findings: The bibliometric findings indicated an increasing participation of Greek scientists and Greek biomedical journals in world research. Greek biomedical scientists also use social networking as a means of scholarly communication. The questionnaire surveys showed that the physicians are the most active researchers and more familiar with the open access publishing concept. However, across all the phases the majority of Greek biomedical scientists seem to be unaware of aspects of publishing in open access journals, although by the third phase more participants seem to be aware. Greek biomedical publishers seem to approve the deposit in repositories, and the self-archiving process under specific terms, because, the publishers' agreements analysis demonstrated, the publishers want to be the copyright holders and information about authors' rights is omitted. Biomedical scientists are confused over copyright. As far as cost analyses are concerned, the journal prices depend on the publisher (commercial or scientific) and the subscriber (the institutional prices are higher than individual ones). The findngs were interpreted according to Roger's diffusion of innovations theory and Lewin's force field analysis.

Conclusions: Open access seems to be acceptable in Greece but the stakeholders, including libraries, need to co-operate more. Greek academic biomedical libraries can actively reinforce the driving forces and reduce the restraining forces (around copyright, mainly) (Lewin's Force Field Analysis) in order to move into the "refreeze stage". However, institutional repositories do seem to be an innovation that (according to Rogers' theory) will take time to develop.

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The completion of this thesis has been accomplished with the effort of other people as well. I would like to thank Dr Christine Urquhart, Department of Information Studies, Aberystwyth University and my second supervisor Dr Pauline Rafferty for their guidance. I would particularly thank my supervisor Christine Urquhart who actively supported and encouraged me the whole period of time of this research.

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List of Abbreviations

AAAS American Association for the Advancement of Science

ALPSP Association of Learned and Professional Society Publishers

APCs Article Processing Charges

ARL Association of Research Libraries

BMC Biomed Central

CERN Conseil Européen pour la Recherche Nucléaire

CHORUS Clearinghouse for the Open Research of the United States

CSIC Consejo Superior de Investigaciones Científicas

DOAB Directory of Open Access Books

DOAJ Directory of Open Access Journals

DOI Digital Object Identifier

EBI European Bioinformatics Institute

FECYT Foundation for Science and Technology

HAI Hellenic Aerospace Industry

HCLSIG Semantic Web Health Care and Life Sciences Interest Group

HEALLINK the Hellenic Academic Libraries Link

H.N.A. Hellenic Nurses' Association

ISI Institute for Scientific Information

JCR Journal Citation Reports

JISC Joint Information Systems Committee

LIS Library and Information Science

LISTA Library, Information Science & Technology Abstracts

LOCKSS Lots of Copies Keep Stuff Safe

MARC MAchine-Readable Cataloging

MEDLARS The Medical Literature Analysis and Retrieval System

MEDLINE Medical Literature Analysis and Retrieval System Online

MedOAnet Mediterranean Open Access network

NARIC National Academic Recognition Information Centres

NDC National Documentation Centre/EKT

NCBI National Center for Biotechnology Information

NIH National Institute of Health

NLM National Library of Medicine

NSI National Science Indicators

OA Open Access

OAI Open Archives Initiative

OAI-PMH Open Archives Initiative- Protocol for Metadata Harvesting

OECD Organisation for Economic Co-operation and Development

OPAC Open Access Public Catalogue

OSTP Office of Science and Technology Policy

OWL Web Ontology Language

PMC PubMed Central

PDEA Public Domain Enhancement Act

PloS Public Library of Science

RAND **R**esearch **and D**evelopment

RDF Resource Description Framework

SCI Science Citation Index

SciELO Scientific Electronic Library Online

SCImago SCImago Journal & Country Rank

SELL Southern European Libraries Link

SGML/XML Standard Generalized Markup Language/ Extensible Markup Language

SHARE SHared Access Research Ecosystem

SPARC Scholarly Publishing and Academic Resources Coalition

SPSS *Statistical Package* for the *Social Sciences*

STM Science, Technology, and Medicine

TRIPS Trade Relationship Aspects of Intellectual Property Standards

UK United Kingdom

UNESCO United Nations Educational, Scientific and Cultural Organization

UNISIST United Nations International Scientific Information System

URL Uniform Resource Locator

WHO World Health Organization

WIPO World Intellectual Property Organization

WoS Web of Science

WTO World Trade Organization

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Chapter 1

Introduction

1.0 Open Access: Past in Relation to Present

One of the human rights over the past hundred or so years, is the right to education and, in a broader context, to knowledge. Sir Antonio Panizzi, Principal Librarian of the British Museum, 1836, aptly summarizes the sentiment:

> "I want a poor student to have the same means of indulging his learned curiosity, of following his rational pursuits, of consulting the same authorities, of fathoming the most intricate inquiry as the richest man in the kingdom." (as cited in Barbour 2006).

Panizzi emphasizes the importance of free – and equal -- access to information, insisting that rich and poor alike have at their disposal the same media in order to satisfy their 'learned curiosity.' As social inequality was very prevalent in society, providing equal opportunities became a working priority for many policymakers. Nonetheless, the means for its widespread application were not available, except, perhaps through public library services. Almost one century later, UNESCO (UNESCO Declaration, 1964) invited the world community to support a movement aiming at the eradication of illiteracy in emergency. Additionally, it emphasized the problem because half the adult population cannot enjoy the scientific and cultural achievements because of the lack of literacy means.

Efforts have proven successful as the percentage of people defined as illiterate is declining worldwide, according to UNESCO's facts and figures:

> "In 2000, one in five adults aged 15+ was illiterate. There were about 860 million illiterate adults in the world in 2000…It is projected that by 2015, the

literacy rate will have increased to 85 per cent, below the EFA goal of 90 per cent" (UNESCO, 2003).

The evolution of technology has contributed to the rapid and widespread dissemination of information. The Internet offers access to a wide range of information sources transcending the barrier of physical borders (Information Resources Management Association, 2014). The Web enables people to access data wherever they are or whenever they need it. Nevertheless, according to the Budapest Open Access Initiative (2002), information access is still limited. This restricted information availability could be interpreted as "selective access." Selective access is the result of access cost. Digital journals and books are available through the Web but have a cost, and access is available only to those who are subscribers or whose institutions are subscribers. This subscription price prevents some scientists from using the literature they need. However, in 2002 and 2003 some special efforts set landmarks in the history of free access. Accordingly, in 2002, the Budapest Open Access Initiative laid down the principles in partial realization of Sir Panizzi's vision, describing open access and recommending the means for ensuring its ongoing practice.

The Budapest Open Access Initiative set the theoretical context for the development of open access, while the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (October 2003), and the Bethesda Statement on Open Access Publishing (April 2003), provided practical guidelines for the implementation of open access and open access publishing. In October 2003, the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities stated that the license of author and rights holder be granted to the user in order to enable open access to authors' works. In addition, the Green Open Access model, which describes the technical standards of an online repository, is established. Thus, according to the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003):

"Open access contributions must satisfy two conditions:

1. The author(s) and right holder(s) of such contributions grant(s) to all users a free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute

derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship (community standards will continue to provide the mechanism for enforcement of proper attribution and responsible use of the published work, as they do now), as well as the right to make small numbers of printed copies for their personal use.

2. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in an appropriate standard electronic format is deposited (and thus published) in at least one online repository using suitable technical standards (such as the Open Archive definitions) that is supported and maintained by an academic institution, scholarly society, government agency, or other well established organization that seeks to enable open access unrestricted distribution, interoperability, and long-term archiving."

The Bethesda Statement on Open Access Publishing was formulated at a meeting in April 2003. Participants contributing in this exchange were representatives of various professional groups --librarians, editors, scientists, publishers and university professors. They adopted policies or proposed ways of enabling open access by harnessing it to the ultimate objective: open access publication and provided detailed and analytical directives for the realization of the Bethesda goal, namely, "the goal of providing open access to the primary scientific literature" (Bethesda Statement on Open Access Publishing, 2003).

The main attributes of the open access publication were defined more concisely in the Bethesda Statement (2003):

"1. The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use.

2. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving (for the biomedical sciences, PubMed Central is such a repository)".

Although the above-cited paragraphs seem quite similar to the Berlin Declaration, there are three points on which they differ. Firstly, paragraph one delineates the permanent aspect of access with respect to the open access publication. In paragraph two, it mentions, for the first time, "when" the publication will become open access via, at least, an online repository. By invoking the example of PubMed Central, the issue of "how" this repository should be structured is also addressed-by invoking the example of PubMed Central.

Additionally, the Bethesda Statement specifies that the work, rather than the journal or publisher, must be open access, and that the community (i.e., the scholarly community) needs to develop criteria for ensuring acceptable standards of usage. This may be particularly important for the supplemental materials increasingly used as raw research data, which are made available to other researchers – and to the public. The open access ideal is also defined by Harnad (2005) a great supporter of the open access movement as such:

> "Open Access (OA) means immediate, permanent, free online access to the full text of all refereed research journal articles".

Proponents believe that the open access publishing model affords scientists many advantages. What's more, it is believed that free access to full-text online journals is ultimately associated with lower costs. The monetary value of publications in author-pays online journals was estimated as low (1% of the Trust's research costs) by Walport, the Wellcome Trust chief at the time (cited in Clery, 2004).

Moreover, Harnad (as cited in Halliday & Oppenheim, 2000) argued that the cost of electronic publishing is so low in comparison to traditional print publishing costs that scholars could publish their own journals merely by paying only for the author's charges.

By "exploiting" this advantage, universities, research institutions and libraries might not need to spend millions of euros on journals every year. They would be able to invest more money on management, textbooks or other resources, and their researchers would be encouraged to follow open access policy. Such claims are disputed by commercial publishers.

Finally, one of the latest definitions is by Borgman (2007)

> "The Open Access research literature is composed of free online copies of peer-reviewed journal articles and conference papers as well as technical reports, theses and working papers. In most cases there are no licensing restrictions on their use by readers. They can therefore be used freely for research, teaching, and other purposes".

Apart from the financial benefits of open access implementation is that of equal access to knowledge, which can also be accomplished. The "free at the point of access" characteristic of open access research literature contributes to knowledge democratization. As the Budapest Open Access Initiative (2002) mentions, all scientists can read and use the freely available scholarly documents because the scientific communication becomes more open to people of different social status.

1.1 *Open Access Models: The New Challenge for Knowledge Mediators*

Open access publishing consists of a great number of different business models. These open access publishing models can be differentiated according to the following criteria:

- The time required for making a work open access
- The means used for making a work open access

- Location-selective work at point of access, available for free
- Category of open access information (article, bibliographic data, abstract, appendices/supplemental materials) and extent of open access offerings in an online journal
- Who assumes the publishing costs

Based on the above parameters, open access business models are divided into the following biomedical categories and are analyzed in detail in the relevant sections of chapter two as follows:

Biomedical Categories	Section
Author-pays online journals	Section 2.1.3.1
Library consortia	Section 2.1.3.1
Free access to articles after a period of time (embargo period)	Section 2.1.3.1
Institutional consortia	Section 2.1.3.1
Print subscription journal – Open access online journal	Section 2.1.3.1
Open access articles in subscription journals (Hybrid Open Access Journals)	Section 2.1.3.1
Open access in subscription journals for developing countries	Section 2.1.3.1
Open access to bibliographic data of the journal articles	Section 2.1.3.1
Self-archiving peer-reviewed articles	Section 2.1.3.2
Free access articles databases/ Institutional and Subject Repositories	Section 2.1.3.2

Table 1.1 Biomedical categories of open access

As a result of the development of new publishing models, new challenges posed for stakeholders who contribute to scholarly communication. Librarians and information scientists as knowledge mediators need to develop new roles and obtain new qualifications in order to be able to respond adequately to these changes. On the one hand, information scientists must be able to detect open access information in a variety of technological environments, such as social networks and subject or

institutional repositories, and promote usage. On the other hand, they also need to be educated in the process of open access publishing by contributing, for instance, to the development of institutional repositories in academic institutions (see section 2.4, 2.5.6, 2.57).

1.2 The Biomedical Publishing System in Greece

Scholarly communication has always been important for the evolution of science and the academic community. E-mails, journals, congresses and teleconferences are some of the means for the dissemination of information. In this way, scientists are able to exchange ideas and opinions. While all the above-mentioned vehicles have their specific roles, some of them, namely congresses and journals, are more significant than others.

Congresses present innovations and advances in the biomedical sciences in a very informal way, even though their proceedings may be published. Nevertheless, their limited duration and frequency do not allow everything to be announced. This gap in daily news coverage is bridged by the journals. In Greece, biomedical journals can be divided into four categories: Greek language journals; English language journals published by Greek scientific institutions or universities; English language journals published in Greece by international organizations or commercial publishers, and bilingual journals in the Greek and English languages.

The national biomedical journals cover local developments in the health sciences. Given that some of the published findings may be of international interest, participation by Greek journals in universal databases, such as that of PubMed Central, contributes to opposing scientific isolationism and empowering the international body of biomedical knowledge. Thus, national research findings transcend Greece's physical borders, becoming known globally. This, in turn, provides the incentive for international collaboration and spurs further scientific advances. There are several interacting and, to some extent, conflicting factors that affect scholarly communication for Greece's biomedical scientists. Firstly, there is a

preponderance of English language journals. Secondly, it is a challenge to find out about Greek open access biomedical journals because of the lack of a comprehensive Greek database that would list them all. Thirdly, as Greek scientists want their research to be internationally visible, they may elect to publish in international English-language journals. Fourthly, Greek scientific societies naturally want to foster and showcase their biomedical research via publications.

There are many stakeholders in scholarly communication in Greece, including the National Documentation Centre, which influence local developments in open access publishing. However, international progress on open access may ultimately be determining its evolution on a national level as well. An example of international progress in this sphere is the mandatory article deposition of publicly-funded research findings in PubMed Central. Prestigious Greek biomedical publishers, such as Spandidos, have complied with this policy (see section 5.2.1).

1.3 Reflections

In 2006, when this PhD thesis was first begun, open access publishing was considered an innovation both on a national and international level. There have since been changes, following the implementation of some of the aforementioned declarations. As concerns Greece, there has been an intense effort to establish institutional repositories since 2008. Despite this, it was in 2012 that the Deans' Senate signed the Berlin Initiative, deciding that open access should be promoted in the universities. With respect to Greek biomedical journals, and in particular those of the scholarly societies, a great majority of the electronic ones had already been free access without author charges since 2006, as research has demonstrated (Section 4.8.2).

Internationally, open access innovation seems to have spread at different rates. Important tools, such as the Open Archives Initiative (OAI) Protocol for Metadata Harvesting, which supported repository interoperability, had already been introduced. Another open access promotion initiative was the SHERPA/JULIET webpage, enabling researchers to check publishers' open access policies. BioMed Central and

PubMed Central were the cornerstones for the establishment of open access publishing in the biomedical sciences. However, a question this thesis raises and seeks to answer is: to what extent is OA publishing now a reality in the biomedical sciences and how does it exist in Greece? The existence of so many different models of open access or open access publishing may be an indication that it is time for knowledge to be freely disseminated; only the future can tell whether OA will in fact become the new status quo of publishing market. In any case, its prevalence may spur the adoption of OA policies and ways of adding value by national and international commercial publishers.

At present, we can study the reaction of different social groups – such as publishers, institutions (universities, libraries, etc.) and scientists – in the dual role of author and reader. Although each group influences the progress of open access, authors and readers are those who can possibly bring about the most significant changes as there appear to be few incentives for commercial publishers to change their practices. If well-known scientists choose open access journals as sources for the dissemination of their research output, these journals will gain prestige, and the authors themselves will set an example to others. While this may sound easy in theory, in practice there are many challenges to overcome. The importance of quality and credibility with respect to open access sources is likely to determine the acceptance of this new model by the scientific community (as discussed in Section 5.2.2).

1.4 Contribution to Knowledge

1.4.1 Researcher Perspective

The idea behind this research derived from a desire to encourage health librarians in Greece to provide services supporting knowledge democratization as defined in the principles of the Budapest Open Access Initiative (2002). Open access seems a promising step towards knowledge democratization but it is also necessary to explore some of the assumptions and claims made about it.

This PhD thesis aims to interpret the new context of medical knowledge dissemination in Greece as presented through open access publishing, especially open access journals. This topic interests me as a medical librarian, because open access publishing may motivate more and more researchers to publish their biomedical research. Furthermore, it may urge Greek biomedical scientists to appreciate the value of open access journals for the scientific community and the importance of evidence in clinical practice. The acquisition of new knowledge could be encouraged by the free exchange of ideas. Greek biomedical libraries could contribute to the improvement of scholarly communication by promoting open access services and providing the appropriate information to as wide an audience as possible.

When this PhD research was commenced at the end of 2006, open access publishing was a novelty for Greek stakeholders. At the time, I took into consideration the fact that Greek libraries, biomedical scientists and biomedical publishers might not be able to understand or accept the meaning of open access publishing because they were simply unaware of it. Consequently, this research would take on a double role. On the one hand, it would serve to heighten participants' awareness; on the other hand, it would present the challenges posed by the open access model, including that of the financial crisis and its impact on the open access movement, which could not have been predicted in 2006.

Additionally, the longitudinal aspect of my doctoral research afforded me the opportunity to assess the changes that might take place in my country over the next years. I based my study of these changes on the theoretical framework of Everett Rogers and Kurt Lewin which evaluate the spread of the innovation and form the proper context for its adoption (Section 2.13).

The results of my research trends for the adoption of open access publishing in biomedical sciences in Greece could not have been predicted from the outset. Nevertheless, the ideal option would be the positive effect of open access publishing on biomedical context in Greece which might become obvious at the end of the entire doctoral research period.

1.4.2 Contribution to Knowledge

Despite the observation that some changes appeared to be happening by the third phase of the questionnaire survey, in general, this research has revealed the uncertainties and the unawareness of biomedical scientists concerning various aspects of open access publishing. The longitudinal case study, supported by frameworks for examining the progress of an innovation, helped to pinpoint some key areas of concern (such as copyright, uncertainty about funding) which are less obvious but deserve greater attention for progress to be made. Gaps between espoused values and behavior were revealed. For example, the research showed the willingness on the part of Greek biomedical publishers to implement an open access policy, but nonetheless, there is a huge difference between theory and practice on published author guidelines about open access deposit. There is a mismatch among the perspectives of the stakeholders. Health librarians should be able to promote open access publishing, and could have an influential, neutral role, but they need to work together with the biomedical scientists and other stakeholders in scholarly communication in Greece.

1.5 Research Questions

1.5.1 Development of Research Questions

The following research questions are the outcome of a careful reading of the literature, as well as of the society I aspire to help through my work, and the significance of each question has been refined over the course of my research.
The main question this research focuses on

> "Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what main changes have been observed over the course of the last few years? (Question 1)"

However, this question demands careful consideration of what it means to improve scholarly communication or what it takes to make such communication easier for biomedical scientists. Consequently, there are some sub-questions, which are important because they contribute to the understanding of open access publishing as a social phenomenon, such as:

- What are the reasons that led to the establishment of open access publishing? (sub-question 1)
- What means facilitated its proliferation? Its cost? (sub-question 2)
- Which models of open access publishing are used? (sub-question 3)
- In what ways do the different models work? (sub-question 4)
- Does open access publishing influence knowledge dissemination? Is it possible to assess this? (sub-question 5)
- Who are the stakeholders of this publishing mechanism? (sub-question 6)
- In what ways do stakeholders influence the new publishing models? (sub-question 7)
- Does English language pose a problem for the Greek biomedical scientists to publish in foreign language journals? (sub-question 8)
- What are the advantages of Greek researchers' participation in open access publishing? (sub-question 9)
- How easy is it for researchers to find digital information on their own? (sub-question 10)
- How might the expectations of library users change as a consequence of open access publishing? (sub-question 11)

Yet other sub-questions are more specific, helping track the development and usage of open access biomedical journals in Greece:

- Are Greek biomedical scientists informed about the characteristics of open access journals? (sub-question 12)
- What means do Greek biomedical scientists use to inform themselves about open access journals? (sub-question 13)

- What is meaning of "Free at the point of access": do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and effectively? (sub-question 14)
- What are the attitudes of Greek biomedical scientists towards open access publishing –and how are these changing? (sub-question 15)
- Are there open access biomedical journals in Greece? (sub-question 16)
- What do Greek biomedical publishers think of open access journals? (sub-question 17)
- How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods? (sub-question 18)
- What is the writing activity of Greek biomedical scientists in open access journals? (sub-question 19)

One of the desired outcomes of this research is to identify what Greek health library services should do to support the appropriate development of open access journals. This requires addressing the following questions:

- Do institutions and libraries promote open access journals? (sub-question 20)
- How could libraries contribute to the development and usage of open access journals? (sub-question 21)

Finally, I hope to show how to evaluate "how open access journals may or may not assist Greek health sciences" and "how biomedical scientists may effectively participate in new models of publishing, either as authors or as readers".

1.5.2 Research Strategy Development

First, it is necessary to clarify the meaning of "open access journals". We consider "open access journals" to be all journals freely accessed by the reader, meanwhile, there are no access charges for the readers. Nonetheless, different models of payment are also explored in this thesis. While the term "open access" accurately describes the unrestrictedness of journal access to readers, it fails to convey the fact that there are costs associated with publication. The term "author pays," encountered earlier on does

communicate the fact that there are upfront costs to be paid, but this term could be construed as misleading, since costs could conceivably be borne by the author's employer or funder. However, if funders are obliged to foot publication costs, it could result in less money with which to fund research projects. In addition, not all authors or their sponsoring organizations may be able to afford publication costs.

The main research question will be examined as a series of surveys from two different viewpoints in order to analyze changes in attitude over the course of time among researchers as authors and clinicians, and researchers as readers. The first perspective concerns Greek clinicians as readers of open access journals and their need to access information on biomedical research in Greece. We will examine the challenges they encounter in so doing, as well as the benefits they enjoy from successful working practices for access to research data. However, it must be emphasized that the success of such a survey depends in large part on the participation of Greek researchers in open access publishing, as well as on their awareness of open access publishing, and it is important to track their changes in attitude. In other words, unless clinicians themselves demand open access journals, and providing Greek researchers are reluctant to present their research to free access journals, surveys to gauge their attitudes will provide but limited information. We will also find out clinicians' opinions about the role of health sciences libraries in finding open access journals as well as in assessing and verifying their quality and credibility. To complement the survey on biomedical researchers, it was important to objectively track the changes in publishing through bibliometric surveys as well as surveys of publishers and publishing procedures.

My research strategy is thus interpretive in its attempt to interpret attitudinal changes. As these changes were gradual and took place over a number of years, the selected research design was longitudinal in some respects. However, longitudinal case study research usually examines the behavior of one defined group or cohort over a period of years. In this study, the time period in question was restricted by the demands of doctoral research to a maximum of five years for empirical research. In this instance, the research questions required the application of several different research methods in studying the various aspects of the problem.

1.6 Structure of the Thesis

This chapter sets out the reasons for my interest in the topic of open access publishing for biomedical scientists in Greece. More details about open access models and the development of scholarly communication are contained in the literature review in **Chapter Two**, which examines the history and the improvements in both formal and informal scholarly communication channels as well as the theoretical framework for studying such changes. In addition, it discusses the evaluation procedures of scholarly communication means through bibliometric measurements, and how copyright principles affect the way researchers and publishers operate.

Chapter Three describes the research's theoretical framework, inspired by the ancient Greek philosophers. It also discusses the research tools used in conducting the surveys and weighs the advantages and disadvantages of the research methods employed.

Chapter Four presents the survey results concerning the findings of the research for the two phases of the bibliometric survey, the three phases of the questionnaire survey, the publishers' interviews, and the publisher website analysis.

Chapter Five integrates the changes on open access publishing around the world according to the literature review, with research results on Greece. The study of changes uses an analytical framework based on Roger's diffusion of innovations theory and on Lewin's theory of change.

Chapter Six presents the answers to the questions and sub-questions connecting the chapters of introduction, results and discussion and provides a general view of the procedures, the results and the conclusions of the thesis. It describes the relations and reactions among stakeholders in an open access publishing context on a national and international level. It considers the limitations of the research as well as its contribution to the currently existing body of knowledge. Suggestions for further research are also discussed.

The **appendices** include the following:

- Table of the main points of Plato's and Aristotle's epistemological and ontological theories

- Questionnaires of the survey (English and Greek – English questionnaires)
- Covering letters for the questionnaire survey (in Greek and English)
- Application form for conducting research in hospital clinics
- Interview questions in Spanish, English and Greek
- Covering letters for the interview survey (in Greek and English)
- Research data from the questionnaire survey processed using SPSS (frequency tables)
- Confidence intervals (Phase 1 Phase 2, Phase 3)
- Data derived from publishers' agreements survey processed using SPSS
- Cronbach's alpha (Phase 1, Phase 2, Phase 3)
- Albert's timeline (2006)
- Published papers

The citation style used in this dissertation is based on the Harvard Referencing Style Guide of Charles Darwin University.

Chapter 2

Transit in Digital Scholarly Communication?

2.0 Introduction

This chapter reviews the literature on scholarly communication channels. The history of formal and informal communication provides a clearer picture about the necessity for various types of channels. In recent decades, the Internet has offered electronic journals and social networks such as ResearchGate. The changes may be observed and explained using theoretical frameworks for understanding change and innovation.

The following section (2.1-2.4) discusses the development of structures that support scholarly communication. The invisible college forms an informal channel of communication which contributes to the diffusion of knowledge as well (Section 2.1.1). Journals are a part of scholarly communication but the history of journal publishing and developments in publishing require separate treatment (Sections 2.5-2.5.5). Progress in scholarly communication depends on well organised information. Consequently, documentation is considered to be directly interconnected with scholarly communication (Section 2.6). Recently, information retrieval and access mechanisms include search engines that also contribute to well-structured and unified information management (Sections 2.7-2.7.3). Web 2.0 affected the scholarly communication as well because it provides for the development of new channels (Section 2.8).

Some issues were and remain important for healthy scholarly communication. Scientists are concerned about how to assess different channels for different purposes and how to deal with intellectual property. Bibliometrics is the science which provides the tools for the measurement of scholarly communication and the activity of researchers (Section 2.9-2.9.4). Copyright protects author rights but the associated limitations may provoke problems for the communication process (Sections 2.10-

2.12). Freedom of Information (appendix 2.1) and Data protection (appendix 2.2) are presented too, as related aspects of access to information but they are presented in appendices. In section changes in scholarly communication channels are explained according to theoretical frameworks (2.13).

2.1 Scholarly Communication Channels

The discovery of means for the effective dissemination of new knowledge has always been a vexed issue for the scientific community. The overlap of research activities, the duplication of effort by researchers, might be attributed to the difficulty of finding out previous research, or the time delay between completion of research and publication (European Commission, 2008, http://cordis.europa.eu/tvp/src/quicksc.htm). However, Fjällbrant (1997) mentioned that the problem was multifaceted, the cause might partly be the outcome of researchers' weakness in detecting colleagues' works, the fault of the publication process and inherent delays or difficulties in access due to cost or other restrictions, or the problems around the documentation associated with the scholarly research outputs – the indexing activities**.**

Although scholarly communication could be considered as the cornerstone of the scientific prosperity, it could not be implied without accessing to the documents. According to the "official" definition of the French Union of Documentation Organizations as described in Briet's book (2006, p. 10) the document is widely defined as the source of knowledge used for advising, education and evidence.

Consequently, if scientists cannot have at their disposal other scientists' published studies as "documents", repetition is unavoidable. Nevertheless, it is very difficult for someone to be informed about all publishing production in their specialty, even in a relatively narrow area. This gap can be partially bridged by the techniques of documentation (see also section 2.6). Academic libraries not only function as documentation centres but have developed new roles to support learning and research. Nowadays, a library may be a scholarly publishing partner through hosting scholarly journals, or creating and maintaining institutional repositories (Gilman, 2013;

Mclntyre, Chan and Gross, 2013) (see Section 2.5.7). The University of Minnesota Libraries has a new role for a scholarly communications librarian (Gilman, 2013).
As we can see in the following section new informal communication channels are continually developing.

2.1.1 Invisible Colleges: informal communication

Scholarly communication as a social procedure has gone through different gradations. It began with the simple exchange of ideas among scientists and it has resulted in a multi-sided system composed of many components. Probably the best way to understand scholarly communication is through description of its models. One of these models, perhaps the oldest one which shows the initial pattern of scientific communication, is the invisible college. Zuccala (2006) mentioned that the term invisible college was first used in seventeenth century Europe when the Royal Society of London was founded, and aristocrats free of any institutional obligation, with common scientific interests and geographic closeness, arranged meetings in order to discuss their discipline concerns. However, the expense and the limited information dissemination to a restricted number of participants were the main disadvantages of this model.

Since then many definitions have been assigned in order to explain the structure and the role of the invisible college for scholarship. The majority of them characterize the invisible college as an informal channel of scientific communication and collaboration. However, technology contributed to the renaming of the invisible college as an electronic one. New means of communication as fax, listservers, e-mail, the Web, were added **(**Wellman, Koku & Hunsinger, 2006, p. 1429-1447). In this way, the limitations of geographic closeness and the elite nature of scientific communication were reduced. All the scientists can participate into invisible colleges now – the process is faster, cheaper and easier – as well as more visible to others as well. Additionally, the volume of disseminated information has increased and knowledge horizons have been broadened. The cutting up of knowledge domains leads to the creation of subspecialties, but also the need to foster intradisciplinary

collaboration. Zuccala (2006) also stresses that these interactions between subject specialists can be formal, informal and can take place at a distance.

In this case, one could say that the invisible college is more openly defined. Nevertheless, communication is taking place only among the scientists or scholars of the same specialty and the need for interdisciplinary collaboration is ignored. Zuccala (2006) developed a new model of (in)visible college which is a mixture of intradisciplinary collaboration, the social actors and the Information Use Environment (Taylor, 1986 as cited in Zuccala 2006). Each of the components has its own meaning for the life cycle of the invisible college. The Information Use Environment defines the visibility or the invisibility of the college. Zuccala also indicates that the Information Use Environment, which may be physically oriented provides the proper tools, as well as the proper information to the investigators. As social actors, investigators belonging to the same subject speciality can communicate effectively as they can understand the disciplinary rules and solve the problems. So the invisible college is composed of three components the subject specialty, the social actors and the Information Use Environment and each of them has a specific meaning. The implications are that understanding of scholarly communication for an individual biomedical scientist needs to take account of their work setting, the technological infrastructure, perhaps the particular aspects of their subspecialty (how active the research is), but the Use Environment extends to links with other disciplines.

With the advent of Web 2.0 and open access developments, the "invisible college" was reinforced and modified into a networked invisible college. Carey (2011) presents an example of networked invisible college applied in biomedical sciences. Faculty of 1000: Peer Review 2.0 is a database which is supported by 10.000 scientists and clinicians who collect and assess articles of 43 disciplines. The role of the Faculty of 1000 is dual, on the one hand a network of virtual cooperation is created via the database and on the other hand the Faculty collaborates with experts of each discipline who together evaluate 1.500 articles per month by establishing the bibliometric indicator F1000 Article Factor. In addition, a context of opinions and ideas exchange is created via postings and comments for each article. The invisible college seems to become more visible as all the comments and postings are signed so

anyone is enabled to identify the others. Certainly there is a monthly cost for the usage of database for individuals.

Networked science, as Chan, Kirsop & Arunachalam (2011) mention, may boost developing countries to contribute actively to the open transmission of knowledge via the new collaborative tools which frame the new form of the invisible college. The distances and the financial problems of each country may not discourage anymore the researchers from establishing Open Science.

However, Fry, Schroeder & den Besten (2009) demonstrate more reasons which prevent e-Science from turning into Open Science. In particular, from twelve interviews in a survey conducted 2006 they concluded that the most serious problems derived from the lack of coordination and standardization at local level (individual project) and macro level (institutional practices). There are different practices for implementing "openness" in contracts' terms, the licensing, and even the project environment. For example the information dissemination as contractual term was manipulated in a variety of ways. It could be via institutional repository or via another mechanism through which the project outcome would be manipulated according to the restrictions of patent laws. The researchers suggest as the best solution of this heterogeneity the development of an infrastructure for the common management of individual projects.

2.1.2 International Support

UNISIST is a product of collaboration between United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council of Scientific Unions. It emphasizes the cooperation between knowledge producer and knowledge user and the information sources which may be used for this purpose (Sondergaard, Andersen & Hjorland 2003).

UNISIST work defined formal communication as based on primary sources (books and journals, theses), secondary sources (subject bibliographies, indexes, library catalogs, databases), and tertiary sources (reviews articles, syntheses). All these

sources would be unavailable without the intervention of publishers, editors, libraries, information centres, data centres, clearing houses, abstracting and indexing services. The final component of formal communication is the user who can be at the same time user and producer of the knowledge. UNISIST depicted the informal communication as a friendly contact between the producer and the user via correspondence or meetings. This part of the UNISIST model does not differ from the invisible college model. However, the revision of UNISIST was required to take account of internet effects. Informal communication is facilitated due to the usenet news, list servers, e-mails, electronic meeting/webcam conferencing and invisible colleges are increased (Sondergaard, Andersen, & Hjorland, 2003).

Formal communication has been enriched not only with new information sources but also computer-mediated communication channels. The new documentary units identified are e-journals, online journals, dictionaries, thesauri, glossaries, taxonomies. Access to these resources is obtained via e-libraries, virtual libraries, the servers of scientific and research organizations, search engines, directories, OPACs. UNISIST would include book reviews, handbooks and encyclopaedias as well – these exist on the internet too, but often in different ways to the printed form.

Another model of scholarly communication, inspired by the Internet was announced as the Scholars' Forum of the California Institute of Technology (Buck, Flagan, & Coles, 1999). The implementation of Scholars' Forum relied on the collaboration of three entities:

- Consortium of Universities
- Professional Societies
- Authors

The Consortium of Universities seems to possess the most central role in this system as it has authority over the majority of functions. The Consortium gives the permission to editorial boards to create and maintain a journal on Consortium servers. Buck, Flagan, & Coles (1999) justify the prestigious position of the Consortium of Universities because Universities have the power and the interconnections not only to produce new knowledge but also to create the new dissemination structures.

The main component of Scholars' Forum is the document database in their preprint form. In addition, a communication forum will be created through which the information exchange will be eponymous (Buck, Flagan & Coles 1999). As far as preservation and archiving are concerned, university libraries are in charge of preserving repositories for both electronic and print records. Finally, copyright policy depends on the institute policy but the authors must reserve limited rights. This model, as Buck, Flagan and Coles (1999) acknowledge, is based on Ginsparg's physics preprint server. Authors would need to grant a limited, non-exclusive licence to the Consortium.

However, the authors do not mention anything about model's financial status. How will the model to be viable? Will the editorial board and the referees be paid? Will the access be free? Which terms should the users follow? Who will fund the function of the model? The only thing mentioned is the presumed reduction of direct expenses, payments to a publisher for subscription (or possibly payment to publish). It is also unclear about the copyright conditions as these depend on institution policies but the authors' rights are limited by the Consortium.

As a final point the trilateral partnership needs to be examined carefully. The harmonious operation of this model is based on the working co-operation among universities, professional communities and authors. The increased duties of universities may provoke some problems to the implementation of the model. Are the professionals willing to grant their rights to the universities? Why would they "sacrifice" their autonomy and power for something new and untested, something which is not so detailed – and more uncertain? Will this model work across, as well as within, countries?

If all the questions are answered, the implementation of this model might be possible. One of the aims, after all, is to make scholarly communication more effective, and less costly, by making access more open to all. New internet applications contribute to the knowledge openness as illustrated in sections 2.1.3, 2.7-2.8.

2.1.3 Open Access Models

There are different models of open access, each with apparent advantages and the disadvantages. Willinsky (2006, p. 211-216) identified ten types of open access. In biomedicine, at that period, from the readers' perspective, the main models were the following:

Gold Open Access Publishing Models (section 2.1.3.1)

- Author-pays online journals
- Library consortia: Libraries cooperate in order to face the serial crisis. Primarily, they launch high quality but cheaper electronic journals to compete with the prestige subscription journals
- Institutional consortia: Universities deal with publishers in order to subscribe to quality journals at lower prices
- Print subscription journal – Open access online journal: Journal which is published in dual mode, the print one represents the subscription model and this is supplemented by an open access electronic journal
- Open access in subscription journals for developing countries: Low income countries have open access to journals which properly are subscription based journals
- Open access to bibliographic data of the journal articles: Databases provide free access to the bibliographic data of journal articles and in this way researchers can be aware about the new developments
- Open access articles in subscription journals - hybrid open access journals: Subscription journals include articles which will be available under open access model if author or funding sponsor pays the author charges.
- Free access to journals after a period of time: After an embargo period of six or twelve months some publishers turn the toll access articles into open access.

Green Open Access Publishing Models (2.1.3.2)

- Self-archiving peer-reviewed articles: Authors are enabled to self-archive their peer-reviewed articles or the preprints, depending on the publishers' policies, in personal websites in order for theses to be available as open access sources to everyone who needs them.
- Institutional or Subject Repositories: BioMedCentral and PubMedCentral which include articles and other documents openly available to the readers.

The common characteristics between biomedical and Willinsky's categories led to the synthesis of the following table

Biomedical Categories	**Willinsky's Categories**
Author-pays online journals	Author fee or Subsidized
Library consortia	Cooperative
Free access to journals after a period of time	Delayed
Self-archiving peer-reviewed articles	Home pages
Institutional and Subject Repositories	E-prints archives
Institutional consortia	Institutional consortia
Print subscription journal – Open access online journal	Dual-mode
Open access articles in subscription journals (Hybrid Open Access Journals)	Partial
Open access in subscription journals for developing countries	Per capita
Open access to bibliographic data of the journal articles	Indexing

Table 2.1 Categories of open access publishing models

The sections 2.1.3.1 and 2.1.3.2 discuss in more detail the characteristics of the biomedical categories and the overlap between the biomedical and Willinsky's categories, as well as some of the differences. However, the above-mentioned categories are analyzed under a different scope according to the main open access routes the gold and the green one. According to European Commission' s definition, (2012) gold open access concerns the publications which immediately provided in open access form by the scientific publisher. While, European Commission (2012) defines the green open access as the published article or the final peer-reviewed manuscript which is archived by the researcher in an online repository before, after or alongside its publication.

A great variety of surveys estimate the impact of both open access roads to the scholarly communication. A survey conducted in 2009 by Björk et al. (2010) showed that the green open access model was used more than the gold open access in all sciences apart from life sciences. Suber (2013a) also states that all sciences were green apart from medicine and biomedicine which were gold. Bernius et al. (2013) investigated possible scenarios for the transition to open access. The researchers stressed the disadvantages of continually increasing subscription prices and they concluded, according to the simulation process method, that a mixture of green open access in combination with some subscription low-priced journals and a few high quality open access journals would be the best for scholarly communication. Harnad (2007, pp. 99-105) stated that green road will promote the open access publishing (gold road). It may happen because the mandatory character of self-archiving in repositories will provoke the cancellation of subscriptions, as the 100% of intellectual production perhaps by depositing the final peer-reviewed draft will be openly available. Consequently, the publishers shall be forced to reduce the cost per article and the publishing costs shall be limited in peer review process fees otherwise their incomes shall be also decreased. The institutions shall be able to pay for the peer reviewed articles and the gold road will be established for some journals. But, Harnard (2010) highlights the importance of the direct access to final peer-reviewed draft of article. However, the reality may change as USA government which is the main research funder defined the embargo period of twelve months as public access mandate of articles, while the mandatory process is under discussion (Wojick, 2013a). Indeed, it is unknown how these evolutions shall influence on publishers' self-

archiving policy and the stakeholders of open access publishing generally. Wojick (2013b) demonstrates a new open access policy as posed in the University of California. In this case, the University of California will have completed the enrichment of repository during an approximately two years period, from 1st November 2013 to 2015. However, as the author highlights the lack of information provokes some points of confusion. The mandatory character of the self-archiving is not clear and neither is the publisher's role. Because, as the draft entry form mentions, the article is not going to be deposited during the embargo period if some other term is not included in the agreement contract between publisher and author. However, Suber (2013a) states that self-archiving policy is adopted by the majority of conventional publishers and if not authors can have a permission on request.

2.1.3.1 Gold Open Access Publishing Models

From reader's perspective, the gold open access publication is often interpreted as 'free at the point of access' publication (Jeffery 2006; Finch 2012; Kumar 2012, CILIP 2014; Aston University 2014). According this perspective, all the journals which provided freely to the readers from publishers are gold open access journals and the following open access categories are included

Author-pays online journals – Author fee or Subsidized

This sort of journal includes articles whose articles processing charges (APCs) are covered by authors or their institutions or their research funders **(**Sweeney & Johnson, 2014). It is worth mentioning that publishers have created membership programs in order to develop collaborations with institutions for paying the APCs (Kieńć, 2014). The end users can access these papers without charge through the Internet. The publication cost depends on the journal to which the article is submitted. Usually, there are fixed costs required to be covered by the authors of accepted works after the end of peer review process. It is noticeable that most reviewers are not compensated. Perhaps, they assume that other people will review their papers without asking for a fee.

The term "author-pays" is a bit misleading as in some cases the universities, scientific institutions or governmental services cover the publication's expenses on behalf of the researchers-authors. Even so, Graczynski & Moses (2004) suggest that it is bad enough for scholars not have access to research because of financial problems but it is even worse for the researcher not to be able to publish his or her results because of economic barriers. However, Suber (2013a) characterizes the "author-pays" feature of open access journals as a myth because the majority of them do not charge at all the authors by mentioning DOAJ report which states that more than two-thirds (67%) of all peer-reviewed open access journals are toll free.

However, ACPs inspired the establishment of new form of open access journals. The mega-journal was suggested by Willinsky (2012, 2014) as a new model which was financed by APCs was pioneered by PLOS and adopted by other publishers such as nature (*Scientific Reports*). *Scientific Reports* seems to be more like a database than a structured traditional journal (http://www.nature.com/srep/index.html). Additionally, BioMed Central a publisher of 279 open access peer-reviewed journals also implements the APCs policy for covering the publishing costs (http://www.biomedcentral.com/about). The publication of great numbers of articles may offer highest revenues to publishers. So, Willinsky (2014) highlights the need for preventing the publishers to turn the ACPs to a new form of subscription model by developing collaborations with publishers which will lead to fair prices; prices which will not be defined by the available funding amounts related to disciplines but by the need to "circulate and grow what we know". Moreover, Dorp (2012) highlighted that the APCs business model is used more in biomedical sciences. Perhaps, it happens because the gold route has greater importance for biomedical sciences (Björk, et al., 2010; Suber, 2013a).

Library consortia – Cooperative

The "serials crisis" threatens libraries and the scope of the collections they are able to offer to users. This widening gap between the increase in library budgets and the increase in subscription prices is a global problem. In the United States the Association of Research Libraries (Kyrillidou& Young, 2005) confirmed the problem by statistically demonstrating the trend that journal prices are increasing quicker than

the inflation. The additional costs of paying for electronic versions of existing titles (as well as the print subscriptions) aggravates the problems for libraries, and may lead to even more cancellations (Serial Expenditures in ARL Libraries, 2005). Strieb & Blixrud (2014) analysed the findings of 2012 ARL report and compared them with the previous ARL reports. The authors (Strieb & Blixrud, 2014) observed that publishing market changed through the years mainly because of the "big deals" between institutions and publishers and publishers merging. The consequences of the new conditions seemed to lead to the cancellation of the majority of print collections and the domination of e-journals (see section 2.5.4). Certainly, the different percentages of responses to the ARL surveys and the lack of information about the percentage of money that each institution should pay in order to participate in "big deals" negotiations are two factors which might affect the quality of the findings. The conditions were similar in the United Kingdom. The United Kingdom. House of Commons. Science and Technology Committee, 2004 in the Tenth Report (2004) concluded that the price of an academic journal had increased by 58% (1998-2003) while the UK retail price index presented an increase of 11% for the same period.

Library consortia seemed a way forward. Relevant libraries cooperated among themselves intending to make agreements with other publishers, to enable producers of high quality but cheaper journals as alternatives to the high-priced, but prestige publications of some major publishers. An example of library consortia is SPARC launched in June 1998. Halliday & Oppenheim (2001) notes how SPARC probably contributed to the subscription price and submissions decrease for Elsevier's journal *Tetrahedron Letters* as a cheaper but quality competitor *Organic Letters* was supported by SPARC (see section 2.2).

Free access to journals after a period of time – Delayed open access

The *free access to journals after an embargo period* model is not just a potential business model but some publishers' policy (see also section 5.2.1). The delayed open access journals concern scholarly subscription journals which turned by the publishers into open access journals via publisher's webpage at the expiry of an embargo period (Laakso &Björk, 2013). According to the survey conducted on the delayed open access journals in 2011 by Laakso and Björk (2013), the publishers who

usually implement the embargo period policy are scientific societies, commercial publishers and university presses. Additionally, the number of articles which were accessible after an embargo period was large because their research showed that 492 journals which published 111.312 articles in 2011 were accessible under these embargo period terms. It would be useful to have access to the full table of journal titles because we would be able to see the subject categories of the journals and make comparisons but the full table of the identified journals is not provided.

Highwire Press is one of the publishers who provides free access to the articles of the traditional scholarly journals after one year (http://highwire.stanford.edu/lists/freeart.dtl, accessed 12/5/2015). Publishers may consider this strategy as the best one because it is a way to avoid their revenue decrease (Laakso and Björk, 2013; Ware & Mabe, 2012). Another reason which may prevent the publisher from setting immediate open access to the articles is the proprietary period which provided to the author for better preparation of research data and article (Borgman, 2015, p. 12). However, Laasko and Björk (2013) and Harnad (2013) state that the delayed open access contribute to the progress of science because delayed open access to journals is better than the closed access. Additionally, the research findings of Laasko and Björk (2013) showed that the citation impact of delayed open access articles exceeds that one of the immediate open access articles. Mizera(2013) explained this fact as an indication that immediate open access has not been standardized yet. But Björk, Sylwestrzak & Szprot(2014) mention that delayed open access is an overlooked phenomenon and this fact may be happened because of the lack of a central index similar to DOAJ.

But does the delayed open access really contribute to the science? The journals offer current information and enable the scientists to be aware about the progress on their area of science. How 'fresh' could a biomedical article be characterized six or twelve months later than the publication date? Delayed access may obstruct current evaluation and is more problematic for sciences that are growing rapidly such as informatics and health sciences. The cited half-life is an indicator which provides the information about the time period during which the article has some utility for the science (Aliakbar et al. , 2014). According to Davis (2013) the cited half-life of health sciences journals is shorter (meadian half life 25 – 36 months) than other sciences.

While, according to the European Science foundation (2012) the readership half-life of biomedical articles do not overcome the twelve months.

Institutional consortia – Open access in appearance

Institutional purchasing consortia is usually formed from a group of universities or other research institutions to provide for their members greater coverage of journals with lower prices if possible through some cost sharing arrangements – the 'big deals' (Regazzi, 2015 p. 169-171). Certainly, the offered journals are not free, because the institutions are subscribers, but the fact is that the articles appear free for institutions' members and they can enjoy access to the journals without personal charge. Nevertheless, the establishment of new business models led to the increase of journals' subscription and specifically the model of institutional purchasing consortia as Ware & Mabe (2012) observed.

By recognizing the importance of journals and the problem of "serial crisis", Greek Universities have introduced such an Institutional Consortium, the Hellenic Academic Libraries Link (http://www.heal-link.gr/). HEALLINK is a portal which offers access to online books, full text journals and databases such as Scopus. In addition it promotes open access resources by including DOAJ and DOAB in its catalogue. Prestigious commercial publishers have made license agreements with the Ministry of Education, Culture, Religious Affairs and Sports; Elsevier, Springer, Taylor and Francis are some of them. However, the sell prices remain high and the renewal process could be characterized as a difficult situation. As the renewal process can last for a long period the access to the journals may be interrupted by the publishers as it was announced on HealLink site (2013) for Springer. Moreover, although the libraries could preserve the digital sources but the expenses are too high so this option is difficult as well. Institutional consortia cannot fix the problems as the prices remain high because of the oligopolistic prices policy of the commercial publishers (Björk, Sylwestrzak & Szprot,2014). Regazzi (2015, p. 171) mentions examples of libraries which could not afford to "big deal" and preferred to interrupt the subscriptions in order to invest their budget on accessing more valuable information sources. Furthermore, high subscription prices discourage even reduced personal

subscriptions as well and the proportion of library material usage is increasing (Tenopir, Mays and Wu, 2011). Although open access publishing may correct the current dysfunction, the number of open access variations seems to be increasing since the 2002 Budapest Open Access Initiative.

Print subscription journal – Open access online journal - Dual mode

As publishers comprehend open access new policies are identified. *Print subscription journals* may be offered with a free online version of the journal. In this way the publishers enjoy the advantages of open access publishing without losing the profits of a subscription print journal. This is discussed in more detail in section 2.5.4, which considers the impact of print versus electronic publication, and current shifts in usage.

Partial mode –Hybrid open access

Another open access publishing mode is the combination of two models- *partial mode,* the combination of subscription-based model and author-pays model. Authors may pay voluntarily for their article to be made open access, but if they choose not to pay, the article will only be available via subscription to the journal (or on payment of a fee to access the online version). In 2004 Springer was the first publisher who adopted the hybrid open access model and operated a programme called Open Choice (Björk, Sylwestrzak & Szprot , 2014). The programme offers authors the choice of paying for immediate open access (Björk, 2012), and the publisher also sends the article automatically to PubMed Central (if the author is a biomedical researcher). AsBjörk, Sylwestrzak and Szprot (2014) stated the APCs charges to Springer were USD 3,000, so, if the publishers charged these amounts of money for publishing the open access articles, their revenues would be the same with these ones derived from subscriptions. Björk (2012) also explains the establishment of hybrid open access as publishers' initiative for the progressive transit to the new publishing model; the open access journal. Some of the commercial publishers who followed Springer's example were Elselvier, Wiley & Blackwell, Taylor and Francis (Björk, 2012).

Indexing mode

The open access to bibliographic data of journal articles – *indexing mode,* offered by the publishers could be characterized, basically, as very good advertising. Wiley provides open access to bibliographic data of the articles, their abstracts and the references in Wiley online library (http://onlinelibrary.wiley.com/ doi/10.1002/jrsm.1107/ abstract, accessed 13/5/2015). Consequently, the reader, who uses the journal, is enabled to know which articles coincide with interests. Automatically, one is able to know the way to acquire these articles without requiring special searching skills for the detection of information.

Open Access in subscription journals for developing countries – Per capita

The GDP of a country may be the worst obstacle for people's education and research. Open access could be beneficial for the developing countries which cannot afford the access to knowledge. Consequently, programmes like HINARI, an initiative of World Health Organization, enable researchers who reside in developing countries to be active via open access to subscription journals. HINARI was established in 2002 and includes 1500 journals from 6 major publishers: Blackwell, Elsevier Science, the Harcourt Worldwide STM Group, Wolters Kluwer International Health & Science, Springer Verlag and John Wiley (WHO, 2013). (See also sections 2.2, **5.4.1**). The access to the information may be difficult in some cases because of hardware problems or the licenses and copyright restrictions (Knols & Cockerill, 2008; Jokstad, 2015).

2.1.3.2 Green Open Access Publishing Models

Green route is a synonym with scholars self-archiving manuscripts. The main self-archiving locations are the home pages (institutional or authors home pages) and the repositories (institutional or subject repositories) (Björk, Sylwestrzak & Szprot, 2014). Green open access sources may include both preprint and postprint form of an article. As Suber (2013b) states that preprint is usually author manuscript submitted to

the journal and the postprint version is the peer review version of the article or the published form of the article.

The authors do not need publisher's permission in the case of preprint self-archiving (Björk, Sylwestrzak & Szprot, 2014). But according to Björk et al. (2014) the authors may be discouraged from uploading the preprints on author's or department page or repositories because on the one hand they consider preprints as inferior of the published articles and the other hand, the preprints are not refereed. Moreover, readers, who need to cite the article, may consider the preprints confusing because of the problematic pagination (Laakso & Björk, 2012; Björk et al., 2014). Consequently, partially, the progress of green open access publishing models depends on the publishers' policies and publishers – authors agreements such as Copyright Transfer Agreement (Laakso, 2014). However, according to Sherpa/Romeo statistics (2015), the 69% of publishers permit the authors to self-archive the postprint version of their articles. But even in the case the publishers allow the self-archiving of postprint version of articles the time lag between the publication of the article and the upload of repository copy, which provoked by embargo periods imposed by publishers, can negatively affect the effectiveness of the green open (Björk et al., 2014). However, the mandatory self-archiving policies of the institutions or the funding agencies may pose limits to the time of embargo periods (Björk et al., 2014). Moreover, the green open access publishing may not be promoted because the authors do not know about the existence of repositories, they do not have free time and the proper skills for self-archiving (Björk et al., 2014).

Self-archiving peer-reviewed articles- Home pages

Authors have the alternative solution of *self-archiving articles on their home pages or departmental home pages*. The cost is low and they can do it immediately. Home pages might include both types; the preprints and the postprint articles and they may also include abstracts for the articles. According to Björk, Sylwestrzak and Szprot (2014) before the establishment of repositories the green copies could be detected in authors' webpages or departmental pages usually linked with curriculum vitae or author's publication lists. But, Kousha and Thelwall (2014) stated that the academics' curriculum vitae did not aim at providing to the visitor access to research results.

However, the researchers highlighted the limitations of their research, mainly, because of the low response. Björk et al. (2014) mentioned in the review article that although authors prefer their homepages or departmental websites in order to make their work publicly available, the repositories are becoming very famous as well because they have some characteristics which make the attractive such as storage for documents preservation and information retrieval tools. But, the authors' homepages do not usually suffer from embargo periods (Laakso, 2014). Additionally, authors break copyright limitations and post the real published forms of their articles in their homepages (Björk et al., 2014).

Institutional/ subject repositories– E-prints archives

Beyond the free access journals, another model of open access is the *the Institutional/ Subject Repositories* (see also Section 2.3, 2.5.6, 2.5.7).

Institutional repositories offer researchers/ authors the chance not only to self-archive their works so as to present a unified form of the different types of documents (mongraphs, articles, preprints) but also to make easier the information retrieval process (Rieger, 2012, Björk et al., 2014).

Subject repositories offer free access to working papers or manuscripts of published articles which concern specific scientific disciplines (Björk et al., 2014). An example of subject repository is the PubMed Central which launched in 2000 by US National library of Medicine for hosting accepted manuscripts of published articles. However, the NIH policy for mandatory deposit of public funding research outcome and agreement with publishers turned this subject repository to a source of actual published articles for the biomedical sciences (Björk et al., 2014). Additionally, PubMed Central was the example for the launching of PubMed Central repository in UK, the Europe PubMed Central (European Science Foundation, 2012). PubMed Central and the ArXiv.org (E-print archives) are examples of subject based repositories (by discipline, for biomedicine and typically physics pre-print archives) (Björk et al., 2014).

According to the above mentioned definitions the institutional and subject repositories mainly differentiate in two points. The first one concern the type of the documents which are uploaded. In institutional repositories are archived a great variety of document type while the subject repositories includes working papers a scholar published papers. The second point concerns the "who" does the self-archiving process. In institutional repositories case, mainly authors self-archive their works. In subject repositories archiving process is taken place by publishers.

Open Archives Initiative (OAI) Protocol for Metadata Harvesting is a tool that helps to locate open access articles (Hagedorn & Hodge 2004**;** Björk et al., 2014). The principle is that searching can take place across several archives, enabling users to locate open access items of interest to them.

2.2 International Activism in Open Access

SPARC International was an idea of Association of Research Libraries (ARL) implemented in 1998. It aimed at the change of scholarly communication status quo (Prosser, 2005). In 2002 SPARC International established the European section. Some of the challenges of SPARC Europe's (http://sparceurope.org/ viewed October 2008) are the support of open access publishing by creating new open access models, facilitating open archiving, overcoming copyright barriers, offering access to the knowledge for all readers.

In 2013, a SPARC director, Alma Swan, highlights the need to "lock" open access publishing by creating an international collaboration chain. Moreover, Alma Swan demonstrates the importance of institutional repositories for scholarly communication through applying common policies for repository management. The European Union aims for 2014 to define the embargo period from six to twelve months so that the authors are able to deposit their articles as soon as possible. United States and Australia have similar policies and so the aim is turning into reality.

For developing countries open access is also important (Kirsop, Chan & Arunachalam, 2007). An overview in the Open Access Scholarly Information Sourcebook (Swan & Chan, 2010) suggests that developing countries need to focus on the development of institutional repositories and establish their own open access journals (for the online version, at least, even if the printed version carries a subscription). Services that help to distribute such open access journals include Bioline International, MedKnow publications (mainly for India) and SciELO (Latin America, Spain and Portugal).

2.3 Open Access Policy in Greece – Developments

Open access generally seems to be promoted in Greece on the basis of apparent progress at the national policy level. According to Georgiou and Papadatou (2010), this progress mainly is a result of the efforts of academic institutions and the National Documentation Centre while the private sector is less active, especially in journal publishing.

The innovations that focused on open access from the university side (see Table 2.2) concern:

- Development of institutional repositories
- Creation of digital libraries
- Launching of open access journals
- Running of harvesters
- Creation of Subject Repositories via international cooperation (e-prints in library & information sciences)

The National Hellenic Research Foundation/EKT (National Documentation Center was integrated with National Hellenic Research Foundation) was the first Hellenic institution which signed the Berlin Declaration on Open Access November of 2003. Since then the National Document Center developed the proper infrastructures for electronic repositories, open access journals and books. In addition, Sachini et al.

(2009) mentions that the National Documentation Center informs the Greek researchers about electronic scholarship and open access topics such as legal aspects of e-publishing and open access. The role of the National Documentation Center in open access promotion is evident from the following activities:

- Organising the 1st International Conference on Open Access in 2008, and in October of 2013 the 3rd International Conference will take place in National Documentation Center.
- Coordinating the European Project MedOAnet which concerns the harmonization of open access policies and practices in Mediterranean countries. MedOAnet established by a seminar entitled as "Policies for the development of OA in Southern Europe", organized and hosted by the Spanish Foundation for Science and Technology (FECYT), and supported by SELL (Southern European Libraries Link), held in Granada in May 2010 (Medoanet, 2012).
- Providing continuing information about open access issues and trends by providing a portal (www.openaccess.gr) since 2008.
- Launching the database "National Archive of PhD Theses" in 1986. During the period from 1998 – 1999, 12.000 PhD theses were digitized. But in 2013, 21.774 PhD theses are in electronic format of a total of 29.600 theses. This fact entails that the majority of PhD theses have been digitized through the years. The electronic form of the theses is openly available according to the terms and conditions of National Documentation Center. In 2010 the "National Archive of PhD Theses" was hosted by electronic repository infrastructure DSpace (EKT, 2010).
- Creating the ePublishing platform, a portal which hosts open access eBooks, eJournals and eProceedings (although biomedical sources are not included). It has been in function since March of 2013 (EKT, 2013).
- Supporting the Repository "Helios" which contains a great variety of documents on humanities and science. It is available via the web since 2008. (EKT, 2008-2009).
- Hosting, managing and developing the aggregator openarchives.gr in cooperation with Vangelis Banos (this is a federated search engine harvesting

66 Greek digital libraries- see Table 2.2, institutional repositories and open access journals such as the *Annals of Gastroenterology*).

Institutional Repositories/ Digital Libraries	**Creation Dates**
Anatolia college: digital archives & special collections http://dspace.act.edu/jspui/	2011
DIGMA: digital archive of Greek music/The Music Library of Greece "Lilian Voudouri" digma.mmb.org.gr	2011
Mediterranean Marine Science/ Hellenic Center for Marine Research The development of its electronic version supported by National Documentation Center http://www.medit-mar-sc.net/index.php/marine	2013
Historical Archives of the American Farm School of Thessaloniki http://ouranos.afs.edu.gr/dspace	2010
E-LIS: Eprints in Library and Information Science – Hellenic Information Sources http://eprints.rclis.org/	2003
Argolikos Archival Library History and Culture http://argolikivivliothiki.gr	2008
Aristotle University of Thessaloniki. Library of Department Electrical and Computer Engineering Repository http://vivliothmmy.ee.auth.gr/	2009
Aristotle University of Thessaloniki. School of Geology. Digital Library "Theofrastos" http://geolib.geo.auth.gr/digeo/	2008
Aristotle University of Thessaloniki – Psifiothiki http://invenio.lib.auth.gr/	2003
Digital Repository of Agricultural University of Athens	2008

http://dspace.aua.gr/	
Digital Library of Levadia Public Central Library http://ebooks.liblivadia.gr	2011
Digital Library of Serres Public Central Library http://ebooks.serrelib.gr/	2011
Helios Repository of National Documentation Center http://helios-eie.ekt.gr/	2007
Grey Literature Digital Library at the National and Kapodistrian University of Athens http://efessos.lib.uoa.gr/greylit.nsf	2007
Digital Library: operational programme "Education and Lifelong Learning" of National Documentation Center http://efessos.lib.uoa.gr/greylit.nsf	2011
Historical Review/ National Documentation Center http://www.historicalreview.org/	Online version 2008
Deltion of the Christian Archaeological Society/ National Documentation Center http://deltionchae.org	Online version 2011
National Archive of PhD Theses/ National Documentation Center http://www.didaktorika.gr/eadd/	2010
The Gleaner/ National Documentation Center http://eranistes.org	Online version 2011
Parthenon Frieze / National Documentation Center http://repository.parthenonfrieze.gr/	2009
Makedonika / Society for Macedonian Studies in cooperation with National Documentation Center http://www.makedonikajournal.org/	2011
Mnimon/ Society for the study of Modern Hellenism in collaboration with National Documentation Center http://mnimon.gr	Online version 2011

Pandektis / National Documentation Center http://pandektis.ekt.gr/dspace/	2007
Tekmeria/ Institute of Historical Research (IHR) – Department of Greek and Roman Antiquity (KERA). E-Publisher: National Documentation Center http://www.tekmeria.org/	Online version 2008 completed 2013
DSpace NTUA / The National Technical University. Central Library http://dspace.lib.ntua.gr/	2007
Cultural Portal of Thrace implemented by Ethnological Museum of Thrace http://database.emthrace.org/	Funded by the European Programme " Information Society 2000 – 2006"
Annals of Gastroenterology/ Hellenic Society of Gastroenterology http://www.annalsgastro.gr/	2000
Hellenic Open University Journal of Informatics http://nefeli.dsmc.eap.gr/ojs-2.1.1/index.php/HOUJOI	2009
Hellenic Journal of Music, Education and Culture/ Greek Association of Primary Music Education Teacher http://hejmec.eu/	2010
Byzantina Symmeikta/ Institute for Byzantine Research. E- Publisher: National Documentation Center http://www.byzsym.org	2008
INE Newsletter/ Institute of Neohellenic Research. E-Publisher: National Documentation Center http://www.ine-newsletter.org/index.php/ed/	2009
INE Notebooks/ Institute of Neohellenic Research. E-Publisher: National Documentation Center http://www.ine-notebooks.org/index.php/te	2009
Historein / Cultural and Intellectual History Society (CIHIS). E-Publisher: National Documentation Center	

http://historeinonline.org	2012
Corgialenios Digital Library/ Corgialenios Institution http://www.corgialenios.gr/library/	2009
Lekythos Institutional Repository/ the University of Cyprus Library https://lekythos.library.ucy.ac.cy	2011
Lyceum Club of Greek Women: Digital collection http://www.lykeionellinidon.gr	2008
Medusa Institutional Repository/ Veria Central Public Library http://medusa.libver.gr/	2010
Digital Library of Leimonos Monastery http://84.205.233.134/library/	2009
Digital Library "Pergamos"/ National and Kapodistrian University of Athens http://pergamos.lib.uoa.gr/	End of 2006
Digital Collection of the Library of University of Ioannina http://pc-3.lib.uoi.gr:8080/jspui/	2009
E-Locus, the Institutional Repository of the University of Crete Library http://elocus.lib.uoc.gr/	Started as Digital Library in 1998, renamed as Institutional Repository in 2008
Anemi: digital library of the University of Crete Library http://anemi.lib.uoc.gr/	2006
Psepheda/ Digital Library and Institutional Repository of the University of Macedonia http://dspace.lib.uom.gr/	2006
Daniilida: Digital Library/ Municipal Library of Patras developed in cooperation with the Library & Information Center of the University of Patras http://xantho.lis.upatras.gr/daniilida/	2009

Dexameni: digital collection of the Library & Information Center of the University of Patras http://xantho.lis.upatras.gr/dexameni/	2008
Kosmopolis: digital collection of the Library & Information Center of the University of Patras http://xantho.lis.upatras.gr/kosmopolis/	Developed in 2004 but in function on Open Journal Systems platform in 2007
Nemertis: institutional repository of of the Library & Information Center of the University of Patras http://nemertes.lis.upatras.gr	2004
Spoudai Journal of Economics and Business /University of Piraeus. Library http://digilib.lib.unipi.gr/spoudai/	2008
Open Education / The Journal for Open and Distance Education and Educational Technology is being published by the Hellenic Network of Open and Distance Education http://journal.openet.gr/	2009

Table 2.2 Digital sources of openarchives.gr

At the beginning of its operation until the end of 2007, 14 digital sources were hosted in this harvester. According to Georgiou & Papadatou (2007) 75 digital sources (15 bibliographic databases, 6 e-journals, 19 institutional repositories, 35 digital collections) were detected but 44 collections were open access apart from bibliographic databases which were not full text. EPEAEK and Society of Information funding contributed to the digitisation of collections and the creation of institutional repositories. However openarchives.gr does not belong to an academic initiative). The openarchives.gr developed in 2006 but improvements took place in 2011, in collaboration between Vangelis Banos with National Documentation Centre.

The activities of National Documentation Centre/EKT on open access issues are interrelated to the research objectives of this thesis. First of all, as Sachini et al. (2009) mention, EKT intends to inform the scholarly community about open access. Consequently, the development of the portal "openaccess.gr" and the establishment of

international conferences on open access issues are two initiatives which may directly affect the attitudes of biomedical scientists as the audience for this promotion. Consequently, the results of questionnaire survey results could reflect the impact of EKT campaign. Additionally, the existence of digital repositories (institutional and subject) and the open access journals are objects under investigation in the present thesis as well. EKT seems to contribute effectively to the development of digital repositories and open access journals especially in subject areas of humanities and science. Finally, the National Documentation Centre evaluates the research activity of Greek scholarly community and its impact to the world scholarship. This thesis assessed the representation and the impact of Greek biomedical researchers to the global research in this area.

As we can see the efforts made at national level were intense particularly from 2008. This fact may be justified because of the great activity on the creation of open access infrastructures such as institutional repositories and digital collections (see Table 2.2). Additionally, the promotion of open access movement started with the organization of the 1st Conference on open access by National Documentation Centre. However, the survey findings about awareness on open access issues remained relatively low until phase three (September of 2010 to May 2011). The biomedical scientists seem not to be satisfactorily informed about the national developments (Section 4.6.4). So the question is "how much promotion was actually aimed at biomedical scientists?"

2.4 Recent Developments in Open Access in Biomedical Publishing

As Suber (2013b) indicates, open access publishing is mainly implemented and discussed in STM disciplines (science, technology, and medicine). Consequently, it is no incidental that new business models for open access biomedical publishing are evolving. Biomed Central and PLoS were representatives of the first attempts followed by others.

Biomed Central (BMC) was founded in 1998 by the entrepreneur Vitek Tracz (Poynder, 2005) after discussions with the National Institute of Health in the USA. At

the time of the interview with Poynder in 2005, it was acknowledged that Biomed Central was not making money, although it was expected to break even once submissions had increased to over 2,000 papers per month. Many of the BMC journals now have high impact factors in Journal Citation Reports of Web of Science. All the articles published in Biomed Central journals are peer-reviewed. They are hosted by Scopus and Google Scholar. The research articles are indexed in PubMed Central and other international archives. BioMed Central enables authors to deposit the final version of their article in any institutional repository as BMC is licensed under the Creative Common Attribution License. This open access publisher supplies researchers with the suitable technological equipment in order to establish a new Biomed Central journal free of charge. Finally, the cost of publication process (article-processing charges) is covered by the authors or their organizations/research funders. In 2008 Biomed Central was acquired by Springer. Springer was the first commercial publisher that promoted open access publishing. The article processing charge, which is paid by the authors, included all the publishing costs and varies from journal to journal. In 2013 Springer not only provides full open access journals but open access books as well. BioMed Central consisted of 250 journals and manipulates the software for launching institutional repositories named as Open Repository.

PLoS was established in October 2000 by biomedical scientists Harold E. Varmus, Patrick O. Brown and Michael B. Eisen. In 2003, PLoS initiated a publishing enterprise that offered scientists and physicians a plethora of high-quality open journals in which they can make their research public. Its first journal was launched in the same year entitled as *PLoS Biology*. The journals are licensed under the Creative Common Attribution License. PLoS is funded by different organizations, universities and other foundations. It is a non profit organization which aspires to open access for the corpus of knowledge in order to enable everybody to find the information needed. However, it follows the author pays model as there is a publication fee for each published article. Additionally, PLoS (2008) intends to help information producers to create new means for exploration and use of scientific ideas and discoveries. In Fall 2010 PLoS launched PLoS network which addresses a mixture of scientists and in this way promotes interdisciplinary collaboration. PLoS Hub: biodiversity functions as an aggregator. Generally, PLoS seems to be an active member of the open access

movement as it collaborates with other open access organizations such as SPARC. It is also a founding member of "International Open Access Week" and it serves as one of the directors of Open Access Scholarly Publishers Association (OASPA). In 2013 PLoS has launched seven scientific journals. All the journals are peer reviewed and immediate open access. Additionally, it provides PLoS Article-Level Metrics which measure the impact of the research. It can be freely used by authors, publishers, institutions and funders. Moreover, PLoS maintains the almetrics movement and the PLoS Currents are another inspiration of PLoS which first launched in 2009 with the section on "influenza" aimed at the rapid publication of research results approximately 24 hours.

DOAJ was established in 2003 by the Lund University and aimed to include all the open access scientific journals. In 2013, ten years later, the Directory of Open Access Journal hosts 10000 journals and 1521764 articles, it has the same aim but different inclusion criteria. The journals included shall

- be open access peer-reviewed journals (their quality will be monitored)
- be representative of all the scientific areas
- be published in any language
- publish review and research papers in full text form
- concern the researchers

All the journals shall be freely available at once without embargo period delays (DOAJ, 2013). However, the new inclusion policy is accompanied by changes in administrative levels as Wojick (2013c) states that DOAJ does not belong to Lund University library anymore because as its Managing Director, Lars Bjørnshauge, explains to him it was not easy for all this content to be manipulated and preserved by only one library. So for the further development of this database an agreement between Lund University and Infrastructure Services for Open Access was signed.

Taylor and Francis Open and Routledge Open Select have implemented the open access partial mode since 2006. The authors could pay a fee and their article was openly available upon its publication. Taylor and Francis Open and Routledge Open

adopt all the open access models. Some pure gold open access journals are included as well. By the Taylor and Francis Open and Routledge Open Select policy, an author can make article in a subscription journal freely available (hybrid open access journals) or after an embargo period 12 and 18 months the Author's Accepted Manuscript can be deposited in a repository via Green open access journal route. Additionally, Taylor and Francis provides a glossary for open access resources via its webpage which could be very useful and informative on open access topics.

Elsevier also backs open access publishing but in a different way. The authors who usually publish in its open access journals are funded by special associations with which Elsevier is in agreement. They can publish in Elsevier's journals by using open access option or in gold open access journals as well.

2.5 Developments in Journal Publishing

2.5.1 Early Beginnings

As mentioned in Unesco (2015) the scientific journal is one of the most important means of scholarly communication because it offers many privileges to the scholarly community. There are different opinions about the reasons for the development of the scientific journal. Houghton as cited in Tenopir and King (2000, p.56) notes that the factors which stimulated the current form of the scholarly journal were the development of newspapers and the formation of scientific societies. Wells (1999) attributes the development of journals to a natural development. The increasing size of the scientific community and the fact that participation of all scientists in the meetings was impossible led to the usage of the proceedings as a space for the host of the papers which were not presented in the meetings. In time, the proceedings were turned into the scholarly journal.

Both Houghton and Wells have a common point in the importance of the learned societies. Prosser (2005) connected the origin of modern scholarly communication with the publication of the Journal des Savants in 1665 and the Philosophical

Transactions of the Royal Society in 1666. The number of scientific journals gradually increased over the next couple of centuries and in the nineteenth century there was an explosion in the number of journals (Scitext, 2000).

2.5.2 A period of Expansion – 19th Century

The reasons for the explosion of scholarly journals might be attributed to cheaper publishing methods and the creation of sub-specialities alongside the growth in scientific and engineering knowledge. Worlock (2004) stresses the new role of the learned societies which aimed at the genesis and spread of knowledge in various ways including seminars, research funding, launching journals, offering students scholarships.

An additional advantage of the journal is the income from subscriptions, as an income stream. The biomedical scholarly society was "marked" by the publication of two major medical journals; the *Lancet* (1823) and the *British Medical Journal* (1840). In fact, according to Ebert (1952) the first medical journal was published in France which was *Nouvelles decouvertes sur toutes les parties de la medecine*, edited by Nicolas de Blegny, in Paris, from 1679 to 1681.The biological sciences influenced the current structure of the clinical research paper, the Introduction-Methods-Results-Discussion format (Scitext, 2000).

In contrast to the European situation, it is not clear which was the first journal in United States. According to Tenopir and King (2000, p. 60) the American commercial publishers differed from European ones because the Americans were more focused on book publication with scholarly journals a sideline, whereas European publishers emphasized journals and their main income was derived by this activity. Nevertheless, Houghton states that the first journal was the *American Mechanics Magazine* (1825) followed by the *Scientific American* (1845), while, according to Meadows that, it was one volume of *Transactions* published by Chemical Society in Philadelphia in 1813 (Tenopir & King, 2000, p.57). Houghton and Meadows, as cited in Tenopir and King's book (2000), have different opinions but their common point is

that the birth of the first scientific journal in the United States of American is dated in the first half of the 19th Century.

Until 1945, learned societies performed an essential function in information transmission about the biomedical achievements. Because they might be responsible for the publication of the new information via journals, they did not impose on the researchers the strict limitations of commercial publishers. Actually there was intense collaboration between authors and scholarly societies entitled as "Circle of Gifts" (Keefer, 2001). Although scholarly societies published the journals, firstly authors provided their works to the scholarly societies in order for the authors' ideas to be disseminated, then the learned societies published the journals and the issues were distributed to scholars and scholars as a response contributed their own works to learned societies.

From 1945 commercial publishers occupied themselves with scientific journal publishing as well. The post World War II era created different balances in publishing context because of the intense need for more and specialized knowledge. Particularly, as Lewenstein (1992) mentions in United States the stakeholders (scholarly communities, scientific writers and commercial publishers) were "invited" to produce evidence-based information in order to solve the world's problems such as diseases and poverty. The first people who responded to this invitation were the commercial publishers and Lewenstein (1992) justifies this willingness because of economic motives. In 1946 McGraw-Hill in New York published the monthly journal *Science Illustrated* and the new *Scientific American* in 1948.

The increasing volume of specialized knowledge and the cheaper publication methods might be two reasons which contributed to the explosion of scholarly journals. However the publication of scientific journals by the commercial publishers since 1946 added a new aspect to the scholarly communication system, the publishers' profit, as publishers' main income depended on this business activity. Consequently, the formal channel of scholarly communication seems to have become an expensive means of information transmission. In addition, the disadvantages of the print journal such as page number limitations and long time lag between article acceptance and

article publication created the proper conditions for searching and exploiting new communication channels.

In Greece, According to Rigatos, Apaki & Samios (1988) the publication of the first medical articles place in a newspaper inspired by Korai who suggested a form similar to a magazine. In 1811 Assanis John published the first medical article about different theories of disease aetiology followed by a lecture of the physician Melissinou in 1812. In 1836, the first medical journal was published with the title *Asclepius* by the Medical Company of Athens, and continued in 1847 with the title *New Asclepius*. Other journal titles of that era are *Galen*, *Hippocrates*, *Medical Newspaper of the Army*.

Very early in the 19th century, Greek physicians understood the need for medical journals. They early comprehended the importance of journals for scholarly communication. The features of such communication also seem to be agreed. First of all, authors secure their intellectual property rights. Secondly, increased readership lends recognition and prestige to the researchers. Thirdly, the peer-review procedure provides confirmation about the quality of the article. Fourthly, article authorship is a prerequisite for the award of research grants or acceptance as faculty member. Finally, an article requires less time for writing and publishing than a book.

Additionally, it was very early, when the Greek scientists realized the need for foreign language Greek journals. In 1835, Medical Company of Athens suggested the publication of a Latin language Greek journal but it was unsuccessful. At the end of 19th Century, 1898, John Foustanos published *La Grece Medicale*. In 1920, the journal *La Grece Medicale* was popular in France. However, in the 20th century there appeared many foreign language Greek journals such as *L' Orient Medicale*, *Bulletin Medical de Constantinople*, *Acta Psychotherapeutica, Galien, Archives de l'Institut Pasteur Hellenique*.

As far as the scientific societies in Greece, their role, even today, is respected as they are in charge of the circulation of the greatest volume of biomedical magazines, whereas only a small number of journals are published by commercial publishers.

2.5.3 Consolidation and Change – Twentieth Century and Beyond

Indeed, the 20th century could be characterized as the era of consolidation and change for journals. On one hand, in that period, the commercial publishers managed to gain a strong foothold in the scholarly publishing market, on the other hand, scientific societies lost absolute control of scientific journal publication. Alice Keefer (2001) suggests that there was a need for more journals with the development of new specialities, technological advancements, pressure for more writing activity ("publish or perish") and the lack of sufficient numbers of scientific journals to host the overflow of articles in the post Second World War era. For instance, the American Institute of Physics has recorded a 100% increase in the number of articles submitted the past 20 years (Langer, as cited in Keefer 2001).

Page, Campbell and Meadows (1997, p. 2) also suggest that commercial publishers were prepared to fill in gaps in journal coverage. However, it was not always "them and us" as a sharp divide, as Singleton (1981) observed that 30 percent of U.K. scientific societies collaborated with commercial publishers, more so in science and technology than in the arts and humanities. Singleton's survey indicated that over half of the respondents agreed about the importance of securing a wide market for the journal. Undoubtedly, many commercial publishers have the experience and the means to promote the scholarly journal.

However, it may be a delicate balance. Commercial publishers are able to publish new journals aimed to meet the needs of new specialties, but this may lead to a plethora of new scholarly titles. So, excessive journal production may harm the system as useless information will be transferred as well if quality is not maintained. Additionally, the profits may or may not be re-invested into scholarly communication. On the contrary, publishers, although they have some profits too, are mainly interested in promoting relevant information and re-investing in knowledge, as far as the interests of the learned society are concerned. However, Singleton (1981) suggests that learned societies may be less responsive to interdisciplinary needs, and a society may be run by academics who have other pressures on their time. Learned societies are not likely to react as quickly as commercial publishers to gaps in the market.

Perhaps, the above-mentioned defects of learned societies explain commercial publishers' power on scholarly communication system. Possibly, these stakeholders could complement one another and a creative collaboration between publishers and societies might solve many problems especially, if commercial publishers could be more focused on knowledge dissemination than pure profit.

One of the most popular and largest global publishers is Elsevier. The Elsevier Company, established in Amsterdam in 1880, specialises in medical and scientific literature. Very famous editions, journals and books such as the *Lancet*, *Cell* and Gray's anatomy are handled by this company. Its profits seem to be very high as we can see in Table 2.3.

REED ELSEVIER FINANCIAL SUMMARY

	£ Year ended 31 December			€ Year ended 31 December			
	2014 £m	2013 £m	Change	2014 €m	2013 €m	Change	Underlying growth rates
Revenue	5,773	6,035	-4%	7,159	7,121	+1%	+3%*
Adjusted operating profit	1,739	1,749	-1%	2,156	2,064	+4%	+5%
Adjusted operating margin	*30.1%*	*29.0%*		*30.1%*	*29.0%*		
Reported operating profit	1,402	1,376	+2%	1,738	1,624	+7%	
Adjusted net interest expense	(147)	(177)		(182)	(209)		
Adjusted profit before tax	1,592	1,572	+1%	1,974	1,855	+6%	
Adjusted tax	(374)	(370)		(464)	(436)		
Non-controlling interests	(5)	(5)		(6)	(6)		
Adjusted net profit	1,213	1,197	+1%	1,504	1,413	+6%	
Reported net profit	955	1,110		1,184	1,310		
Reported net margin	*16.5%*	*18.4%*		*16.5%*	*18.4%*		
Net borrowings	3,550	3,072		4,579	3,686		

**Excluding exhibition cycling. Had exhibition cycling been included underlying revenue growth would have been +4%.*

Table 2.3 *Elsevier revenues 2013 - 2014*

According to the above table, Elsevier's revenue annually presents an upward trend. Consequently, publisher's profession has still been a profitable one, even in periods of financial crisis for their primary customers, the libraries? On the other hand, Elsevier do develop new services such as Scopus and e-journals. So, indeed, they do make a profit, but they need a reserve, for investment in new products.

United Kingdom. House of Commons. Business, Innovation and Skills Committee (2012), published publishers' responses to Hargreaves' proposal (2011) for changes in

Intellectual Property (IP) and Copyright policy. Elsevier (as cited in United Kingdom. House of Commons. Business, Innovation and Skills Committee, 2012, p. Ev w141-w145) stated that the weakening of IP as an obstacle to innovation because such an action will lead to the weakening of copyright protection as well. The publisher considers that copyright promotes the investment and growth, because many profitable innovations were developed under the IP context. Consequently, Elsevier maintains that the opportunity for promoting new technologies and especially text mining are not prevented because of IP policy. Scopus is based on a text mining process, specifically, the SciVal Spotlight proprietary algorithm. This process provides useful facts and figures for the powerful research areas in which investments can be very profitable for the UK economy. However, the lack of licences especially for data mining will be a discouraging factor for those authors as right holders who want to publish in the UK.

On March 1 and 8 of 2004 the United Kingdom. House of Commons Science and Technology Committee heard the testimonies of the commercial publishers about their profits and the availability of scientific information to the interested social groups; the researchers, the students. Furthermore, the open access publishers deposited their opinions about the advantages and the future of open access publishing. The main point of these hearings distinguished the need for the governmental support of open access publishing. According to Hane (2004) the first day representatives of Elsevier, Wiley Europe, Nature Publishing and Blackwell were asked for their profits and their opinion about open access publishing. It is worth mentioning that Jarvis, managing director of Wiley Europe, mentioned that the danger which arises because of the announcement of the medical information to the public. Probably, he highlighted the sensitive character of medical data. The second day, the representatives of nonprofits and open access publishers (PLOS, U.K.'s Institute of Physics, Association of Learned and Professional Society Publishers (ALPSP), Oxford University Press, BioMed Central) refuted commercial publishers' claims. By looking to the recent past, but almost ten years later, we could come to two conclusions, first, that the learned societies have always supported public access to information (in principle) and the commercial publishers, who were opposed to the perspective of open access publishing, have already enriched their range of publishing models with variations for open access publishing.

2.5.4 Electronic and Print Journal Publishing - Effects

There has been experimentation in United States and Europe since the 1960s, on electronic journals, although most of the early versions such as *ADONIS*, *Computer Human Factors Journal* (1982) were finally judged as unsuccessful as some problems could not be overcome. The decade of 1990 was the start of the golden period of electronic journals. Scientific societies created electronic journals, *Psychology* (published by the American Psychological Association) and the *Online Journal of Current Clinical Trials* (published by AAAS and OCLC) are some of the most well known developments in that period.

Galvin (2004) observed that the first catalogue of electronic journals of Association of Research Libraries counted just 110 journal titles in 1991 but now the eighth edition includes some thousands. Electronic journals encompass many advantages and overcome the problems of traditional journals. The writers are not confined because of page number limitations. Now, lengthy articles can be incorporated as well, with images and other data files that may be accessed as appendices. Additionally, links with related articles are available. Access to journal issues is direct without the long periods of waiting for the new printed issue to be received. As far as cost savings are concerned, Galvin (2004) states that the reduction of print subscription costs does not mean the increase of savings because new expenses are incurred such as the maintenance of technology, staff time spent reviewing subscriptions and aggregator packages.

The impact of the electronic journal on scholarly communication depends on the discipline as well. Talja and Maula (2003) contend, on the basis of a survey in 2000, that nursing and ecological environmental scientists are more familiar with the new technological products such as electronic journals and databases than the scientists of other disciplines such as literature/cultural studies and history. For libraries, one advantage of electronic journals is transparency of usage (Galvin, 2004) – and this can help the authors as well. Traditionally, citations provided an indication of usage, but not everything that is read is cited.

In my view, indeed, this method of download monitoring may show how interesting an article can be but it does not reflect how many times the article has been used by other writers in order that a new paper to be written and new knowledge to be developed, as influences may not be consciously acknowledged by researchers. According to the results of McDonald's survey (2006) the contribution of print journal usage to citations as an important indicator of scholarly communication is now undermined because of the existence of electronic journals. Usage may reflect citations, but the relationship is not direct as there are other factors to be considered.

Kling and Callahan (2003,) point out some disadvantages of e-journals, principally the archiving problems and the facilitation of plagiarism. The archiving problem becomes obvious when the electronic journal ceases or the subscription expires. There is a problem because the libraries stop having access to the back files for the years which the subscription was activated or the electronic journal was published. As Keefer (2001) mentions, the libraries rent the information, to licence the electronic version of the journal. It means that they have access to the journal as long as they can pay, but no access to the journal after subscription cancellation, even for the period which had been already paid, although this depends on the contract between publisher and library. The libraries have tried to fight against this "headache" by obtaining access to both print and electronic form of journal. But some publishers' policies for dealing with print and electronic journals, and rising subscription costs, together with new journal titles, have caused problems for libraries with diminishing budgets (Davis, 2003). Moreover, this practice cannot be followed in all cases as there are the pure electronic journals as well. What can be done in this case, just ignore them but if they are equally important, what is suggested? The reliability of publishers to honour commitments for access is not guaranteed as publishers may exchange or buy out titles from each other.

Plagiarism threats may dissuade authors from publishing their article in electronic journals. It is much easier by using copy and paste method to take sections of a document and add them to another one. Certainly, authors attempt to protect their properties by publishing their articles in Adobe Acrobat (pdf) or Postscript forms which make copying a more difficult procedure but not impossible.

Another product of electronic publishing is electronic preprints. Preprints have existed since the 1960s when the time lag between the acceptance of an article for publication and the publication of the article in the journal was extremely long. In the 1960s preprints were exchanged among the colleagues via the "invisible college" in high energy physics in particular. Borgman (2007, p. 52) commented that although in the 1960s the target was the quick spreading of the information, nobody could predict the present speed. Paul Ginsparg was the inventor of well-constructed and successful preprints distribution system, the arXiv.org e-Print Archive. This preprint archive was developed at Los Alamos National Laboratory where Ginsparg was a staff member during the period 1990 – 2001. In 2001, the Cornell University Library hosted arXiv. ArXiv is a repository in which the scholar can simply deposit the preprint and everybody is capable of having access. Additionally, the preprints may be updated in a simple procedure via e-mail.

As author can submit his or her paper in many forms, it is not hard work to prepare a paper for arXiv submission. There are many advantages, as readers are informed about research results in time, and can comment on the paper. For some disciplines, this might appear as a "negative point" as the preprints are not "officially" peer-reviewed. But this fact is not only their difference with the official article but also it is a guarantee for the readership of published article (Henneken et al. 2006), and authors have the advantage of receiving comments from a wider audience before publishing an official journal article.

In 2011 arXiv celebrated its 20th anniversary. The rates statistics present that over 7000 preprints submitted in the e-repository in January of 2013. In August of 2012 more than 770.000 preprints were included. The need for more secure ways of funding led the Cornell University Library to the development of a collaborative model in order the institutions which use more the e-repository to back up it. By the end of 2012, a new government model would implement for the operation of arXiv. It would be composed of the administrative team of Cornell University Library, a Scientific Advisory Board and the Member Advisory Board. The major role for the administrative and financial manipulation of the arXiv remains in CUL team but it will be advised by the two advisories organs on a volume of topics such as new policies etc.

These developments are evolving, as the electronic journals are not necessarily a straight substitute for print journals as it obvious from the relationships identified by Harter and Kim (1997).

- E-journal replaces print journal
- E-journal coexists with print journal
- Journal is in electronic form only, but individual articles can be ordered in paper form
- E-journal is "secondary to" the print journal
- Electronic version is published several months after the print version
- Print version is published several months after the electronic version
- The full print version is not available electronically

Both versions exist but with different pricing arrangements

As Waters (2005) highlights the print journal is secondary to the electronic journal as the electronic version can host more data such as images, maps, copies of interview schedules and some of the raw research data. Search and retrieval is more versatile, and libraries are not bothered with costs of binding, circulation, and storage of paper volumes. This change, of course, has implications for long term access. A survey conducted in 1999 concerned the future development of electronic journals with forecasts for the next five to ten years (Keller, 2001). A later study by the Association of Research Libraries examined the patterns of journal subscriptions in University Libraries in North America from 2002 to 2006. Keller (2001) used the Delphi technique to obtain a consensus of expert views concerning the future. Specifically, the research results showed that role of the print journal as the major mean of scholarly communication will be undermined. New communication channels will be more useful in certain cases, and the need to preserve both electronic and print version of the journal will be diminished. Pure electronic journals will be overwhelmed, while, the pay – per- use access might be more preferable. The later ARL study confirmed some of the trends, such as the different phases of the migration from print to electronic format and the predominance of electronic journal (Prabha, 2007).

Both surveys illustrate the dominance of electronic journals against the print ones as a medium of formal scholarly communication. Moreover, new business models emerged such as library purchasing consortia, and full-text article databases from publishers or aggregators. These models and publishers' trustworthiness made libraries more confident about the long-term usage of electronic journals. Although not mentioned in the above studies, institutional repositories could be considered as a new medium of scholarly communication to complement the electronic journals (see section 2.5.6).

The greater availability of electronic text has had an influence on the ways in which researchers as readers interact with onscreen text. Liu (2008) has reviewed the literature and concluded that readers generally scan more, and spot keywords in onscreen reading, but still prefer to print out for in-depth reading. Tenopir et al. (2009) found that more reading was done, but less time is spent per item read. They also confirm that articles are read for many purposes and the pattern of usage depends partly on the purpose. The proportion of library material usage is increasing, as the dependence on personal subscriptions is decreasing – but reading from personal subscriptions were more likely to be from print journals. In a later international survey, Tenopir, Mays and Wu (2011) found that life scientists and health scientists valued citations greatly, and health scientists were the most likely (among different scientific disciplines) to cite 30 or more references in a final grant report. Most scientists (and notably the life scientists) reported reading about 20 articles for each article actually cited in a publication – but patterns varied greatly and although the health scientists were more likely to report not reading additional articles to those cited, the mean was still over 20.

2.5.5 Alternative Publishing Models and the Publishing Crisis

In spite of many advantages of electronic journals there is a disadvantage which is partially responsible for the scholarly communication crisis. Publishers continually increase journal prices and the upshot of it all is that the libraries which are considered as the treasury of information cannot afford the high cost of the journals as their budget is not sufficient. Consequently, one of the most significant stakeholders

in scientific communication is steadily weakening. And monograph acquisitions have decreased as well. The information exchange associated with scholarly communication may be passing through a transitional period. Electronic publishing could help this situation but it is possible that the main wind of change may come from the direction of open access publishing.

Halliday and Oppenheim (2001) analysed and cited three alternative publishing models: the deconstructed journal, free access model and the market model (as originally proposed by Smith, Harnad and Fishwick, respectively).

The ***deconstructed journal model*** inspired by Smith is based on unlimited Internet usage and to the pointers to quality controlled resources described as a subject focal point (SFP). In contrast to other scholarly journals this model of journal will not be peer-reviewed, but there is quality control to be carried out by organisations, or independent certification agents. By choosing to link to the journal article, an overlay journal or subject focal point in effect puts a stamp of approval on the document. This model has not been implemented yet.

The ***free access model*** is a popular type of journal invented by Harnard announced for first time in 1995. The articles are peer-reviewed in digital form. It is an author-pays model as Harnard presumes that the costs may be reduced if publishers are not intervening. Publishers' profits are excluded. Publication costs will be "recovered" by authors so the end-users will be enabled to have free access to the articles. *New Journal of Physics* is an example of Harnard's model.

The ***market model*** was a conception of Fishwisk et al. They intended to assist the normal dissemination of academic communication to deal with the problems of the serials crisis. Authors and subscribers will cover all publication costs while editors and referees will be paid. In this way, editors will encourage authors to submit high quality articles. Authors who cannot afford to pay, such as those from developing countries, will be subsidised. Articles will be available via the publishers' database.
Halliday & Oppenheim (2001) conclude that for all three of the models the cost for publishing compared to the print versions, and that their simple form, may adequately cover user needs. Neither the model of deconstructed journal or the market one are

considered to be sufficiently established as the former it includes a ranking system and the operation of that is unclear, as Halliday and Oppenheim (2001) state. Moreover, there is an extra doubt about the implementation of market model because the motives of the stakeholders are not known – would paying peer reviewers result in bias, for example?

The free access model is a clearly described model which has already been tried. In particular, open access sources are available free of charge for the readers. Normally, open access publishing should have acted as a safety valve for the increase in journal prices but some barriers may prevent open access journals from functioning as a countervailing factor. The most serious barrier has been the views of the researchers. Primarily, they prefer to transfer their copyright to publishers aimed at the publication of the research results in prestigious journals and the acquisition of impact factor ratings for their curriculum vitae. Secondly, they doubt the future of the open access publishing as their existence is dependent on authors' fees, or fees by organisations to pay for publishing by their staff. In addition, as only the minority of open access journals has been included in the Science Citation Index, it means that a great volume of the open access journals were not estimated according to this indicator. Zavos, Kountouras, Katsinelos (2006) comment, related to impact factors measurements that the impact factor indicator should not be considered as a reliable mean of journal evaluation and the selection of a journal for publication must be based on real criteria

If there is a research study whose results cannot be read by wider audience, the study in effect is like a research project which was never conducted. On the other hand, if the scientific community identifies and promotes open access publishing, the obstacles will be surmounted, the editorial quality will be assured as it happens on the traditional business model and the scholarly communication crisis will belong to the past. Surveys have conducted in order to observe the impact of open access journals on citations and the sciences. This is the vexed subject on which many discussions and studies have taken place through the years. Davis conducted two surveys on this topic and the results were announced in 2009 and 2011. A third survey was conducted by Björk and Solomon published in 2012.

Davis' first research (2009) was focused on the citation advantage of hybrid open access journals. It concerned the author – pays articles in subscription – based journals for obtaining open access and it was an observational study. Around nine to eleven journals could be classed as biomedical, while the two of them represent the plant sciences. Web of Science was used for the metadata and citations. The types of document categories were original articles and reviews. The citations were retrieved for the period from 2003 to 2007. Though, it is not clearly mentioned that if the embargo period may be considered as a factor of reducing open access citation advantage percentage. In addition, there was not analysis of the sample size (number of open access articles to the subscribe-based ones) in the text. The study showed that open access citation advantage has a decreasing direction through the years, specifically, 7% per year. This decline of open access citation advantage percentages cannot be adequately explained by the author. However, finally, two journals showed a positive and significant open access citation advantage without emphasizing on the reasons of this advantage. It is mentioned, generally, that apart from the open access there are also other factors which can affect the citation advantage such as more authors, Impact Factor.

Davis' second survey (2011) used different research methodology and sample size but the results were very similar to the first one. Although the downloading and readership might be increasing the citation impact did not seem to be seriously affected. The sample size was larger than the first survey as 36 journals were included about sciences, social sciences, and humanities. However the number of articles involved in the randomized controlled trial differentiated among open access and subscription-based articles (number of open access articles= 712, number of subscription control articles= 2533) as formed by researcher in collaboration with publisher. All the journals, although published by 7 separate publishers were hosted by the platform of Highwire Press. This fact may indicate some special reasons or inclusion criteria which could affect the citations of the journals, however no information about it was mentioned. Additionally, it is worth mentioning that almost the one third of the journals (n=11) concerned physiology sub-discipline. It is a factor which may affect the survey results as the physiologist may have a specific behaviour towards open access. As far as the findings concerned, in the second survey Davis (2011) maintains that although the open access articles may be downloaded more

often, the time required in order to be cited was similar to that of a subscription article. However, the evaluation of readership took place in different size of journals because 16 journals of social sciences and humanities were excluded because of the sample heterogeneity. The researcher (Davis, 2011) concluded that the increase of readership are not followed by the proportional increase of citation counts as the people who mainly request the open access to knowledge are those ones who do not contribute to the knowledge reproduction such as students, patients. The majority of the researchers who are authors can have access to the subscribed resources because they belongs to the elite research universities. Because, generally, the researchers can pay as it is presented by the citation analysis. But the results were derived by a research conducted in the same database, the Web of Science. Certainly, the author justified the choice of the specific database as a more reliable and clarified downloads as indirect type of readership measurements in limitations section of the article.

Björk and Solomon (2012) conducted a broader survey in four databases Ulrichsweb, Journal Citation Reports 2010 (JCR), SCImago Journal & Country Rank (SJR), and the Directory of Open Access Journals (DOAJ). The main characteristic of the selected journals was their inclusion in Web of Science and Scopus citation databases. The data of the selected journals were detected in Ulrichsweb and DOAJ. The JCR survey conducted by comparing 610 open access journals with 7.609 subscription journals included in Web of Science. In the SCImago Journal & Country Rank portal the research conducted by analysing the citation counts of 1327 open access journals in comparison with 11124 subscription based journals included in Scopus. The journals represented the disciplines (according to the Ulrichsweb coding): arts and literature; biological science; business and economics; chemistry; earth, space and environmental sciences; education; mathematics; medicine and health; physics; social sciences; technology and engineering. Two years – impact factors used for counting the scientific impact (2010-2011) for the JCR and SCImago. The research in SCImago Journal & Country Rank bibliometric indicators did not cover the whole year of 2011 as the citations counts and articles did not represent the full data of the second year (2011). Nevertheless, different citation impact among disciplines was observed. Gold open access journals had a priority over the subscription journal especially in biomedical sciences. The authors explained the citation advantage of open access journals on the one hand by considering that the open access character of

the articles positively affected their citation rate and, on the other hand, by stating that the APC funded journals published by reputable publishers were as high quality journals as the subscription ones. As far as the open access citation impact of dual mode journals (see also section 2.1.3.1) published before 1996 is concerned, open access electronic journals had lower citation rate than the subscription model print part. While the open access online journals and subscription-based journals published after 1996 had almost the same impact.

In conclusion, each of the survey adopted a different type of research methodology. Nevertheless, all of them came to similar conclusions. They showed that the reading and citation impact of open access journals do not differ from those of subscription journals. However, these surveys had a common denominator, Web of Science was the main database of citation data. Even in the case of the third research the citations might be extracted via JCR and SCImago, but the second database was unable to provide the facts and figures of the whole time period of 2011. So the majority of the information was retrieved via JCR. In my opinion, the fact that the citations of open access articles are assessed as similar to these ones of subscription-based articles is not absolutely negative because the open access publishing model is a new one in comparison to the subscription model, but nevertheless it can have a comparative advantage. Perhaps, the surveys' findings would be clearer if more open access journals or articles were included in the examining databases in order that the sample size would be more equally distributed.

Web 2.0 applications provide new opportunities for immediate and open publishing (see also Section 2.8)

2.5.6 The Development of Institutional Repositories

The high subscription cost of journals led authors-scientists to a dilemma. They have become more discriminating when depositing their work. They need to preserve some rights of access to their articles, and many wish to use their publications in teaching of their students – to allow students cheap or open access to the print or electronic version. One solution is that authors should be able to host their articles on

the author's website or in their institutional repository (see also 2.1.3.2) in order for their publications to be accessed without charge. Many publishers are not against this idea in principle, and, so, they allow authors to post a version of their article on the author's website or the 'institutional repository' site. Nevertheless, it depends on the publisher's policy which version of the article can be made available by the author. It can be the final version of author's article (prior to publication) or the version prior to peer-review (unrevised). The first option may be more profitable for the publisher because in this way users will look for the official article as well, the second option may not be so popular with authors, and could be confusing for readers as well.

Lynch (2003) considers institutional repositories as an indication of the new role of the universities. Universities have become more active in order to change the structure of the scholarly communication and "exploit" the Internet for their own purposes as well. Lynch (2003) defined an institutional repository as:

> "…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. It is most essentially an organizational commitment to the stewardship of these digital materials, including long-term preservation where appropriate, as well as organization and access or distribution"

Even if technological advancements permitted the development of institutional repositories, the next question is the deposit of the document, or a surrogate of the document. The form of documents in the repository relies on publishers' policies, as it has already been mentioned. But, what happens when the publisher denies the archiving of full-text form of article, post peer review? A typical answer to this question is given by an example of institutional repository CADAIR (http://users.aber.ac.uk/repstaff/faq.html, 2008) - the repository of Aberystwyth University- which faced this problem by providing a link from the abstract "there will always be a prominent link to any published version in an e-journal, which will go straight to the full text at institutions that subscribe to that journal".

In 2013, CADAIR's frequently asked questions **(**http://www.inf.aber.ac.uk/advisory /faqs/index.php) could be divided in two categories; on the one hand, the guidelines for depositing in CADAIR and on the other hand the guidelines on copyright and related topics. CADAIR encourages the link to the institutions which have access under subscription to specific articles, so that the users of the repository who searching via these institutions might be enabled to have immediate access to the papers. Additionally, the role of SHERPA/JULIET is highlighted as far as the publishers' and research councils' policies concerned. Specifically, SHERPA/RoMEO and JULIET (University of Nottingham, 2006-2014, http://www.sherpa.ac.uk/romeo) supplies information on archiving policies of the publishers and research councils by creating four categories of journals in their classification. These four categories are the following

- White: No self-archiving permitted in any circumstance
- Yellow: Self-archiving of the preprint version of the article permitted
- Blue: Self-archiving of the post-print version of the article permitted
- Green: Self-archiving of both the pre-print and the post-print permitted

By providing information on publishers' archiving policy, libraries could assist the active researchers to decide whether the journals they select also allow them to deposit their work in a repository or their personal website. Additionally, in this way some extra information about copyright policy is provided by the publishers via SHERPA/JULIET.

The institutional repository services in United Kingdom have benefited from the projects funded by the Joint Information Systems Committee. Jacobs, Amber & Andrew (2008) highlight the main points of JISC activities, which include use of open technologies for digital repositories. JISC intends to create a national network of higher education repositories, and supports all the phases of digital repository creation, such as the information use services, data and text mining procedures, workflows, preservation process and tools.

Although, in 2013, the volume of institutional repositories is continually increasing, there is a misunderstanding about the real aims of their developments. It must be clear

that open access repositories cannot replace open access journals or the Directory of Open Access Journals (DOAJ) and they must not be managed like them because they are not. However, Jacobs, Amber & Andrew (2008) mention that repositories can provide the opportunity for publishing an overlay journal which includes unpublished papers from open access repositories. Moreover repositories can be used as a publishing platform and in this way contribute to the sharing and exchange of original and unpublished research data (Gilman, 2013; Mclntyre, Chan & Gross; 2013). However, the hosting of a successful electronic journal is not a simple procedure. New skills are required for library staff, but above all an effective Library-Faculty publishing partnership must be built (Mclntyre, Chan & Gross, 2013).

Repositories may provide free access to articles of a great variety of journals or unpublished articles but they simply contain a university's research output, or possibly the output of a group of universities. They also contain a variety of item types, not just journal articles. Shreeves and Cragin (2008) insist that there is some confusion about the role of institutional repository which is caused by the different purposes it may serve in each institution and the reasons for the launch. For example, some institutions consider it as a way to promote widely their research output; in others, the libraries comprehend it as a vehicle against high subscription prices via use of a general open access policy.

Institutional repositories have the following common characteristics as the above mentioned authors maintain:

- Open access to its content even though this may happen after an embargo period
- Searching and retrieval of institutional repository material via search engines such as Google
- Usage of Open Archives Initiative Protocol for Metadata Harvesting for the detection of metadata from different Institutional Repositories
- The description of deposited resources are developed by the owner (the author) or the librarians
- The majority of the content may not be formally peer-reviewed (final version)

- All the repositories secure the preservation of their content in some level

Repositories' common characteristics contribute to drawing conclusions about their real goals. So, regardless of the reasons for which they were created, institutional repositories promote the scientific knowledge by making it freely available and providing it through search engines and harvesting facilities. Additionally, they look after content preservation by providing content via permanent URL's such as Archival Resource Keys. McGovern and McKay (2008) emphasize digital preservation because they perceive it important as the access point. Indeed, if an institutional repository is not linked with an active preservation program, all its content will be run the risk of being lost because of its weakness to adjust to new technological conditions.

Institutional repositories could be an active channel of scholarly communication. United Kingdom. House of Commons. Business, Innovation and Skills Committee's (2013) fifth report confirmed the important role of Green road to the transition to open access and suggested the enforcement of the mandatory character of self-archiving from funding agencies and institutions. In addition, the author must be free to choose the open access road as the most proper to publish. Nevertheless, there are serious obstacles which prevent the establishment of green road. The most important problems are the lack of awareness at all levels. As Duranceau (2008) mentions, faculty usually ignore the existence of the institutional repositories and the reasons for deposit. So, author considers the advertising of the institutional repository as very important action for its enrichment and she also highlighted the mandatory deposit of the document as a possible way forward. However, the cooperation of librarians with institution's faculty can be a determinant factor for the communication with the publishers and the solution of the copyright limitations problem that may deter faculty from deposit.

Research studies have been conducted to assess the behaviour and awareness about open access repositories. A large-scale survey was conducted as part of the PEER observatory project **(**Fry et al., 2009**)**. Seven European countries (UK, Germany, France, Spain, Italy, Sweden, the Netherlands) participated, and more than 100 questionnaires from each country were collected. Scientists' awareness and attitudes

depends on the discipline. For example, the medical scientists in those countries are generally informed about the open access journals (gold road model). They seem to be supporters of the peer-review system for the validation of their research findings. Moreover, the increasing number of open access journals included in well-known databases such as Directory of Open Access Journals and the development of BioMed Central may explain the medical scientists' awareness.

Creaser et al. (2010) points out that medical and life sciences may be easier to connect to open access through open access journals (gold road). Additionally, the same research showed that the life and medical scientists differ from the other scientists because it is almost impossible for them to use non peer reviewed open access articles or earlier (non-definitive) versions of a paper. The deposit of preprints considered to be risky because of the premature announcement as the idea may not be thoroughly implemented. Creaser et al. (2010) also stated that there is confusion about the meaning of the term "institutional repository" as there is vagueness about its content. However, it is worth mentioning that the medical and life scientists participated as authors in the focus group were unaware about subject repositories in spite of the existence of PubMed Central. Creaser et al. (2010) explains this fact by stating the discontinuity which may be presented between the two different roles, the role of author and the role of the reader. Furthermore, the unawareness about the deposit in repositories may be also explained by the fact that the archiving in the subject repository PubMed Central is usually completed by the publisher so that the biomedical scientists do not need to occupy themselves with this procedure.

Nevertheless, institutional repositories may be turned into an important means of scholarly communication, but this remains to be demonstrated. Therefore another important point related to repositories is their usage statistics. The most popular ways of usage statistics of open access sources are download counts and page views. According to Konkiel and Scherer (2013) altmetrics supplement the current metrics and provide new means for measuring the online activity. Atmetrics evaluate the repository content by measuring its usage via social networks (Mendeley, Citeulike, Connotea, Facebook, Twitter, Google, Reddit and LinkedIn). So the combination of traditional means (download counts and page views) and altmetrics offer a picture for the impact of research not only on the scientific community but the society generally.

Another method of institutional repositories assessment, in particular "The Ranking Web of World repositories" developed by a research group belonging to the Consejo Superior de Investigaciones Científicas (CSIC), the largest public research body in Spain (http://repositories.webometrics.info/en). It evaluates the repositories according to the web presence and web impact as illustrated via search engines. The methodology attended use the following parameters

"**Size (S).** Number of web pages extracted from Google

Visibility (V). The total number of external links received (backlinks) by the number of regerring domains for such links obtained from MajesticSEO and ahrefs databases.

Rich Files (R). Files in formats like Adobe Acrobat (.pdf), MS Word (doc, docx), MS Powerpoint (ppt, pptx) and PostScript (.ps & .eps) extracted from Google.

Scholar (Sc). Using Google Scholar database we calculate the normalised number of papers between 2007 and 2011.

The four ranks were combined according to a formula where each one has a different weight but maintain the ratio 1:1 between activity (size sensu lato) and impact (visibility)" (Cybermetrics Lab, 2013). However there are inclusion criteria in order for the repositories to be included in the directory. On the one hand they must be autonomous and on the other hand the repositories should be mainly composed of scientific papers.

Consequently, the academics will be in double satisfied because on the one hand their repository's content can be evaluated and it can be beneficial for their promotion and on the other hand their research impact on the society can be an attraction for more scholarships and funding. In this way, a repository can draw the interests of more and more academics and its role as a mean of scholarly communication is becoming more effective. Moreover, an increasing number of surveys highlights the impact of institutional repositories on scholarly communication. A major study, Ruiz-

Conde and Calderon-Martinez (2014) observed the function and visibility of 100 top university repositories. This research did not only evaluate the content of the repository in quantity and quality terms but also it assessed repository web visibility. Comparing the repositories according to their above mentioned characteristics, authors managed to identify the leading repositories in different geographical areas. They also concluded that the importance of a repository mainly depends on the prestige of the university. Nevertheless, the value of the repository for the storage and the diffusion of knowledge is highlighted as well.

2.5.7 Institutional repositories in Greece

According to Chantavaridou (2008) one of the first trials for the establishing of an institutional repository in Greece was in 1997 from the University of Crete. However, it was limited to full text theses and dissertations accompanied with metadata. The same study shows that in 2008, nineteen institutional repositories in Greece were in operation and the majority of them (15 repositories) included electronic theses, dissertations and scientific texts of all kinds. Chantavaridou also mentions authors' uncertainty about copyright status of material in institutional repositories and ignorance as one of the most important obstacles for the open access movement. According to Rodriguez-Armentia & Amat (2010) the researchers might expect to find open access material in publishers' websites.

National Documentation Centre (see also section 2.3) has launched seven repositories mostly over the period of the thesis research. This fact may illustrate the acceptance of this new communication means by the Greek research community. The electronic repositories are the following

- National Archive of PhD Theses contains 28.000 PhD theses from all the Greek Higher Educational Institutions and the PhD theses of Greek scientists from Foreign Educational Institutions certified by Hellenic NARIC (2010)
- Helios Repository provides open and unrestricted access to a great variety of documents' types such as publications, books, sound and images files created from National Hellenic Research Foundation (2007)

- Pandektis includes digital collections concerned the Greek history and civilization created by the Institute of Neohellenic Research, the Institute of Byzantine Research and the Institute of Greek and Roman Antiquity. Its presentation took place at the end of December of 2007.
- Acropolis Educational Resources Repository contains sources produced by the Information and Education Department of the Acropolis Restoration Service which enrich the knowledge about Acropolis. It was developed during 2011 – 2012 (http://www.epset.gr/el/node/877)
- Parthenon Frieze (Repository) originated by a project carried out by the National Documentation Centre (EKT) and the Acropolis Restoration Service of the Hellenic Ministry of Culture and Tourism (YSMA) provides valuable information about Parthenon Frieze to scientific community (2009) (http://www.openaccess.gr/blog/)
- FOSS Repository includes documents created by the Greek Free/ Open Source Software Society (its members, communities and developers) concerned its actions about Free Software, Open Hardware and Open Content
- Ergani Repository contains archival sources which depict 19th and 20th local history and the daily life and political activities in north eastern Aegean

The majority of above mentioned repositories concern the Greek heritage and the scientific research is limited to "the National Archive of PhD Theses" and the "Helios Repository", consequently, the information biomedical research provided in this repositories is limited as well.

2.6 Documentation and Scholarly Communication: Interactions

Centres or departments of documentation contribute to knowledge detection and unification, through producing secondary documents such as bibliographies, catalogues, and the process of indexing. This fact is confirmed by the description of the qualifications of the documentalist as described in Briet's book **(**2006, p. 20**)** , where she emphasises the importance of subject specialist skills in understanding the

physical and intellectual integrity of the documents and their value, both current and possible future preservation needs. if the documentalist makes finding relevant research easier, a researcher should have more time for study and research. On the other hand, there is the possibility that researcher could find useful information in documents rejected by the documentalist but relevant to his or her needs.

Documentation techniques should promote the scholarly cooperation as scientists not only can be aware of other people's publications, but also they can build on existing knowledge in their own research as documentation techniques and scholarly communication are two interdependent processes. It would be useful to analyse a definition of the scholarly communication in order to understand those features which unite the two terms. According to Borgman (1990, p. 13-14), scholarly communication studies how scholars use and disseminate information through formal and informal channels and documentation creates the formal channels which enable scholars to find and disseminate information. In addition, the study of scholarly communication includes the growth of scholarly information, while, documentation presents it. Finally, the study of scholarly communication includes the information needs and uses of individual user groups, while, documentation techniques try to satisfy these information needs by providing the proper documents to the individual user group.

As far as the development of documentation theory concerned Briet (2006, p. 12) dated this from the third quarter of nineteenth century. Since the nineteenth century many social and technological changes have taken place. New means of communication have been established. From the later part of the twentieth century, the printed indexes and bibliographies were superseded by bibliographic databases and the printed catalogues by electronic ones. New tools such as digital libraries make scholarly communication faster, and better as more communication tools are available, with knowledge-sharing software to maintain virtual communities of practice, for example, and Web 2.0 tools to support interaction.

From the past to the present, independently of the tools, the key for the successful practice of documentation has been effective information retrieval methods. These are core documentation tools - by offering the proper information retrieval or search

engines – to enable scientists to detect all the information they require within a document collection simply and quickly. Beall (2008) highlights in *The weakness of full-text searching* that the lack of metadata-enabled searching may make the resource discovery within the resource difficult. The huge volume of information transmitted via the Internet and specifically search engines and databases makes finding relevant journal articles a challenge. The lack of full description of resources created confusion because of the "high recall" and "low precision" problem. Meanwhile, although, a lot of information sources could be retrieved, only some of them would be useful or related to the query – and even probabilistic searching algorithms might not help. Therefore, standards for the description of internet sources such as web sites, electronic books or articles were developed named as metadata.

A representative definition of the term metadata has been developed by the National Information Standards Organization in USA:

> "Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource" (NISO, 2004, p. 1).

According to NISO (2004, p. 1) metadata divided in three categories. **Descriptive metadata** which mainly includes the bibliographical data of a source like the title and the abstract. The **structural metadata** which concerns the physical characteristics of a source such as pages. The **administrative** metadata offer technical information of the resource such as those who have access to it.

Nonetheless, it is not enough for the creator to use metadata, he or she must choose which schema will implement. Some of the most well-known schemes are

- Dublin Core
- AACR2
- TEI (The Text Encoding Initiative)
- EAD (Encoded Archives Description)

The multiplicity of schemes could provoke many problems as if each creator used its own metadata standard, the mapping involved in information retrieval could be turned into a complicated process. Fortunately, there are initiatives and systems in place in order that this problem might be avoided. Examples include Open Archives Initiative and Resource Description Framework.

Open Archives Initiative offers two functions:

- Translation of metadata to a common set of elements prepared for harvesting
- Store of the translated metadata in a central index available for cross-repositories searching regardless of the native metadata used by the independent repositories.

Resource Description Framework (RDF), developed by World Wide Web Consortium (W3C), contributes to the creation of records by using metadata from different schemas (NISO, 2004, p. 11). RDF is a formal language for describing structured information so as to allow information exchange across applications. RDF works in the form of RDF triples subject-predicate-object. For Semantic Web applications, both the subject and the object can each be identified by a Universal Resource Identifier.

The following sections trace some of the developments that took place in the later part of the twentieth century, to illustrate how the documentation tools were developed, used and affected scholarly communication.

2.7 Developments in Information Retrieval

A great and very important technological advancement was the conception of search engines. In July 1945, Bush firstly talked about the idea of virtual libraries, information retrieval and hypertext by describing a machine named a Memex in his article *As we may think* published in The Atlantic Monthly. The users of the Memex would be enabled not only to enter all their documents via microfilms (at the time) in it as a repository but they would be capable of making notes and comments on the

documents by creating their own file. Additionally, user could join different information sources in order to create a new one.

The Memex preceded contemporary personal information management tools, which would illustrate how the principles could be applied. Specifically, Connotea (now ceased), CiteSeer, Zotero, all of them, have a target; they mean to help individual to store the bibliographic sources which one needs and make them easily accessible via an information retrieval engine by constructing personal digital libraries. Hull, Pettifer, and Kell (2008) deem the personal digital library as the improved form of a library. It enables the users not only to build their own personal information sources (personalisation) but also creates a communication net depended on the common interests and information needs, to allow sharing of personal collections (socialisation).

The father of modern search technology may be considered to be Gerard Salton who implemented the SMART informational retrieval system (Wall, 2006,). This relied on concepts such as the vector space model, inverse document frequency, term frequency, term discrimination values and relevancy feedback mechanisms. Searching at the time of the SMART project was limited to searching abstracts of scientific papers (Evslin, 2006). Tools such as thesauri were developed to provide consistent and controlled indexing (Voss, 2006).

Information specialists/documentalists managed to support information retrieval in other databases especially through the thesaurus construction. As cited in Voss article (2006), one of the most famous thesauri is MeSH (Medical Subject Headings) created by National Library of Medicine of America. Its first edition took place under the title Subject Heading Authority List in 1954 (U.S. National Library of Medicine. National Institutes of Health 2003a). In 1960 National Library of Medicine established MEDLARS (The Medical Literature Analysis and Retrieval System) which reinforced the procedure of bibliography compilation and individual information retrieval (U.S. National Library of Medicine. National Institutes of Health 2003b**)**.

In the following sections the information retrieval seems to be a part of search engines (see section 2.6.1), the social networking applications (see section 2.7) and citation

databases (see section 2.8) as all of them aim at the detection and the evaluation of electronic sources.

2.7.1 Search Engines

One of the most popular search engines is Google. Google search engine retrieval is a different way of finding items of importance, based on the links others have made to Web sites. It is different to the traditional documentalist approach to indexing, as it is a purely mathematical approach. In particular, Google downloads web pages in a repository, each of them has an ID number named as docID and then the indexing function is performed by the indexer according to hits in "barrels" (Brin and Page 1998).Brin and Page (1998) mentioned that apart from indexer, sorter is another instrument "charged" with indexing function as well. The indexing procedure is an automated process based on algorithms and software programs.

Another significant function of Google is the evaluation of indexed web pages applied by PageRank (Brin and Page, 1998). High PageRank indicator is defined from the number and the quality of the other pages which reference to webpage. Meanwhile, the webpage A has high PageRank indicator because many and high PageRank webpages reference to it.

A similar function is applied by developing the "related citations" search algorithm by NLM and the mapping that is possible on a PubMed search or OVID search. This means that users think they are doing a Google type search but in fact there is a lot of mapping going on in the background. The technology advancements allow the development of friendlier to the user information retrieval tools. In particular, according to Icahn School of Medicine at Mount Sinai. Gustave L. and Janet W. Levy Library PubMed Tutorial (2013) PubMed compares the words from the Title, Abstract and MeSH headings of all the citations and detects the related citations by finding the common words. Searching is divided into simple and advanced search, the advanced search looking a little more like the traditional Boolean searching of database information retrieval.

2.7.2 Secondary Information Sources – an overview of main developments

Søndergaard, Andersen and Hjørland (2003) claim that secondary literature arises from the need to control and disseminate the great volume of primary sources. The evidences of this statement could be the quality of the secondary literature. In particular, secondary literature represents the sources which abstract and index the primary literature. It includes subject bibliographies, bibliographic databases, libraries catalogues and other sources which may abstract primary information sources. One of the oldest forms of secondary sources was the abstracts journals (Osburn, 1984).

National Library of Medicine contributed to the development of secondary sources in biomedical sciences by publishing the Index Medicus in 1879. In the late 1950s the Index Mechanisation Project was transformed into the later computer oriented bibliographic retrieval and publication system called MEDLARS (Dee, 2007). MEDLARS led to the introduction of MEDLINE in 1971. Medline is considered to be the largest bibliographic database in life sciences (U.S. National Library of Medicine. National Institutes of Health 2003b). Its main feature is that the records are indexed with MeSH.

Nowadays, the role of bibliographic databases in controlling and disseminating primary literature is very important because they help researchers to locate easily journal articles. Additionally developments such as federated searching, searching across several databases simultaneously, appear to offer time savings for researchers. Joint (2010a) debates whether federated searching really offers the one-stop search engine solution that will compete successfully with Google Scholar.

Apart from bibliographic databases, the other channel of secondary services is the library catalogue. The OPAC (Open Access Public Catalogue) is in electronic form and each end user can have access to the information treasure of the library from his or her desktop. The electronic cataloguing of library documents is based on record formats as MARC and UNIMARC (IFLA Universal Bibliographic control and International MARC core Programme, 1999; Baker & Dekker, 2003).

2.8 Web 2.0 and Scholarly Communication

The main "ingredient" of scholarly communication process is information, from research data, reviews of the state of evidence, methods and data analyses. So the changes in the information environment have an immediate impact on scholarly communication. Digital information sources contribute to the alteration of disciplinary borders as they offer the opportunity to deal with a great volume of data even if the data sources and services originate from heterogeneous sources and different disciplines. Hence the interdisciplinary research is promoted, for example, the etiology of a disease may be interpreted according to biological factors. Consequently biologists and clinicians may cooperate at each other in order that its causative agents can be investigated.

The traditional journals may be too specialized to host cross-disciplinary research results and articles (Swan, 2008). Therefore, there is a growing need for more open communication channels. Web 2.0 seems to offer the tools for collaborative research as Procter et al. (2010) explain. The increasing development of blogs, wikis and social networking sites for scientists such as Reseachgate and Mendeley may not only confirm Procter et al. but also reveal scholars' need for new communication channels. Indeed, the Web 2.0 applications could provide the platform for new forms of scholarly communication, as Gu and Widen – Wullf (2011) state, because they:

- support online writing
- strengthen the invisible colleges
- turn the authors into publishers
- contribute to the multidimensional communication
- provide user-friendly environment, without requesting skilful usage techniques

However, Procter et al. (2010) and Gu and Widen – Wullf (2011) surveys which had been conducted to evaluate Web 2.0 applications and their impact on scholarly communication concluded that it was too early for a complete assessment about the

impact of Web 2.0 services on scholarly communication. Additionally, both studies focused on the problem of digital information assessment because of the lack of the traditional "peer review process". New methods such as altmetrics (see sections 2.5.6, 5.2.1-5.3) may be used for this purpose in future. Swan (2008) expressed her viewpoint that JISC should fund in order new software to be created in order to secure the quality control and evaluation process in the new communication channels via Web 2.0 forms. Procter et al. (2010) considered the local support of Web 2.0 usage as an important factor. Procter's et al. opinion seemed be supported by other scientists. Gu and Widen – Wullf (2011) highlighted the need for further study about the role of the library to the scholarly communication and social media.

The effect of Web 2.0 services on library's services was investigated by Joint (2010b) who emphasized the role of the library in securing data confidentiality and dealing with the lack of data security and lack of personal protection with Web 2.0 use. But he also suggested that the applications can be seen as information tools without judging their contents.

Libraries as "living" organisations need to be informed and adjusted to the technological advancements in order to enable their users to take advantage of the improved services as well. According to Mahmood and Richardson (2013) librarians enjoy the benefits of Web 2.0 tools developing new services, to improve their communication with users and overcome the disadvantages of Web 2.0 technology such as threatening of data security and data protection.

There is increasing evidence for the impact of Web 2.0 applications on scholarly communication. Van Noorden (2014) analysed the benefits on scholarly communication from using social networks such as the ResearchGate, Google scholar and Twitter and the researchers' attitudes according to the results of a long-scale survey conducted by *Nature*. Holmberg and Thelwall (2014) conducted another survey about evaluating the disciplinary differences in Twitter scholarly communication. They concluded that the researchers using Twitter for communicating with other scholars are the more active and experienced ones, mostly based in the natural sciences. Moreover, the academic libraries seem to use and support social

network tools such as the Twitter in order to promote their services and communicate with the academic community (Stvillia &Gibradza, 2014).

2.9 Development of Bibliometrics

Additionally, the evaluation of scholarly information is a common field implemented by bibliometric methods. The results of bibliometric analyses illustrate the relationships among research areas and disciplines. In addition, bibliometric techniques are tools for the assessment of library collections as well. Finally, the bibliometric measurement would be impossible without using informatics as it has been taken place via electronic databases.

2.9.1 Impact Factors and Citation Indices

The most popular and valuable bibliometric technique of scholarly communication is citation analysis. Borgman (1990, p. 11) emphasizes the usability of Science Citation Index and the Arts & Humanities Citation Index especially for analysing large datasets. According to Andres (2009) co-citation analysis creates a matrix of inter-scientific connection as it processes not only the citations the authors give to, but also the citations they receive from other authors. Consequently, the invisible college, the informal type of scholarly communication, becomes visible, because the production of scientific cooperation maps is possible. The frequent "exchange" of citations among particular scientists makes this cooperation obvious.

The citation databases of ISI have been the base for the development of new bibliometric databases and indicators for bibliometric analysis at a macro level e.g. the Center for Science and Technology Studies of Leiden University created a bibliometric database which included all the articles written by authors from the Netherlands indexed in Science Citation Index, Social Science Citation Index and Arts &Humanities Citation Index during from 1980 to 1993 (Moed, H F , De Bruin, R E & van Leeuwen, T N, 1995). Researchers aimed at the assessment of national research performance by evaluating the oeuvres of research groups. Additionally, the

authors emphasized on the importance of analysing the publishing activity of particular work groups via ISI indexes.

Scientific community considers the ISI Indexes as very reliable and credible citation resources. This highlights the double meaning of ISI Indexes as on the one hand they are used as bibliometric tools for the estimation of the scholarly communication, on the other hand, they strongly influence the scholarly communication as they indirectly recommend the scientific journals that should preferably be used by the scientists for greater visibility. This is more acceptable to the physical and biological sciences than to some social sciences and the arts and humanities (Moed, 2005, p. 125).

The scientific journals included in Journal Citation Report, a quantitative tool of the ISI database, are evaluated according to impact factor indicator. The impact factor is a bibliometric indicator which defines the journal quality as communication channel. So, the journals with high Impact Factor appear more prestigious and famous than the other ones. Consequently, more and more scientists have ambitions to publish their research results in these journals in order for them to be highly rated as well. In addition, one of the criteria that libraries may use for choosing the titles for journal collections is the Impact Factor.

Calculation of the impact factor is the combination of two elements.

> "The IF of a journal A in a particular year *Y* is computed following the formula:
>
> $$IF_A = \frac{All\ citations\ in\ Y\ to\ articles\ in\ A\ during\ (Y-1)+(Y-2)}{All\ citable\ articles\ in\ A\ during\ (Y-1)+(Y-2)}$$
>
> The denominator is the total number of "citable" articles published in a particular journal within a given timeframe. The numerator is the total number of citations in the current year to any article published in this journal during that given timeframe. The ISI has defined this time frame as two years (Dong, Loh & Mondry 2005).

The same article mentions an example impact factor calculation:

"the *New England Journal of Medicine* published 366 "citable" articles in 2003 and 378 "citable" articles in 2002. Citations in 2004 to any articles published in 2003 and 2002 are 14147 and 14549, respectively. Following the above formula, the IF for this journal in 2004 is:

$$IF = \frac{14147 + 14549}{366 + 378} = 38.6$$

Although, the Impact Factor of ISI is widely used there are some doubts about its trustworthiness. The increase of a journal's impact factor normally depends on the citations' number to citable articles of the journal the previous two years. However, it is possible to manipulate the figure and thus provoke the false rise in the journal's impact factor as mentioned by Dong, Loh and Mondry (2005) who describe the example of the journal Leukemia which accused by the journal Leukemia Research about the creation of self-citations.

Normally, the impact factor of a journal can be increased in the case that the articles "attract" more and more readers, subsequently more citations. Nevertheless, the crucial role of Impact Factor increases belongs to denominator because a lower denominator leads to a higher Impact Factor. At this point it is beneficial to discuss the weakness of ISI algorithm to distinguish and calculate the Impact Factor according to each document type citations apart. While, the citable articles of denominator are not all articles included in a journal but only research articles, technical notes and reviews, the numerator is composed of the citations of all documents published in the same journal such as citations to editorials, conferences abstracts, book reviews. It can lead to a very deleterious effect in journals with a great coverage of citable articles in their content.

For example, the journal A which contains a great variety of commentaries, book reviews, editorials present a higher numerator number than that one of the journal B of which the greatest part is covered with "citable" articles. On the contrary, the denominator of the first journal will be lower than the denominator of the Journal B, because journal A contains less "citable" articles. So, journal A will have a higher

Impact Factor than journal B, because it managed to attract more citations than journal B by publishing less citable articles.

However, the above mentioned example does not concern the review biomedical journals. The data are different when someone compares two different types of scholarly journals; a review biomedical journal with a primary research biomedical journal. The review journals usually have higher impact factors than the primary research biomedical journals in their category (Khaled, 2015). For example, the nominator of the journal *Annual Review of Immunology* for the period 2009-2010 is higher as review articles attract more readers and its citations are increased too, while, its denominator is lower because the citable articles are mainly reviews. The research journal *Immunology*, for the same period, contains meeting abstracts, articles, reviews, corrections, editorial material presents lower numerator because it includes less reviews and more original research articles and its denominator is higher because it includes a greater variety of citable documents (original research articles and reviews). Consequently 2011 impact factor for the *Annual Review Immunology* was 11.148 while for the journal *Immunology* was 3.321.

Nonetheless the role of ISI databases to the science is not in doubt, they present some other shortcomings also. One of the most serious problems for an institution or even a country may be the exclusion of non-English journals from the ISI citation indexes (van Raan, 2004) because research results remain internationally unknown and the contribution of the national universities or research institutions to the research field appears to be downgraded.

Additionally, over time some editors appeared suspicious about the methods of journals' evaluation that ISI applies because the procedures and the data are not accessible **(**Rossner, van Epps & Hill, 2007)**.** These suspicions are increased because Thomson Scientific does not publicize the facts and figures as Brumback (2008) maintains.

None the less, the problems remained as Citation Indexes covered only journal articles, so citations from books or to books and conferences proceedings were not included. However, the Citation Indexes are updated and new services are offered.

2.9.2 New Developments in Citation Tracking, Collaborative Filtering

New bibliometric tools such as Scopus, Google Scholar, PubMed related articles and Amazon's book reviews help scholars to detect bibliographical sources more easily and more comprehensively. These search engines not only cover the gaps of Citations Indexes but also provide more data as we shall see.

Scopus is a registered trademark of Elsevier. It is another abstract and citation database of peer review journals, book series and ISSN conference proceedings. It is worth mentioning that it also indexes 1900 open access journal titles. However, it offers the privilege to the journal subscribers to have direct access to the full text articles. In addition Scopus is the source on which the portal SCImago Journal & Country Rank is based**.** SCImago Journal & Country Rank is an assessment tool of the scientific disciplines. It estimates the visibility of the journals included in SCOPUS since 1996 (SCImago Journal & Country Rank, 2015).

Google Scholar is an artefact of search engine Google. Someone can find relevant documents by using author names or/and keywords. There are different kinds of documents can be retrieved such as theses, books, papers, abstracts located in a great variety of sources, meanwhile, academic publishers, university repositories, professional societies etc. Also, if it is possible, the full text form of documents is included. As far as articles sorted concerned, Google states that they are categorized according to the characteristics which scientists use in order to evaluate an article such as author's prestige, article's usage frequency (times cited) etc (Google scholar, 2013).

Another useful tool for tracking citation is the related articles now called "related citations" of PubMed, the bibliographic database of National library of Medicine. "Related citations" are presented next to the records displayed on the page. "Related citations" of a specific article offers a quick and easy way to find more articles focused on one's interests. PubMed also provides a type of citation index. If a record is cited by document included in PubMed Central this is shown on the record page.

Additionally, the Internet enables people to exchange opinions about their common interests through collaborative filtering recommendation systems. Recommendation systems provide critics about a great range of items as books, music, movies, articles etc. So, if someone has not personal experience about an item, one can find information from other people who are experienced. It is the automation of the process "word-of –mouth" (Schafer et al. 2007, p. 291). Recommendation systems are based on algorithms. The quality of results depends on the usage of an appropriate algorithm. The evaluation of algorithms is not an easy task. Nevertheless, a lot of trials have taken place in order that the recommendation systems' effectiveness can be detected. According to Schafer et al. **(2007, p. 312)** accuracy is the most important evaluation mean, accuracy between the predicted and the "true" ranking.

All the above mentioned innovations derived mainly from internet improvements may be a sign that the need for the development of new citation and evaluation tools was intense. In addition the creation of new publishing models such as open access journals and repositories might provide the motive to the scientists for the invention of new developments such as Scopus, SCImago and recommendation systems in order the new scholarly communication means to be detected and assessed. Furthermore, these inventions may boost the Greek biomedical scientists to trust the open access sources if they realise that they may promote the visibility of Greek biomedical research.

2.9.3 Critiques of Evaluations of Citation Analysis Tools

Citation analysis is a very important topic, and a vexing one for the scientific community as it is an evaluation method for scientists' reputation and performance. So, it is to be expected that constantly new comparative surveys are conducted about the validity and applicability of WoS of ISI and the new tools Scopus and Google Scholar. Although most come to the same general conclusions that the most popular bibliometric tool remains the WoS, followed by Scopus, and Google Scholar, there are some differences in the methods used for evaluation, and some differences in the findings (discussed in more detail in the following section).

Jasco (2005) commented on these three databases by comparing the quality of them. He stressed that the commercial databases of WoS and Scopus are well structured, whereas

Google Scholar presents problems with the search options and the presentation of retrieved information and this fact cannot wholly be justified by its open access character. In general, by analysing the characteristics of each database in his articles, Jasco (2005) tends to be in favour of WoS and Scopus and against Google Scholar. WoS and Scopus complemented each other, and Google Scholar comes distantly third.

Meho and Yang (2007) did another research study on this topic by examining the citation to the works of 25 academics in the three above – mentioned databases. They suggest that the combination of the usage of the three databases; Scopus, Google Scholar and WoS provides a more accurate and comprehensive picture of scholarly impact of authors. Nevertheless, the authors mentions that the time that they spent to collect and process the data from Google Scholar was 30 as much time collecting data from WoS and 15 as much time collecting data from Scopus. Consequently, collecting data was much more time consuming procedure in comparison with WoS and Scopus.

Meho and Yang (2007) characterize WoS as an indispensable citation database but they also consider that the use of Scopus as additional citation source may be indicated. They state that Google Scholar is a useful tool because of its international coverage. However, they downplay its "unique citations" because they are not of the same quality of WoS and Scopus and they highlight the need for searching and downloading improvements.

Indeed, Google Scholar faces serious technical problems but we cannot ignore two things. First of all, it is a free tool and it may mean some tradeoffs in quality and coverage, the second point which we cannot ignore is that from the great mixture of document sources it includes it may offer some unique citations.

Harzing (2008) compares WoS to Google Scholar. She points out the advantages and disadvantages of both citation databases but she seems to recognize the role of Google Scholar in bibliometric procedures.

Vukovich et al. (2008) suggest that Scopus has a greater volume of international and open access journals. WoS functions as a complementary tool. In spite of the information retrieval problems, Google Scholar offers the opportunity of unique

citations as it is indexing book chapters, dissertations, electronic prints and research reports.

Jacso (2012) describes some of the new tools of google scholars and specifically the H-index and Google scholar metrics by analysing the advantages and the disadvantages of the new tools. He identifies the signs of improvement but he also highlights the problems and the need for more progress.

Leydesdorff, Moya-Anegon, De Nooy (2015) analyse the quality and the quantity of citations and the relations which formed among them. Their research is focused on the common journal titles of Web of Science and Scopus and the data are derived from JCR and SCImago respectively. The Google scholar is not included because of technical issues. The network of citations which developed among Web of Science journals is denser that this one of Scopus, but the Scopus is offered for more observations and study.

2.9.3.1 Critical Appraisal Checklist

Given the debate (which is ongoing) about the most valid methods of using databases (particularly citation sets) for bibliometric analysis, six papers were selected for detailed scrutiny as they were research studies, relevant to this research. Three of the papers also critiqued the fourth and earlier work (Jacso, 2005). In 2012, Jacso re-evaluates Google scholar by studding the new tools of Google scholar and in 2015 Leydesdorff, Moya-Anegon, De Nooy decided to exclude Google scholar from their research for reasons included in Jacso's article. In health services research, critical appraisal is a recognized method of assessing the validity and utility of a research study. Using an accepted critical appraisal checklist for qualitative research *(Gl*asgow University, Department of General Practice, 1997) helped me to evaluate the research design, the methods and the research findings of the presented studies according to criteria which are adopted in health sciences research. In addition, the specific structure of this sub-section provide me the opportunity to present the review process which may be part of formal scholarly communication. The articles of Meho and Yang (2007) and Vukovich et al. (2008) critique Jacso's article (2005), Harzing (2008) commented on other research by Jacso , Jacso (2012a) assesses the Google

Scholar again and Leydesdorff, Moya-Anegon, De Nooy commented on another Jacso's article as well. Consequently, all the articles have two common points; they critique the citation databases and the four to the six include critique about Jacso's works as well. The original questions and the adapted questions are shown in the Table 2.4

Original questions	***Adapted questions***
Did the article describe an important clinical problem addressed via a clearly formulated question?	*Did the article describe a problem and was a clear question formulated?*
Was a qualitative approach appropriate?	*Was the selection of research methods appropriate for the question?*
Was the sampling strategy clearly defined and justified?	*Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)*
What methods did the researcher use for collecting data?	*What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)*
What methods did the researcher use to analyse the data, and what quality control measures were implemented?	*What methods did the researcher use to analyse the data, and what quality control measures were implemented?*
Was the relationship between the researcher(s) and participant(s) explicit?	*Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)*
Are the results credible?	*Are the results credible?*
What conclusions were drawn and were they justifiable?	*What conclusions were drawn and were they justifiable?*
Are the findings transferable?	*Are the findings of wider application and significance?*

Table 2.4 Critical appraisal checklist

(The answers to the checklist questions are Yes, Can't tell or No).

2.9.3.2 Jacso's Article

Jacso, Peter 2005, "As we may search – Comparison of major features of the Web of Science, Scopus, and Google Scholar citation-based and citation-enhanced databases", *Current Science,* vol. 89, no. 9 , pp. 1537-1547

Jacso's article is an article written for the 50th anniversary of citation indexing. It could be characterized as a dedication to Eugene Garfield and his creature the Institute of Scientific Information, and undoubtedly, the role of Eugene Garfield in bibliometrics and scientometrics is unique and unrepeated.

The aim of article is the comparison of three citation–based databases Web of Science, Scopus and Google Scholar. First of all, he describes the features of each database.

He states about Google scholar

> "… The expectations are different for fee-based and free databases, but open access should not provide excuse for ill-conceived and poorly implemented search options, and for convoluted, and potentially misleading presentation of information" (p. 1538).
> "*G-S* is a free service, and for many who consider it to be a gift for the world it may be anathema to say any but good words of it" (p. 1539)."

The above extracts may create a negative impression about the usability of google scholar to the scientist who needs to advise this citation databases. But they can also provide a motive for further improvement of Google scholar.

As far as the methodology followed is concerned, this is not so clear from the beginning of the article. Jacso mentions that:

> "There are several papers which mention *Web of Science, Scopus* and *Google Scholar*, including a few substantial reviews (11–13). I re-tested the three major systems for this review in April and May of 2005, but I also relied on the earlier

> in-depth reviews of *WoS* (14), *Scopus* (15) *Google Scholar* (16) and its updated version (17), as well as on a series of commentaries about citation enhanced indexing/abstracting services (18–20), link-enabled cited references (21), using citation scores for filtering and sorting results (22), software approaches to citation searching (23), and citation browsing (24)" (p. 1538).

Although, he informs us about the period he conducted the survey he does not explain why he chose these months, and for what reasons. Additionally, he uses many of his previous articles, with only few other details provided. The information retrieval process is based on three parameters:

- Documents citing a specific paper
- The coverage of a specific journal (number of articles of the *Current Science* which are included in the databases)
- The most cited articles of the above mentioned journal

The test article is Garfield's article in Science 1955, an article too old for the databases Scopus and Google Scholar while it is ideal for a database like WoS, a database with a long past.

The chosen journal is *Current Science* and as the author states

> "Originally, I wanted to test the breadth of coverage of *Current Science*. However, the difference in the number of records was so great that it would have made it a futile exercise. Suffice it to say that *WoS* had 26,020 records, *Scopus* had 3657 records" (p. 1544).

Finally, the results of information retrieval of most cited articles of the journal *Current Science* were taken by Scopus without mentioning which these articles are.

Generally, the author shows a preference for WoS and Scopus. In addition, he does not depict their disadvantages, while, he constantly presents Google Scholar "weaknesses". The conclusions seem to be an elevation of Garfield and his work against Google Scholar.

Finally, the findings, in my opinion, do not seem to be of wider application and significance because the subjectivity is too intense. Obviously, the author is influenced by the personality and work of Garfield, but this does not provide the motives for further research.

Summarising the results of critical appraisal, using the checklist, the score indicates the extent of possible bias.

Question	**Yes**	**Can't tell**	**No**
Did the article describe a problem and was a clear question formulated?			√
Was the selection of research methods appropriate for the question?			√
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)			√
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)	√		
What methods did the researcher use to analyse the data, and what quality control measures were implemented?		√	
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)	√		
Are the results credible?	√		
What conclusions were drawn and were they justifiable?		√	
Are the findings of wider application and significance?			√

Table 2.5 Critical appraisal checklist score for Jasco's article

2.9.3.3 Harzing's Article

Harzing, Anne-Wil 2008, *Google scholar - a new data source for citation analysis*, viewed 17 January 2009, <www.harzing.com>

The title makes us feel that this article will be an overall presentation of Google Scholar as a new data citation source. However, it is not clear what the aim of the article is. She describes the advantages and disadvantages of this new citation tool but in a different way, in particular, by presenting the disadvantages of Web of Science in comparison with the advantages of Google Scholar. Additionally, not only the common disadvantages of the two citation sources are depicted, but also mainly the disadvantages of Google Scholar are illustrated.

Harzing uses mainly the positive results of other colleagues' conducted survey on Google Scholar, but also her personal observation. She expresses her strong disagreement with the statements of Jacso's papers [Jacsó, P. (2005) Google Scholar: the pros and the cons, *Online Information Review*, vol. 29, no. 2, pp. 208-214, Jacsó, P. (2006a) Dubious hit counts and cuckoo's eggs, *Online Information Review*, vol. 30, no. 2, pp. 188-193, Jacsó, P. (2006b) Deflated, inflated and phantom citation counts, *Online Information Review*, vol. 30, no. 3, pp. 297-309]. Generally, this article seems to be a protest against the preference of WoS at the expense of Google Scholar or an answer to Jasco's comments. She may also want to back up her Publish or Perish tool which works via Google Scholar.

As far as methods of data analysis concerned, they are not so clear. Harzing searched the citations of her own work in both citation databases Web of Science and Google scholar via Publish or Perish tool and compared the results. The usage of Publish or Perish tool may be explained by the fact that Harzing mentioned

> "The output of Publish or Perish is only as good as its input. Whilst I do believe that in most cases Google Scholar presents a more complete picture of an academic's impact than the Thomson ISI Web of Science, all databases have their own limitations, most of which are discussed in detail below."

Additionally, the limitations of Thomson ISI Web of Science are mainly analyzed according to the results of previous studies, so, this paper seems to be based on literature review as well.

Finally, she does not reach any firm conclusion, but she provides us the motives via some evidence in order to use Google Scholar and conduct more surveys on this citation tool.

Question	**Yes**	**Can't tell**	**No**
Did the article describe a problem and was a clear question formulated?			√
Was the selection of research methods appropriate for the question?			√
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)			√
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)		√	
What methods did the researcher use to analyse the data, and what quality control measures were implemented?		√	
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)	√		
Are the results credible?		√	
What conclusions were drawn and were they justifiable?		√	
Are the findings of wider application and significance?	√		

Table 2.6 Critical appraisal checklist score for Harzing' s article

2.9.3.4 Meho and Yang's article

Meho, Lokman I. & Yang, Kiduk 2007, "Impact of data sources on citation counts and rankings of LIS faculty: web of science versus scopus and google scholar", *Journal of the American Society for Information Science and Technology*, vol. 58, no. 13, pp. 2105-2125.

This article is a case study which presents the effects of Scopus and Google Scholar on Web of Science citation counts analysed by the works of 25 library and information faculty members.

The research questions are posed in order to clarify the reasons for conducting the study. The means for answering the questions are analysed, for example the author chose the specific faculty members because

> "…These faculty members make an ideal case study due to the interdisciplinary and multidisciplinary nature of their research areas and their use of, and reliance on, various types of literature for scholarly communication (e.g., journal articles, conference papers, and books)" (p. 8).

They also give an explanation for the reasons Scopus and Google Scholar were selected.

Analytically, the theoretical part of the article (introduction- emergence of competitors to Web of Science) provides a detailed overview of citation analysis tools which contextualises the research design and it is mainly reliant on the results and the critiques of other relevant surveys. As far as the practical part (methods, results and discussion) concerned, an analytical description about data collection methods and data analysis procedures are presented and all the problems, that the researchers faced, are mentioned. Moreover, the presentation of results is analytical as well. Each database is examined according to its effect on faculty member ranking. Additionally, the questions seem to be answered.

This article seems to have all the evidences which make it a reliable and valuable study. However, the following paragraph of the results may alter a bit the above impression a bit

> "The results of the test group are discussed where needed (see below). Because the three tools provide different citation coverage in terms of document type and time period, we limited most of the analysis to citations from types of documents and years common to all three tools, that is, conference papers and journal items (e.g., journal articles, review articles, editorials, book reviews, and letters to the editor) published between 1996 and 2005. Excluded from the analysis are citations found in books, dissertations, theses, reports, and so on, as well as 475 citations from *GS* that did not have complete bibliographic information. These 475 citations primarily included: bachelor's theses, presentations, grant and research proposals, doctoral qualifying examinations, submitted manuscripts, syllabi, term papers, working papers, web documents, preprints, and student portfolios" (p. 16-17).

One of the questions was

1 "Do these new citation sources represent alternatives or complements to *WoS*?" (p. 7)

So I wonder in what way this question will be answered given that all the citations which had some diversity according to their publication types are excluded from the analysis. In my opinion, in order to have an answer for this question, the authors have to examine that diversity.

The authors clearly present the conclusions and suggest subjects for more and more research. Certainly the worth of this survey is not altered because of the above-mentioned drawback. Indeed, it could present the next steps for more research.

Question	Yes	Can't tell	No
Did the article describe a problem and was a clear question formulated?	√		
Was the selection of research methods appropriate for the question?	√		
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)	√		
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)	√		
What methods did the researcher use to analyse the data, and what quality control measures were implemented?	√		
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)		√	
Are the results credible?	√		
What conclusions were drawn and were they justifiable?	√		
Are the findings of wider application and significance?	√		

Table 2.7 Critical appraisal checklist score for Meho and Yang's article

2.9.3.5 Vucovich et al. article

Vucovich, Lee A., Baker, Jason Blaine, Smith, Jack T. 2008, "Analyzing the impact of an author's publications", *Journal of the Medical Library Association*, vol. 96, no. 1, pp. 63-66.

This is an article about the role of information scientists in detecting the citations of an author's publications. This survey took place in 2006. The motive of this research was the request of the University administration to the Reference Department of Lister Hill Library of the Health Sciences at the University of Alabama at Birmingham (UAB) for identifying the most highly cited articles (greater scientific impact) which had published by UAB authors over the past ten years.

The citation research was conducted by implementing an advanced research strategy based on the author surname with the initials (middle and first) and the city name in the CI field. WoS and JCR were the main citation sources but the authors also mention other citation sources such as Scopus and Google Scholar.

Finally, the authors conclude that more surveys must take place in order to evaluate the suitability of the other citation analysis tools in compare to WoS and JCR. Additionally they highlight librarians educational role by reporting

> "Though this analysis focused exclusively on WOS, there are more tools that need to be further explored. Thompson Scientific's JCR and its JIF are still important tools that researchers will readily understand; however, use of these traditional tools introduces limitations in use and interpretation. Given the availability of multiple tools that may be considered in addition to JCR's citation analysis, such as GS and Scopus, it is up to librarians to carefully explain to researchers what tools are available, what criteria are used, and how the various pieces of this puzzle are put together to reach an answer that has both merit and validity."

Question	Yes	Can't tell	No
Did the article describe a problem and was a clear question formulated?	√		
Was the selection of research methods appropriate for the question?	√		
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)	√		
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)	√		
What methods did the researcher use to analyse the data, and what quality control measures were implemented?	√		
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)			√
Are the results credible?		√	
What conclusions were drawn and were they justifiable?	√		
Are the findings of wider application and significance?	√		

Table 2.8 Critical appraisal checklist score for Vucovich et al. article

2.9.3.6 Jacso's Article

Jacso Peter, 2012a, "SAVVY SEARCHING. Google scholar metrics for publications: the software and content features of a new open access bibliometric service", ***Online Information Review,*** **vol. 36, no. 4, pp. 604-619.**

This paper is a research paper which aims at the trial of the one of the two new bibliometric tools of Google; the Google scholar metrics. From the beginning of the article, in the context section, the author explains the reason and the motives who urged him to conduct the survey on the software and the content characteristics of Google scholar metrics. Particularly, he mentions that

> "Usually I review the progress and regress of Google Scholar once a year. This year is an exception simply because Google Scholar developers have introduced two new services in the past nine months: Google Scholar Author Citation Tracker in 2011 (Jacsó, 2012a) and Google Scholar Metrics for Publications in April 2012. Given the wide-scale adulation of any information services which have the word Google in them it is important to inform librarians and other information professionals about the pros and cons of every service of Google, Inc. which relates to the domain of library and information science and technology."

As far as the research methodology concerned, although the phrase of the title "savvy searching" may indicates the type of the used methods there is no explanation or definition in the text about it. However, he analytically describes the tests and the software he used in order to examine the different parts of the research object; the software, browsing, searching, sorting functions, citation matching and content and this fact makes the understanding of methodology easier. The keyword searching with the term "online" presented the problems which derived from the confusion between the title of the journal and the form of the journal.

Moreover, each of the part is depicted separately and there are tables and figures which affirm the collected data and some of the researcher's claims. Although there is not a section focused on the conclusions in which the authors resulted, the

references to google scholar improvements and the problems which remain and must be fixed provide a picture of author's conclusions, for example he mentions in "searching" section that

> "The layout is good, and for the first time in any Google product/service, the developers were willing to number the entries in the result list, making it easy to determine"

> "GSM limits the primary result list to 20 periodicals even if there are 120 journals matching the query. However this limit is a problem when there are many more journals, such as those with information systems or computer science in their title."

> "GSM would not get a passing grade for real use in tenure, promotion, grants and accreditation applications, but it deserves another chance after more attention is paid to the parsing and citation matching component, and the underlying Google Scholar database undergoes the badly needed cleansing project."

As far as the wider applications of findings concerned, the author suggests more researches must take place in other databases and particular he highlights the need for

> "Further tests on a larger set of marketing journals using different cited reference enhanced databases are the next steps of this research to reveal the differences in the positioning of journals in the league tables created from the Microsoft Academic Search, SCImago, and the Web of Science databases."

Question	Yes	Can't tell	No
Did the article describe a problem and was a clear question formulated?	√		
Was the selection of research methods appropriate for the question?	√		
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)			√
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)	√		
What methods did the researcher use to analyse the data, and what quality control measures were implemented?	√		
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)	√		
Are the results credible?	√		
What conclusions were drawn and were they justifiable?	√		
Are the findings of wider application and significance?			√

Table 2.9 Critical appraisal checklist score for Jacso article

2.9.3.7 Leydesdorff, Moya-Anegon, De Nooy's article

Leydesdorff, Loet, Felix de Moya-Anegon, Wooter de Nooy, 2015, "Aggregated journal–journal citation relations in Scopus and Web of Science matched and compared in terms of networks, maps, and interactive overlays", *Journal of the Association for Information Science and Technology*.

This article is a study of the journal-journal citation relations which are created in Scopus and Web of Science. Particularly, the researchers state that

> "In this study, we compare the networks of aggregated journal–journal citation relations as provided by the *Journal Citation Reports* (*JCR*) 2012 of the *Science Citation Index*(*SCI*) and *Social Sciences Citation Index* (*SSCI*) with similar data for 2012 based on Scopus."

Google scholar could also be used in this study as it is a citation database. The authors explain its exclusion because of google scholar technical difficulties and reference to Jacso Peter, 2012a, "Using Google Scholar for journal impact factors and the h-index in nationwide publishing assessments in academia–siren songs and air-raid sirens", *Online Information Review*, vol. 36, no. 3, pp. 462–478.

While, in endnotes they mention

> "GS has a limit of 1,000 records that can be downloaded from the results of a search. In Scopus, this number is 2,000, but Scopus is also commercially available as a database for further analysis."

The authors present extensively the differences in structure and contents between Scopus and Web of Science and they implement quality control measures in order to secure the validity of the results. In addition, they mention that Scopus covers humanities better than Web of Science. So, the Arts & Humanities Citation Index is not included in JCR and in this research as well but in Scopus humanities are covered. The collected data were extracted from Scopus and Web of Science in 2013 but they were "2012 data" which concerned the common period from 1996-2012. However

the researchers explain that the way of extracting data was different for each database but they are certain about the reliability of the data because

> "The definition of "2012 data," however, may differ somewhat for each of the two database providers. *JCR* uses a cutoff date in March, when the previous year is assumed to be finished (Marie McVeigh, personal communication, April 7, 2010), to produce a beta version of *JCR* for the previous year during the summer (June/July). In October, this is followed up with a second (error-corrected) version. The production of the Scopus database is a continuous operation; the 2012 data were extracted by one of us on October 13, 2013. The SCImago group that processes Scopus data since 2009 has learned that changes after October do not affect the database of the previous year seriously."

Additionally, they describe the method they used for the selection of the journals and they present the following parameters which use for the precision of the journals matching in network analysis

> "After correction for duplicate ISSN numbers, journals with identical ISSN numbers were identified as identical (cf. Gavel & Iselid, 2008). Thus, 10,276 journals could be matched. 2. For the unmatched journals, journals with identical titles in the two databases were considered to be identical; this applied to 196 journals. 3. Fuzzy-string matching with the Ratcliff–Obershelp algorithm (Ratcliff & Metzener, 1988) was used on the journals remaining after the second step, using the larger list of Scopus journals as input to the matching.8 Journals with similar titles but different ISSN numbers were matched only if the ISSN numbers were found to refer to the same journal in different formats, such as print versus an electronic version. Thus, another 52 journals could be matched."

The explanation of the used specialized terms such as the "indegree specialization" makes the text more readable even for the non-expert reader. The methods of data analysis and the presentation of results (the VOSviewer visualizations, global maps and network analysis) are used by other scientists as well and authors' choice is reasoned according to the global bibliography.

As far as the results concerned, they seem to be credible because the researchers used the appropriate tools to control them. In particular they highlight that

> "In the final section, we visualize the shared and unique journals in Scopus as two overlays to the base map for all Scopus journals. Rao–Stirling diversity values of the two sets provide a statistic to express the variety and disparity in terms of the coverage across the maps (Leydesdorff et al., 2013, 2578; cf. Rafols & Meyer, 2010; Rao, 1982; Stirling, 2007)."

However, the authors do not omit to refer the problems which they were faced because of the errors in references. Additionally, in spite of the different meaning of "citable items" in both databases the results analysis were confirmed by the Garfield (1971) "Law of Scattering" because the shared journals (common journals) from JCR and Scopus are the main journals which accepted the greater number of citations and construct a dense network of links. Meanwhile, the 10,542 journals which are common in both databases are the leading journals because they are the sources of more cited or citing articles. In the case of Scopus the unique journals do not seem to be so important because they are more citing than cited.

Question	Yes	Can't tell	No
Did the article describe a problem and was a clear question formulated?	√		
Was the selection of research methods appropriate for the question?	√		
Was the sampling strategy clearly defined and justified? (choice and range of data sources studied?)	√		
What methods did the researcher use for collecting data? (reliability – could someone else repeat the research?)	√		
What methods did the researcher use to analyse the data, and what quality control measures were implemented?	√		
Was the relationship between the researcher and the data source producer explicit (any suggestion of bias?)		√	
Are the results credible?	√		
What conclusions were drawn and were they justifiable?	√		
Are the findings of wider application and significance?	√		

Table 2.10 Critical appraisal checklist score for Leydesdorff, Moya-Anegon, De Nooy

2.9.4 Conclusions

Although each article uses different sample methods and data analysis process, and their surveys took place at different periods, all of them have two common points and this fact is more important. On the one hand, it is generally accepted that Google Scholar has serious technical problems for bibliometric studies which must be fixed in order for Google Scholar to be more functional**.** More recent studies Jacso (2012b) and Harzing (2014) present a real improvement of Google scholar and they depict that this bibliometric tool is regularly updated. However, later studies, after Jacso, show more convincing evidence that WoS is not sufficient to demonstrate research impact anymore. All the later studies demonstrate that WoS is not enough as it does not include all the document types. Scopus and Google Scholar can have a complementary role. Surveys have shown that the research impact of a faculty is best described by collecting information from the three databases, and more recently DeGroote and Raszewsi (2012) highlighted the need for using the citations from the three databases (WoS, Google Scholar, Scopus) in order for the h-index of a nursing faculty to be adequately created. What is also clear from the studies is that there is little agreement about a valid methodology for comparing Google Scholar, WoS and Scopus. This is a serious drawback for fair comparisons to be made. However, the citation databases are continually improving in order to respond adequately to the needs of the scientific community for example the new version of WoS includes new citation tools such as the "Conference Proceeding Citation Index" and the "Book Citation Index". Additionally, new version of WoS is interlinked with Google Scholar (Thomson Reuters, 2015).

2.10 Copyright

2.10.1 Development of National Copyright Legislation

The advent of printing press in the fifteenth century was inter-related with new social circumstances. Until that era, access to the manuscripts was a privilege for the few, with most of the population poor and illiterate. The new type of book production was,

however, quick and prices were lower. Consequently, with easier reproduction, piracy was encouraged and commercial interests were affected. England became the first country which implemented trade control of books. The Licensing Act of 1662 obliged the authors to deposit a copy to the Stationers' Company in order for the book to be licensed for printing. However the modern form of Copyright was inspired by the later Statute of Anne in 1710. Two new concepts were introduced. The first concept concerned the protection of owners' rights for the fixed period of 28 years and the second one concerned the deposit of nine copies of the book in certain libraries.

Since then, many amendments and updates have taken place in order to accommodate new type of "works" resulting in the UK law "Copyright, Designs and Patents Act 1988". The 1988 Copyright Law may recognize the "first ownership of copyright" to the author but not in the case in which the work is an artefact of employment, in this case the employer is the first owner.

Book trade problems in the seventeenth century urged other European countries to compose their own Copyright Law. French Copyright Law was "born" around the same period with the English one. Nevertheless, the perception was different. It seems that they were created for different reasons and this fact can be demonstrated by the analysis of the terms used. English "Copyright" term means the right of making copies, while, the French Law was based on "droit d' auteur", the right of the author, one's right to dispose of his or her work as he or she wishes. Additionally, Copyright put limits on the free transmission of ideas. In contrast, in France the practice of censorship was not a usual phenomenon. However, Geller (2000, p. 209-264) stated that the French Crown authorized specific publishers with the right to print and publish books, so that in practice, differences may have been small. Finally, in England, book publication was central to the legal thinking, and done according to the rules of Stationer's Company.

Although Greece has been a country with intense writing activity since antiquity, the matter of copyright was introduced much later. The first completed and actual law on intellectual property was integrated into Greek legislation in 1920. Perhaps, it happened this way because the commercial motive was absent. Greek authors were

possibly interested more for the knowledge transmission than the profit to be gained from control of publishing rights. Geller (2000, p. 209-264) provides another explanation, based on his literature review, and he presumes that the oral word was most popular than the write one. Besides, the city states were interested more in promoting culture than intellectual property rights. The Greek authors participated in contests and the award was the honour.

Indeed, the delayed transition from oral to literate culture might be a reason for the impede implementation of intellectual property principles in comparison to other European countries but is it the real one? The reality described by Geller's sentence (2000, p. 209-264) "these texts were freely performed again and again…" may have another meaning. The democratization of the knowledge and the culture has been popular since that era. Perhaps, Greek people could not think of censorship and financial interests because their minds were attuned to free transmission of cultural items. We must not forget that Greece is the "maker" of Democracy.

However, it was inevitable that Greece would be influenced by international trends. It is not accidental that the law of 2387/1920 was approved at the same period that this country joined the International Berne Convention of 1886, the Berne Convention for the Protection of Literary and Artistic Works.

The law 2387/1920 was shaped according to the French "droit d'auteur". But the most important law in Greek legislation about this subject is 2121/1993 because it revised previous law and was adjusted to comply with the directives of the European Community. This law has been in force since then (1993).

Great Britain and France, the pioneers in copyright, set the example for other European countries, although in different ways. It would be very interesting to see to what extent some European countries are affected by the Statute of Anne and some by the principles of French Revolution. Crews and Ramos (2004) conclude that the influence of Great Britain and France on Spain, German and Netherlands' copyright laws is obvious because there are common points. Spain and Netherlands define the range of protected works in a similar way to English definition (as might be expected from the historical organisation of nation states at the time). They use the words

"literary" and "artistic works" as the United Kingdom does. Additionally, Spain utilizes another word of English description the "original" one. All of these countries emphasize the objects which are subjected to copyright protection in contrast to France and Germany where the definitions are different. Both of their copyright definitions personalize the copyrightable documents and highlight author rights. It cannot be accidental that both countries use the same approach to characterize the protected works. Germany describes them as "personal intellectual creations" and France as "individualized intellectual creation" (Crews and Ramos, 2004). Another evidence of this effect concerns the copyright owner of works created during employment. French and German copyright law do not mention anything about "works made for hire" but they refer to the author's right for transferring copyright. On the contrary, in this case, United Kingdom, Spain and Netherlands consider and define as first copyright holder the employer.

Generally, although there are differences among the national copyright laws, all European countries are evidently influenced by Great Britain and/or France. So, the pioneers triggered the need for national Copyright Laws to be established and also determined the main principles of the new Copyright Laws.

In the USA the first reference to an "author's right" was in the Article I, Section 8, Clause 8 of the U.S. Constitution

> "the Congress shall have power to promote the progress of science and arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

However, the first Copyright Law was implemented by the Copyright Act of 1790. An Act motivated by Statute of Anne in 1710, as it promoted the protection of owner's rights for 28 years with emphasis on the "public domain". Many revisions were applied, the most important of them in 1831, 1870, 1909, and 1976. The principle of res judicata, which means that "the matter has already judged" and is no longer subject to appeal, contributed to the growth of the Copyright Law.

American Copyright Law had a serious gap about foreign authors because the law concerned only Americans. European authors might have found a market for selling their books in America but they were obliged to sell their books cheaply for distribution to the American market (Geller, 2000, p. 209-264).

This problem was fixed in 1988 when United States signed the Berne Convention. Its standards were implemented by the Trade Relationship Aspects of Intellectual Property Standards (TRIPS) agreement.

The Berne Convention is an international treaty (with up to 100 members) signed at Berne of Switzerland in 1886. It aims for the protection of the rights of member authors as if they were citizens of any signatory country – domestic laws prevailed, but authors who were not citizens of the country enjoyed the same rights as authors resident in that country (item 3 of article 5 of the convention).

This international agreement covers a wide range of works as it does not include only literary sources but also artistic works. Creators' rights are secured for at least 50 years after their death.

However according to Spinello and Tavani (2005, p. 25), in critiquing implementation of such legislation because they consider it as thorny not only at the international level but also within the borders of a confederate state such as the U.S.A. as its nation implements its own laws.

However, the distinction between the idea and the expression of the idea is very clear in the U.S. Copyright Law. The idea as a thinking product is not legally protected but only if it is expressed by using any means from a book to a sonata as mentioned in article 2 of The Berne Convention. The same article protects those who have adapted a work, or translated it as being original works.

2.10.2 Copyright – Intellectual Property

Copyright is like a jigsaw puzzle and only if all the pieces are unified is somebody able to comprehend its meaning. Consequently, it is absolutely necessary to see each aspect separately in order to have the clearest view possible. So, the terms intellectual property, creator's rights, orphan works, fair use, public domain will be analysed in the following sections.

Intellectual property is a term with a very broad meaning as it concerns whatever is related to creator and any other right holder's protection. It includes not just copyright law but also patents and trademarks. Consequently, it is composed of two parts; the "industrial property" and the "copyright". Industrial property refers to patents. Spinello and Tavani (2005, p. 26) defined the patent as a form of legal protection given to individuals who create an invention or process.

A product is subjected to patents' protection under the following mentioned terms

- It must be useful. A product of which the existence is necessary cannot be characterized as a patent
- It must be considered as a novelty. A product which presents similarities with other ones in the way of construction cannot be considered as innovation.
- It must be a sample of intelligence. A product easily constructed cannot be subjected to patents protection.

A patent must be a trademark as well. The emblem and the name of a company must be used only by the company that used it first and it is declared to the Patent Office or the analogous public service. Meanwhile, other subsequent companies cannot name their products under the same firm. For example, a refreshment not produced by Coca Cola industry is not a Coca Cola refreshment. So in the case the new refreshment was named as Coca Cola, the Coca Cola firm could bring a case against the other company because Coca Cola's trademark is patent protected. Consequently, the protection of "industrial property" impugns against "unfair competition" and piracy, while the "copyright" protects the moral and commercial rights of rights holders.

Many of our modern views about intellectual property are underpinned by the ideas of Locke and Hegel. Locke and Hegel are some of the philosophers who examined the meaning of "property rights". Locke claimed that each person must be enabled to enjoy the fruits of their labour. He believes that if someone takes care of an unusable piece of land and turns it into a farm, he or she is the owner of this land.

Locke mentions in The Second Treatise of Government

> "As much land as a man tills, plants, improves, cultivates, and can use the product of, so much is his property. He by his labour does, as it were, inclose it from the common" (Locke, 1952).

Certainly he refers to the limits of this property ownership, as he demonstrates that

> "there is enough and good left for others" (Locke, 1952).

He means that someone may use and own a piece of common land but the ownership must be bounded and not at the expense of other people. Lockean ideas could be implemented in intellectual property because the expression of an idea is a product of thinking and pain. So the creator is the only owner of its product. Even in the case of intellectual property rights, nobody is enabled to use her or his rights against other people.

Modern copyright law obeys Locke's principles in some ways. First the copyright concerns the physical expression of the ideas, not the ideas themselves but the books or other intellectual sources. Second, it legitimizes the author as the only person who is worthy to enjoy the results of their own effort. Finally, Locke defines that the property must not prevent the public good so copyright limits the intellectual property rights by applying the principles of fair use.

Hegel is another philosopher who formed a theory about property rights in his book "Philosophy of Right" (1952). Hegel enriches Locke's approach and adds a new data, the data of personality. Because

"property is the embodiment of personality" (Hegel, 1952, §51)

For Hegel the properties are the media and means for personality growth. Meanwhile, acting upon things is necessary for self-actualization – to be what we are. People must have their own place in order to feel free. Their products are the means to express themselves freely and thus belong to them and this fact is highlighted by Hegel (1952, §68).

However, Hegel and Locke's theories present some gaps which may make their implementation difficult. Locke's theory characterizes the property as a result of some hard work and the question is then how we identify the efforts of a writer, which are the criteria? We could say it depends on the volume of a product but it is not always a good measurement. Because the results of a research may be written in a small monograph but the researcher worked very hard in order to conduct the survey and analyse the results in these conclusions. The intellectual gain may not be reflected in the amount of effort as demonstrated in the quantity of output.

As far as Hegel's theory concerned, it emphasized the role of personality growth and the self-actualization. But the matter is how easy this theory is to be implemented in copyright? Because, although a book is a kind of self-expression, what happens when it is a fruit of collective work? So, in this case the participants cannot express themselves properly or they are limited in how allocation can be awarded fairly? Nevertheless, each theory has its own worth as a way of thinking about rights and responsibilities and the gaps cannot reduce their value and their contribution to the sciences.

Utilitarianism provides a social approach on intellectual property rights as they protect intellectual objects in order to urge people to create for the benefit of the society. As the security which the system of rights provides, this makes the creators feel comfortable in the creation of novel objects. For example, if intellectual property rights are not defended, someone might research a problem and come up with a practical solution. If others could copy this, without rewarding the inventor, then there would be no incentive for people to invent.

Marx mentions the exploitation of the labour because of the function of capitalist system. Capitalism contributes to the removal of labourers from their objects as the producer financially exploits them and not the creators as Marx and Engels (1848) refers.

Although Marx agrees with Hegel that labour is an expressive activity, he maintains that the creator has not the control of its product as he or she should have. According to Marx and Engels (1848) it happened because the modern industry is owned by the aristocrats.

Consequently, the modern bourgeois as industrial owners are the exploiters of creators' products. An example here is the role of very large organisations and the creative work of their employees. The problem appears to be more intense when large organisations such as Disney are the owners of creators' rights especially because of their financial status and control over their employees. So, it is possible that large publishers, could act together to create something like trusts and exploit a great range of the intellectual production of a country.

Consequently, Marx considers the intellectual property rights as an unreliable system of creator's protection because there is no need for creator's rights protection. He suggests the abolition of intellectual property rights because of the social character of the product (Marx's concept of man as illustrated in Fromm's book, 2004, p. 105) In addition, Marx and Engels (1848) in Communist manifesto mentions that nobody can own anything and all the intellectual objects will be common and freely available.

According to Spinello and Tavani (2005, p. 17)

> "Proponents of this view, which we might label "information socialism", argue that the elimination of intellectual property rights will lead to the expansion of the intellectual commons and the fostering of creativity".

The strict system of intellectual property rights is considered to be a bit problematic but its non-existence is impossible because of its advantages. First of all, the countries protect their intellectual property (the work their citizens and organisations

have done in the expression of ideas) from free riders and invest in new research in order to promote new products. However, the consequence of inadequate patent law is discussed by Spinello and Tavani (2005, p. 20) who mention the example of India. Indian patent law does not adequately protect pharmaceutical products and the result is for them to be easily copied.

The "information socialism" is certainly an ideal situation because people will use the existent knowledge in order to produce new information. But, we cannot know how this model can be implemented because it has not been implemented so far.

Finally, the existence of a copyright law system must be required for the normal function of the market but a revision of the system is necessary as well. Because, on the one hand, the evolution of technology offers new type of products which must be protected and on the other hand, the sale of information at high prices hinders the development of scholarly communication and the development of new knowledge.

However, Bammel (2014) in a submission of the International Publishers Association to the office of the UN High Commissioner for Human Rights states that Intellectual properties are inextricably linked to Human Rights. In particular, copyright, dynamically, contributes to the empowerment of the science and the enrichment of scholarly communication by permitting development of the proper mechanisms for the effective scientific information dissemination. Consequently, the current copyright context works well either in paper or the digital form and any change of it can affect the international framework.

2.10.3 Copyright and Creator's rights

Creator rights, as has already mentioned, are divided into two branches, moral and the commercial rights. Moral rights identify the ownership of the creator. The creator can use and reuse the product as one wants. Commercial rights concern the exploitation of the product for economic reasons.

McFarland (2004), Boyle (2004), Warwick (2004) and Halbert (1999) as cited in Spinello and Tavani book (2005, p. 198) emphasize in similar ways the economic character of authorship. They claim that the copyright highlights more the economic interests of individual creators than the social character of information. The meaning of authors is romanticized, because, the originality of a work is not guaranteed as often the authors borrows from one another. In this way they are doing an overall contribution to the society. Additionally, the concepts of the above mentioned scientists are confirmed by the daily practice, by the fact that both of types of rights (moral and commercial), anymore, are not concentrated on the author as they should be. Such an example is the case of journal articles. Usually, the authors of an article transfer their rights to the journal publisher in order for the article to be published in the journal. Consequently the authors have no rights on their products and the publishers may manage the knowledge as they want. However, the authors are willing to transfer their rights because they are indirectly benefited. They may not have a money reward but the reward comes in publicity for their research, and hopefully promotion and greater recognition. Publishers take on the work of ensuring the article meets academic standards by administering the peer review process, and ensuring that the article has an audience. Authors traditionally have been happy for publishers to take on that work. The following diagram**,** derived from the current research, illustrates the commercial relationships developed among academic and scholarly authors, publishers and libraries and the way money flows

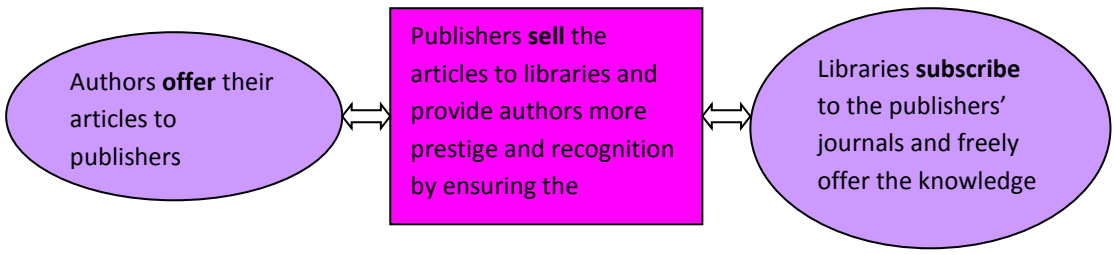

Figure 2.1 *Commercial relationships*

As we can see in Fig. 2.1 academic and scholarly authors are not paid for their articles by the publishers. However the publishers make money because they sell the articles and generally their journals to the academic libraries and personal subscribers. In this way, authors are satisfied because library's users are their main audience and so they

obtain more prestige and recognition. Publishers are satisfied too because of the increased profits. Meanwhile, the libraries offer journals without charge to their users but with heavy costs to themselves because of publishers' charges.

2.10.4 Copyright and Orphan Works

Orphan works are a real problem because the possessor of the work is anonymous or the existing data are inadequate to identify the author or the copyright holder. Subsequently, these sources cannot be reused as their use can be considered as a copyright infringement. It is a very serious affair especially when the content of the work is very significant and reproduction is forbidden. Many attempts have been made in order to eliminate this problem which arose in United States because of the Copyright Act of 1976. The Copyright Act of 1976 abolished the registration of copyrighted works. Consequently, the absence of a central database of works might solve the problem of bureaucracy but created a new category of copyrighted works, the orphan ones. So, whoever wanted to be advised by these works, one should have conducted a research about their copyright status.

The first remedy was twice proposed as the Public Domain Enhancement Act (PDEA) in 2003 and 2005. PDEA brought back the renewal process as a fee paid process. As a result, the copyrighted works, which would not be renewed, would be available free for use into the public domain. This bill was not approved.

The law H.R.5439 introduced the solutions for the cases with an unallocated copyright holder in 2006. Finally, the 2008 Orphan Works bill (S. 2913) and the similar bill (H.R 5889) suggests the need of creation of a database for copyrighted visual works. This bill passed the Senate September 26 (legislative day, September 17), 2008, but the second bill never became law.

The question is what happened with the orphan books or articles as the above-mentioned databases concern only visual works and according to the section 101 of title 17, United States Code excludes the books, magazines newspapers, electronic information.

However, United Kingdom Intellectual Property Office (2008) proposed that orphan works can be legally used under the condition that a bill will be paid on behalf of the creator and when one could be identified he or she will have some profits. Obviously, United Kingdom aimed at the facilitation of information release and it could make the first step from a serious problem of orphan works. The successful implementation of Government's proposal might become the example for the rest of member states of European Union.

2.10.5 Copyright and Fair Use

Although the copyright law defines the usage of protected material, in some cases, it may be very strict and excessive. So the concept of fair use defines some circumstances under which the use of the published copyrighted material without the consent of the copyright holder is allowable. The fair use rules concern:

- *The aim of the use*: for example, it is fair use for a teacher to copy a book for educational reasons. However if a teacher copied the entire book for each member of the class, that would mean that the author would be deprived of royalties on sales of the book, and the publisher would argue that this use was unfair. Indeed, the author would be deprived of royalties but it would happen for good reasons, otherwise, students or pupils should be deprived of knowledge. So this kind of "piracy" might be justified. We cannot sacrifice everything on the money altar. But it would be a crime if this book was copied and sold without the copyright owner's licence. The illegal commercial usage is clear, and copying for educational purposes has to be carefully licensed and controlled.
- *The nature of the copyrighted material*: It depends on its content as much as the difficulty of creation, as strict copyright law, for example forbids a CD with songs to be copied. Additionally, an unpublished work is protected by the laws about privacy as it may be created for private reasons.

- *The size of a copy*: The copy of a chapter is an absolutely different thing from the reproduction of the entire book. The extent of the copying which is fair is a matter of debate.
- *The effect of the copy on the copyrighted work*: The use of copied material must not harm the exploitation of the original work. The sale of pirate CDs seriously damages the purchasing power and the value of the original ones.

The above mentioned conditions must be satisfied in order the defendant to be vindicated in court. However, there are also the cases of "incidental inclusion" a phrase referred by the "Copyright Law fact sheet P-09: Understanding Fair Use" of UK Copyright Service which means that there was not the intention of the illegal action.

Finally, the Fair Use is a policy of United States Copyright Law and it has been used in many Court cases such as Sony Corp. against Universal City Studios (http://en.wikipedia.org/wiki/Fair_use, 13 October 2013). However the study of court cases for copyright infringement shows the fact that the copyright law is affected by the social and technological changes so it must be revised according to the new data. The case of a peer to peer file (P2P) sharing system in Metro-Goldwyn-Mayer Studios Inc. against Grokster Ltd (2005), provides a new dimension on the matter of infringement liability, in particular the concept of contributory infringement. Lipinski (2005) mentions in his article that the contributory infringement is in force when it is interrelated with guilt. It means if someone helps somebody else to infringe accidentally or unintentionally, he or she hasn't commit the wrongful act of secondary liability. However, another kind of contributory infringement is the case that somebody who knew about copyright infringement did not act in order to prevent the end user from infringing.

The problem of secondary liability is not a new one. It was first-discussed in the case of Sony Corp. of America Inc. against Universal City Studios in 1984. Specifically, it was about contributory technology and according to Lipinski (2005) the question for the Court in Grokster was whether the P2P is such a technology as well.
This case added a new factor, that of motive. As the technology has two sides, infringing and non-infringing, it is not enough to use the peer to peer file system in order to be characterized as contributory technology but also to be evidenced that this

usage intentionally fostered copyright infringement (Lipinski, 2005). In the Grokster case was observed that the percentage of non-infringing use of P2P was very low in comparison with the percentage of infringing usage. Consequently, the court judged the technologies contribute to the piracy (Lipinski, 2005).

Another legal case in the music area concerns Bridgeport Music against Dimension Films about illegal musical sampling (2005). Bridgeport Music Company administers the copyrights of the most Funkadelic bands' songs. Samples of these songs were used without copyright owner's permission by new artists, consequently, Bridgeport Music sued Dimension Films and other companies or artists for illegal sample use. So, the 6th Circuit characterized the sample as an illegal action when it happens without copyright holder's permission. Dames (2007) analyses another cause of "illegal sampling". It is the lack of mandatory registration as, the copyright infringement may happen accidentally and unintentionally, especially when the copyright holder's data are unknown or inadequate. Nevertheless, the end-users of the music will be sued characterized as copyright infringers and they may pay for damages. Dames suggests the creation of a system

> "…that would work similar to a stock market index in which variables such as the amount of work, the nature of the work, the creator's popularity, and the passage's popularity determine a sample's economic value range. As applied to copyrighted works, music, literary works, and film and video could be indexed for example" (Dames, 2007).

Mandatory registration may be a good solution for alleviating the problem of orphan works as well. But a system comparable to a stock market index might not be a fair system. It depends on the variables which would fix the economic values.

However, the problems which are presented because of the musical infringement are more common and more prominent, perhaps due to the fact that music is the most profitable area. Case law is evolving.

2.10.6 Copyright and public domain

Public domain concerns the free use of the work when the copyright protection finishes. However, European Foundation (2010) states that the public domain period is constantly limiting, and the future is unpredictable. So the possibilities for free usage of material are less and less. The copyright protected period for the works depends on the national copyright legislation. The film *Night of the Living Dead* directed by Romero (1968), *Moby Dick* by Melville (1851), are some of the most famous examples which belong in public domain and can be used in any way (Wikipedia, http://en.wikipedia.org/wiki/, 13 October 2013).

International agencies such as WIPO, World Trade Organization and European Union and the national governments are trying to strengthen copyright legislation in order to protect rights holders but also they try to find ways to facilitate the legal access to the copyrighted material such as the implementation of Creative Common licences (see section 2.10). Copyright seems to be the vexed matter of many discussions even in nowadays, and the new information media (e-mails, blogs, webpages) raise other questions for the authorities. Freedom of Information and Data Protection will be analysed in this chapter as well.

2.11 *Copyright Modernization and Problems*

The great volume of information production and the variety of information forms made the "modernization" of copyright landscape an imperative need. At the international level, WIPO is the agency with a very active role on copyright topics. Two international copyright treaties, the WIPO Copyright Treaty and the Performances and Phonograms Treaty (1996), aimed at the adjustment of Berne Convention on the new conditions. The Trade Related Intellectual Property Rights Agreement is another vital initiative of WIPO. In 2001, WIPO and WTO cooperated for the implementation of TRIPS Agreement in less developed-countries, so that these countries will be able to benefit from their intellectual production as well.

The European Union tried to harmonise the different copyright laws of member states which were based on British and French copyright laws. The compulsory character of copyright directives which it passed shows its intention for the establishment of a common information market. Two of the most important directives of European Union are the Database Directive and the Directive on Copyright and Related Rights. The first Directive defines a database as:

> "This is a collection of independent works, data or other materials that are arranged in a systematic or methodical way, individually accessible by electronic or other means, each of which may or may not be subject to individual copyright" (Muir and Oppenheim, 2002).

It is a very substantial definition as it includes all the kinds of documents and emphasizes on the way the database organizes the copyrighted and non-copyrighted documents included. Consequently, if the individual documents are copyright protected, they shall remain protected as database documents. As far as the database protection concerned, as the same article refers, in the case the database presents some kind of novelty in the choice or arrangement of the documents, it will enjoy fully copyright protection and database right (Muir and Oppenheim, 2002). Database protection lasts 15 years. Finally, if the criteria of novelty or investment are not fulfilled, the database has no protection.

The second Directive, the Directive on Copyright and Related Rights intended to reinforce copyright holders' rights especially in the digital environment. One of the main characteristic of this Directive is the function of anti-copying devices such as Electronic Copyright Management Systems and as mentioned in Muir and Oppenheim (2002) the intended prevention of the function of anti-copying devices for the purpose of infringement is judged as a criminal offence. However, the effective implementation of these devices is in doubt because it is not known in what way the legal or illegal function will be defined. Meanwhile, there may be confusion when this device allows copying as a legal procedure according to copyright exemptions and when it must be prohibited. Perhaps the most significant part of this Directive is the characterization of infringement as a criminal offence.

In USA there is a similar situation. In 1998 Digital Millennium Copyright Act was passed in order to protect databases and define the deactivation of technical devices against copyright infringement as a criminal offence.

Although the Copyright Legislation is continually being updated, it provides some "protective valves" via its limitations and exemptions. The Library as an institution is one of the privileged institutions supported by the copyright law because of the informative and educational character of the library, as Fernandez-Molina (2011) explains. Nevertheless, libraries' rights are in danger because they enforce licensing agreements in order to secure access to international famous journals under terms which are opposed to the copyright limitations as explained in eIFL-IP handbook (2006). It happens because of two reasons. On the one hand, the contract law is more powerful than copyright law and on the other hand the libraries may accept terms which are against their interests because they do not understand publisher's language.

One of the problems faced by the libraries is the preservation of the electronic documents. The cost of the equipment and the staff that are requested for this procedure in combination with the cost of the subscriptions make the physical ownership of digital information impossible. Consequently, Adrienne Muir (2004) justifiably mentions that libraries are obliged to rent the digital information instead of owing it.

Certainly, digital information is a rented informative source because often the access is lost after cancellation of the subscription even for the paid period. Additionally, interlibrary loan by using the digital articles is regularly prohibited. The situation is very different with the printed collections. The libraries were the owners of the journals even after subscriptions' cancellations or they could loan the articles available in the collections. As stated by Muir (2004), United Kingdom has taken a lead, with support from the Joint Information Systems Committee of the UK Higher and Further Education Funding Councils, to provide some workable licensing solutions. The JISC model licence for journals created by JISC for the needs of this type of university research. She also mentioned that after the termination of the subscription the access may be limited to the period of the subscription or to be obtained directly via publisher's website or a third party server. A proposal was

LOCKSS (Lots of Copies Keep Stuff Safe). LOCKSS is a system which hosts the content of electronic journals and makes it accessible after the subscription ends.

Finally, perhaps, all the above – mentioned difficulties were absent if publishers' policy for the electronic journals was similar to the printed ones from the beginning. Meanwhile, they could provide continuing access to the e-journals even in the case the subscription was interrupted. Also libraries should be free to disseminate the electronic digital knowledge as this happens with printed journals specifically via interlibrary loan.

Well–known publishers implement different types of archiving policies by offering alternative kinds of access to the past issues. A representative example is depicted by Elsevier (McSean, 2004), one of the most famous publishers in Science Technology and Medicine. Elsevier provides two alternative solutions for access to electronic articles; the access to backfiles and the archiving initiative**.** Access to backfiles of electronic journals is secured for subscribers via ScienceDirect by signing another licence**.** Moreover, Elsevier retains the right of archiving all its electronic journals in perpetuity via ScienceDirect. Elsevier maintains an archiving system apart from ScienceDirect platform so the data may be reloaded even after a disaster. Meanwhile, it also tries to create the backfiles of the journals from their first volume.

Although Elsevier maintains in electronic form the backfiles of the journals, the question is how the library will retain its access right after the termination of the contract. Elsevier applies the post termination access policy to journals of ScienceDirect and offers two alternative choices. With the first one customers have access to the full text journals of paid period by supplying them with CD-ROMS which include the SGML/XML and PDF forms of raw data. With the second choice, the library can preserve its right of access for the paid period via ScienceDirect by paying an annual fee which is calculated upon the number of full text articles' downloads.

Elsevier stresses another problem the publishers must cope with which concerns the loss of publication rights. Indeed this is a serious problem especially in the case of digital information. The problem is provoked by the DOI (Digital Object Identifier)

ownership policy. According to Hammond (2008) each electronic source must always have only one DOI. The problem is what happens with digital information which changes owner. The transfer of property does not seem a complicated procedure. It is a simple agreement between disposing content publisher and acquiring content publisher. The new owner of DOIs must update the URL about the new location of the contents. It means that although the contents' website may have via changed the DOIs (Digital Object Identifier system) remains the same so the URL must be updated in order for the digital objects to be detected in their new location. However, the question is what happened in the case of backfiles. As Hammond (2008) indicates the situation is getting complicated when the old and the new publisher provide access to the journals two different DOIs.

In spite of the difficulties there are solutions the implementation of which depends on the publishers' agreements and interests.

Publishers' collaboration enables them to solve this problem for the sake of their customers. The solution based on publishers' collaboration is Multiple Resolution which allows to disposing publisher and acquiring publisher to maintain two URLs at the same time and for the same DOIs.

2.11.1 Creative Commons: an output of copyright modernization

According to Creative Commons website Creative Common licenses aim at posing a balance in the status "all rights reserved" that the Copyright law defines by enabling authors to grant some rights to readers (http://creativecommons.org/licenses/ - 8.09.2013). Because as Lessing (2004), one of the creators of Creative Commons, mentioned that Creative Commons intend to complement Copyright law not to fight it. Specifically, the following six types of Creative Commons licenses concern

- Attribution
- Attribution – Share Alike
- Attribution – Non Derivative Works
- Attribution – Noncommercial

- Attribution – Noncommercial – Share Alike
- Attribution – Non Derivative Works

Under the legal terms, the creator informs the readers about their rights on the creator's work and the limits posed. Consequently, any infringement or plagiarism or commercial use may be considered as an illegal action. So creator may be free to open access to his or her work via a website or repository without feeling uncertain about the protection of copyright and moral rights.

The importance of Creative Commons for the open distribution and re-use of the content seem to be of general acceptance as literature review shows. Readhead (2012) states that "CC-BY is now emerging as the gold standard for open access publishing, particularly in STM fields". This preference for Creative Commons also supported by the European Commission (2013) conducted a survey in which participate all the European Union members apart from Cyprus. The motive was the revision of the Directive about the re-use of public sector information. The Commission was interested to know the opinion of the stakeholders about standard licensing, datasets and charging for the re-use of public sector information in order to develop guidelines in the future. There were a feedback 355 questionnaires from five different groups of stakeholders (citizens, public authority, commercial and non-commercial re-user, re-use expert and other). The 71% of participants consider the Creative Commons licenses as the most appropriate tool which secure the interoperability. The European Commission concludes that available licenses is gaining the approval of European Union members.

Bammel (2014) highlights the need for the implementation of Creative Commons as they enable the author to control the usage of the work by establishing the principles of Copyright law. The safety which is provided by copyright protection helps towards the availability of free information via Internet, whereas might impede the functioning of usual business models.

2.12 *Summary conclusions on copyright and legal aspects*

Copyright, data protection, and freedom of information provide useful insights into the principles of intellectual property and rights of access to information gathered about individual citizens, and how such openness is viewed and valued in different countries. The analysis of Freedom of Information legislation and Data Protection Policy (**see appendices 2.1-2.2**) may seem irrelevant to the copyright but information scientists and librarians must be aware of national and international legislation that governs access to information, whether that information is protected by copyright or available, under certain conditions to the public on request. Libraries may offer access to government information, and library staff must be aware of citizens' right and obligations. Additionally, information professionals must be informed about the meaning of confidentiality and privacy so they will be able to protect data and implement the privacy policy.

2.13 Theoretical Frameworks for Studying Change

Innovations derived from technological advancements may be termed as "routine" nowadays. The question is to find out how much they can affect the daily practice, to provoke the change, and to make the innovation acceptable and workable. Everett Rogers and Kurt Lewin, identifying the need for evaluating the effectiveness of the innovations and the conditions which affect them, structured theoretical frameworks for studying change.

Rogers formed his theory and published it in the 1962 book "Diffusion of innovations". This theory is based on four keystones; the innovation itself, communication channels, the time period of change and the social system. Each of the four elements has a different weighting for the diffusion of the innovations. The diffusion is the dissemination process of the innovation to the members of a social system over time. It may take place via mass media and/or interpersonal

communication channels (Rogers, Singhal, Quilan, 2009, p. 418). The time between the diffusion of innovations and adoption of the innovations divides the change agents, those who take up the change, into five categories:

- Innovators
- Early adopters
- Early majority
- Late majority
- Laggards

While the adoption process includes the following five stages

- Knowledge
- Persuasion
- Decision (accepted or rejected)
- Implementation
- Confirmation

The spread rate of the innovation depends on the following factors

- Relative advantage
- Compatibility
- Complexity
- Trialability
- Observability

A very interesting survey was conducted by Greenhalgh et al. (2004) about the ways in which the innovations in health service delivery and organizations can be spread and sustained. Roger's theory "Diffusion of Innovations" was extensively used. A combination of above mentioned factors and the presentation of key players as expert opinion leaders can be decisive for the adoption of the innovation. The authors highlight the individualistic character of this theory because its unit is the individual. In addition, they state that it is a simple theory which can be implemented in complex

innovations in services and organizations in which the unit is the team or a department.

Dalrymple et al. (2009) used the "Diffusion of Innovations" theory aiming at the adoption of an evidence-based guideline in a teaching hospital. The authors justified the choice of the specific theoretical framework by highlighting the wide range usage of the theory for explaining the adoption of healthcare innovations generally and specially clinical guidelines. They adjusted the factors which affect the spread rate of innovation to the needs of the specific survey. These factors were the following

- Relative advantage over the current practice
- Compatibility with workflow
- The complexity (difficulty of use negatively affects adoption)
- Trialability (ability to try an innovation prior an adoption positively affects adoption)
- Observability (innovation visible to others are more likely to be adopted and spread)

The researchers also examined and resulted in conclusions about the parameters which affected the adoption of the guideline such as

- Influence and communication channels
- Organizational context and adoption decision
- Information sources
- Clinical decision support
- Suggestions for improvement

Another research study shows the usability of Roger's theory but in combination with other theories. In particular, it was conducted in Greece by Loukis, Spinnelis and Katsigiannis (2011) in the Hellenic Aerospace Industry (HAI). They justified the choice of this theory because of the existence of above mentioned spread rate factors as a wider set of adoption determinants. In this way, they managed to identify

significant barriers such as high complexity and low compatibility which prevent the adoption of B2B e-marketplaces by HAI.

Lewin's theory the "Force Field Analysis" was presented in 1947 (Lewin, 1947a, 1947b). Force Field Analysis rates the driving forces and the restraining forces of change. Additionally, the present state is evaluated and possible actions (to reduce the restraining forces, and increase the driving forces) help to plan a route to result in the desired state.
Apart from Force Field Analysis, Lewin described the change as a three - steps process which includes

- unfreeze
- change
- refreeze

Unfreeze is the early stage of the change when the need for change is visible. The planning of the change is requested. At the second step, the change is becoming. It is a transition period from the old to the new condition. The role of leader and the change agents is normally very important to make this transition. Lewin maintained that during the period of "unfreezing" the restraining forces should be weakened. When the change is taking place a confusion period must be followed until the phase of refreezing is established when the change process is completed, the new ideas are crystallized and the condition is balanced again.

Dent and Goldberg (1999) highlight the fact that some parts of Lewin's theory have been misinterpreted specifically the phrase "resistance to change". Lewin considered that the resistance to change concerned all the system which should be changed, the employees and the managers as well because both of them belonged to groups. The study of group dynamics could not be explained by the individual psychology but the study of the whole system. The management textbooks analyse the resistance to change as the resistance of the employees to the change.

Baulcomb (2003) mentioned the successful implementation of the Theory of Change during the establishment of a separate day unit for the chemotherapy of cancer

patients. There were driving forces and restraining forces as well. But the manager tried to cope with the staff as a team with a participative role for each one. She highlights the benefits from the involvement of the whole team for a lasting and effective change as Lewin pinpointed in his model. The restraining forces were weakened because the driving forces were strengthened. The fears were addressed through new qualifications and the staff became more self-confident in adjusting to the new working conditions.

Buonocore (2004) reflects on the implementation of change in a hospital department using the Lewin theory to structure the explanation of how and why things happened the way they did. The specific article depicts the experience of the leader, an Advanced Practice Nurse, who applied successfully an insulin drip protocol, according to the principles of Force Fields Analysis to implement change in practice.

The following figure illustrates the key components of the implementation as mentioned in the article in correspondence with the three stages of Theory of Change.

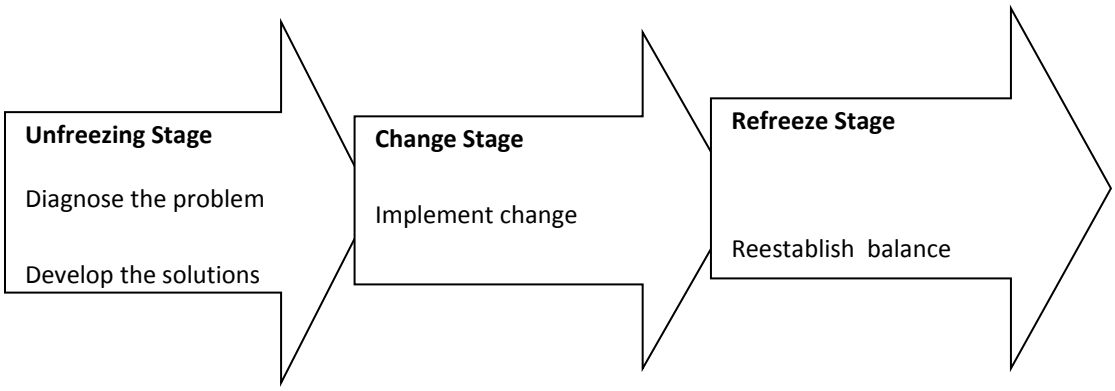

Figure 2.2 *The three stages of the new insulin drip protocol implementation*

There was a well – structured plan which led to the success from the beginning of the procedure. As the majority of the problems and barriers were known at the first stage, they could be perceived as recognised. Nevertheless, during the second stage new problems were provoked but the effective communication among leader and the nurses and the education of nurses on the new protocol were the keys for the solution of the problems and the weakening of the restraining forces.

So at the third stage of data collection, there was a positive impact to the long term implementation of the protocol as no serious health problem such as hypoglycaemia was identified. The full adoption of the protocol was discussed.

Although both the Rogers and Lewin theoretical frameworks aim at the same goal, the evaluation of innovations and their contribution to social change, they use different methodologies. However, Force Field Analysis could be used to complement Diffusion of Innovations. Rogers' theoretical framework focuses on the characteristics of the innovation and how this affects the change process. Lewin's theory provides the tools to detect the drivers for the innovation forces and how to limit the restraining forces.

2.14 *Summary conclusions*

Scholarly communication was enriched with new channels of communication through technological advancements. However, the most important channel remains the scientific journal. High priced journals and the need for access to research results led to the creation of open access movement. Although, at the beginning, the first initiatives for open access to knowledge were supported by nonprofit organizations, in 2013, we see that prestigious commercial publishers (Springer, Elsevier) have integrated open access publishing policies.

The Web 1.0 development directed the launch of digital resources. Electronic journals, institutional repositories were just the beginning. The request for easier detection of digital sources via internet led to the creation of harvesting search engines and the form and usage of metadata schemas.

One of the important obstacles to the transition from print to electronic era is the copyright issue. Copyright laws vary in their focus (rights of the author, or rights of those responsible for the "expression of the idea"). Meanwhile, the matter is how the relationship between the rights of the author and the rights of publisher can be balanced. Normally, the creators are the holders of moral and commercial rights

(copyright). However, the publishers, as responsible for the "expression of the idea", managed to become the copyright holders by providing to the creators the ability for publishing in reputable scientific journals. Consequently, the use and re-use of a paper or the deposit of the paper in an institutional repository depend on the publisher's policy. In this way, creator is unable to define the usage of one's work and the information is locked and available only to the minority of people who can pay for it. The open access movement tends to change this reality by promoting the equal access to knowledge. However, the need for the protection of moral rights and copyright led to the formation of usage licenses such as Creative commons. Creative commons protect the copyright holder from infringement by informing the reader about the usage rights. So if someone encroaches upon Creative commons' principles, one can cope with the Court. In this way the reader knows the limits derived from the licenses and the publisher can protect the document from illegal action. Moreover, the author can be more certain about the protection of moral rights, in theory at least.

However the existence of digital resources created new needs and doubts about the traditional methods. Web 2.0 modernized scholarly communication by launching social networking, which enabled the scientists to be authors and publishers at the same time as they could immediately announce their research results via their blog or a social network engine such as ResearchGate. New metrics tools were invented as altmetrics which contributed to the article evaluation but by using different methods such as downloads, while, citation analysis and Impact Factor were re-examined by the scholarly community. Additionally, Web of Science is not anymore the only database for the evaluation of articles and journals. Scopus and Google scholar function as complementary resources and the SCImago Journal & Country Rank is similar to Science Citation Reports.

Finally, as it is observed in this section many changes are happening such as Web 2.0 and adoption of open access policies by international publishers. The changes could affect or be affected by open access publishing. However, the need for studying the changes is obvious. Rogers and Lewin theoretical frameworks offer the tools for in depth study and explanation of the changes which are taking place in open access publishing. Consequently, analysis using both theories helps to explain the extent of

change observed, what the restraining forces are, and how other stakeholders in open access publishing such as libraries could act for the benefit of researchers in Greece.

Chapter 3

Methodology

3.0 Introduction

The research philosophy provides the fundamental principles on which the research design and strategy are based. This chapter describes the epistemological framework of the research, and the major elements of which it is composed. The different aspects of open access must be explored in order that the problems be properly identified and suitable research questions posed. After discussing the research philosophy (Section 3.1) and the research strategy (Section 3.2), the methods are described (Sections 3.3 – 3.12). The empirical research comprised survey work (series of questionnaire surveys, plus some interviews), plus some bibliometric analyses. The chapter discusses the design of the survey tools, and the advantages and disadvantages of the approaches used. Similarly, the approach taken for bibliometric analysis is evaluated.

3.1 Research Philosophy

As this is a thesis based on biomedical sciences and open access journals in Greece, it seems appropriate to consider the Greek philosophers and knowledge when devising the research strategy**(see** also appendix 3.1**)**. The Greek philosophers, Aristotle and Plato, were the main influences initially. Aristotle stressed the importance of observation as a research method because it emphasized senses and especially sight. Therefore I was taught that the careful measurement and observation via surveys can help me to draw objective conclusions comparable with other researchers' results. Plato as an idealist, emphasized the superiority of the world of ideas and of reason. By exploring the ideas and emphasizing careful reasoning, I will try to understand the social setting, as it is viewed in the social sciences, where experiments are not so easy to set up as they might be in a laboratory.

Theories were considered for constructing the research framework. Positivism and interpretivism are the most popular research approaches in the scientific world. These were inspired by the Greek classical philosophers. They are opposed to each other because of their contrasting principles.

Positivism uses the natural laws for studying the social reality and it defines as a basic research tool, observation. Plato and Aristotle affected the formation of positivism by their writings (see appendix 3.1).

Plato occupied himself attaining a whole definition of knowledge and forming the principles of **Epistemology**. He comprehended the meaning of knowledge and indicated the manner of reaching real knowledge which is through reason and (logic) explanation as presented in Theaetetus dialogue (Plato, 1967, p. 3). In addition Plato developed the Theory of Ideas in his work "Republic" which is interpreted as **Platonic Ontology**. The Theory of Ideas is the theory of the concepts. The concepts cannot be conceived by the senses. They are a real thing outside of any mind, hypostatized notions (Plato, 1970, p. xiii).

Aristotle in Metaphysics developed a different theory from Plato and a different definition of epistemology as **epistemology** being essentially the theory of knowledge. He claimed that knowledge exists in the sensible phenomena which are consisted of particular things the "substances". The major means of obtaining this kind of knowledge are the senses, mainly the sight, and the experience based on memories (Aristotle, 1968, p. 3). While, the meaning of the word "substances" was explained by Aristotle by stating another theory, the Theory of Substances or the Theory of Being which is known as **ontology**. Aristotle distinguished among the properties of the thing, the one which is the most important or essential is this one which categorizes the things. It identifies the species (deduction methodology). An example of this method is "If we know that a horse is a mammal, and that Black Beauty is a horse, we can deduce that Black Beauty is a mammal" (Skirbekk & Gilje , 2001, p. 69).

As Bryman describes the rules of positivism, the effect of Greek philosophers is visible

"1. Only phenomena and hence knowledge confirmed by the senses can genuinely be warranted as knowledge (the principle of phenomenalism)

2. The purpose of theory is to generate hypotheses that can be tested and that will thereby allow explanations of laws to be assessed (the principle of deductivism)

3. Knowledge is arrived at through the gathering of facts that provide the basis for laws (the principle of inductivism)

4. Science must (and presumably can) be conducted in a way that is value free (that is, objective)

5. There is a clear distinction between scientific statements and normative statements, and a belief that the former are the true domain of the scientist. This last principle is implied by the first because the truth or otherwise of normative statements cannot be confirmed by the senses" (Bryman, p. 13, 2008).

Many philosophers through the years studied positivism, but Auguste Comte was considered to be the founder of this concept for the social sciences at the beginning of the 19th Century. As Hirschheim mentions:

> "He said the study of human phenomena should reflect methods used in physical science. 'Positive' science was to be undertaken. The science of sociology - for discovering the laws of human behaviour - would be pre-eminent. It would be used to establish a perfect society based on these laws of behaviour" (Hirschheim, 1985).

Positivism seems to have had a great impact on the information systems research and this assertion is confirmed by Alavi and Calson (as cited in Davison, 1998, p. 2-3) who in 1992 reviewed 902 IS research articles which implemented positivism research framework. Although positivism managed to connect the physical with social sciences, there were some doubts about its appropriateness and the adequacy of this theory for the understanding and description of human phenomena. So, in the latter part of 19th century, a new movement was formed by the anti-positivists.

The new theory was named as interpretivism. This research tradition was established by Greek ancient philosophers too, specifically the Sophists. Maybe one of the greatest exponents of this was William Dilthey (Hirschheim, 1985). We can see that this theory emphasizes the subjective meaning of social action. The term "subjective" is a central sign of the opposition between positivism and interpretivism. As it has already mentioned, the positivists consider that the scientific procedure must be objective. However, the interpretivists support that the social reality cannot be explored in an objective way as the society is composed of human actors and the subjective feature is so important. Additionally, the researcher must communicate and interpret the actors' behaviour and actions. This fact may indicate a "subjective" interaction between researcher and the subjects of enquiry. Consequently value-free data collection is impossible. This difference applies to the research methodology as well. Usually, positivists consider quantitative methods as the most proper way for testing the hypothesis, while, interpretivists use qualitative methodology as the best way to understand and explain human behaviour and action. But, even when both theories use the same research tools, the survey objects and the hermeneutics of the collected data are absolutely different.

The appearance of interpretivism did not lead to the disappearance of positivism. However, in the beginning of 20th Century, the positivism theory took on different ideas. The logical positivism, as positivism renamed in the new century, derived from the Vienna Circle. It was a mixture of the work of Russell and the positivism of Mach. According to Hirschheim two refinements formed the new structure of positivism

- "there has been a move away from the classic positivist position of phenomenalism (where the only acceptable data came from experience) to physicalism (where data is seen to emanate from the world and not merely private experience; intersubjective agreement on objects is allowed).
- A second refinement to logical positivism shifted the goal of science away from individual explanation (or laws) to theoretical networks of knowledge statements linked together through deductive logic and grounded in direct observation" (Hirschheim, 1985).

The differences between positivism and neo-positivism are obvious. The fact of the interpersonal agreement provides a new way of phenomena explanation. Private experience is not enough for the interpretation of a situation. Collective thought replaces the individual opinion. Knowledge must be generally observed and accepted as valid. The deductive process and the observation remain the major research tools but used in a different manner. The individual laws are overturned in favour of the theoretical networks of knowledge statements. Nevertheless, the main point is the approach to pure knowledge, the objective viewpoint, through intersubjective agreement by applying deductive logic.

However, the distance between the above mentioned theories can be covered by a sub-theory of positivism, that of realism. A philosophical theory which seems to have much in common with neo – positivism is Critical Realism. Realism links positivism and interpretivism by combining characteristics from both theories. On one hand, realists are influenced by positivism so that the natural and the social sciences "can and should apply the same kinds of approach to the collection of data and to explanation, and a commitment to the view that there is an external reality to which the scientists direct their attention" (Bryman, 2008, p. 14). But on the other hand, critical realists, especially, adopt a mixed method research approach affected by interpretivism because they aim for the observation of this external reality in order to understand its structure and its functional mechanism, in the acknowledgement that human social structures can change far more rapidly than those observed in the physical sciences. As Bhaskar (2011, p. 2) mentions that

> "we will only understand – and so change – the social world if we identify the structures at work that generate those events and discourses…These structures are not spontaneously apparent in the observable pattern of events; they can only be identified through the practical and theoretical work of social sciences"

However with the use of the word "critical" in Bhaskar's theory arises the question about an interrelation between critical theory formed by the theorists of Frankfurt School and critical realism theory; "are there any common characteristics between the two theories?"

As Strydom (2011, p. 12) demonstrates

> "Critical theory proceeds from the pragmatic- realist assumption that reality is something external to and independent of us which we experience through its real generative mechanisms when we run up against it under particular circumstances and are compelled to form a concept or theory of it which could guide appropriate action; thus reality exposes us and we expose ourselves for the benefit of learning, problem solving and world creation"

Although there are different schools of thoughts on critical theory, the main themes that most seem to share are:

- dealing with some aspects of social science as objective reality (to help explain what is going on)
- understanding and interpretation (to help understand why things might be the way they are)
- critique of the current situation (to analyse assumptions, challenge assumptions) (so that we can move towards improvement and empowerment)

These themes present some similarities with the main principles of critical realism as Bhaskar describes it.

The choice of research philosophy can be complicated for projects in library and information science. Certainly, choice is mainly based on the research project and the hypotheses which will be generated (or tested). Experiments are possible, and quantitative methods used. Generally there has been a move towards more interpretive and qualitative research in the field of information behavior, for example. In this research it was important to understand more about the mechanisms, the reasons why open access was, or was not successful, and what the measures of success might be. As a health librarian working in a University Library, it is important to provide some quantitative evidence for any changes, but understanding the reasons was also very important. For all these reasons the survey results (literature review, quantitative and qualitative evidence) should be taken into account in order for the interactions of different variables to be observed.

The adoption or rejection of an innovation is an outcome of a variety of factors. In general, the features of the innovation and innovators and the environmental context can influence the innovation diffusion (Wejnert, 2002). The analysis of the main variables which could affect open access publishing implementation was focused on the following points

- the description of open access models (innovation characteristics)
- the attitudes and the awareness of Greek biomedical scientists around open access publishing and traditional publishing models (innovators' features)
- the study of open access publishing context emphasized on the interactions among stakeholders and the reasons which provoke them (environmental context influence)

Roger's Diffusion of Innovations Theory and Lewin's Force Field Analysis were used for the interpretation of the above mentioned analysis evidence. Both theories have been evaluated and criticized as well. Roger's Diffusion of Innovations Theory is considered to be an actor – centered theory as the actor's characteristics may influence the innovation adoption (Wejnert, 2002). As Haines and Jones (1994) observed the speed of innovation acceptance depends on the characteristics and the role of five actors' categories: the innovators, the early adopters, early majority, late majority, laggards. However, the communication among actors seems to be one-way among the ones who know and the others who do not as Cain and Mittman (2002) mention. This one – way communication could have advantages or disadvantages. It depends on the objectivity of opinion leaders. If the opinion leaders highlighted only the benefits of the open access publishing a virtual reality could be created. For example, new publishing models could be harmed in the future because of the inappropriate awareness of biomedical scientists**.**

Lewin's Force Field Analysis Theory could also be characterized as an actor – centered theory but it functions in a different way. The opinion leader as a manager must study the circumstances for the change and predict the evolution according to the interaction of the driving and restraining forces. The collective work of groups, the creative collaboration between managers and employees are very important for the

successful implementation of the innovation. Burnes (2004) points out that there are some critiques against Lewin's theory:

- its implementation presupposes that the organization works under steady situations
- it does not take into account the politics and the power of the organization
- it is influenced by management principles and top - down communication processes

Burnes' analysis mentions that all the above critiques can be rejected by studying the text of the Theory. As we can see in the description of Force Field Analysis in Section 2.13, the examples of the theory's implementation show that

- problems which may be created cannot be predicted and so the circumstances cannot be continually steady. Nevertheless, the theory can be implemented successfully
- politics and power can be the driving and restraining forces which hamper or promote change so the theory takes them into account
- even though the theory has a managerial perspective, the top-down communication process seems to be less intense because of the collaboration and the feedback between opinion leader and employees

The criticisms of both are a healthy reaction of the scholarly community to the principles of the theories, but their utility as theories are as explanatory frameworks, to help to focus on what is happening and not happening throughout the process of change.

3.2 Research Planning

For this research on open access, it was important to consider that the biomedical researchers that might be part of the audience for the research work in a quantitative way. They work in a positivist tradition. However, the focus of the research was not only to track what was happening, and the extent of the changes, but also to

understand the reasons for the behaviour. This meant that the main target was the exploration of the open access publishing as a new phenomenon, its different models and their functional mechanisms.
The main question(s) on which the research focused is

- Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what main changes have been observed over the course of the last few years?

However, this question requests careful consideration of what it means to improve scholarly communication or make such communication easier for biomedical scientists. And, quite importantly, can open access publishing be identified – how easy is it to be defined? There are therefore some sub-questions which are important because they contribute to the understanding of the open access publishing as a social phenomenon such as:

- What are the reasons led to the establishment of open access publishing?
- What means facilitated its proliferation? Its cost?
- Which models of open access publishing are used?
- In what ways do the different models work?
- Does open access publishing influence knowledge dissemination? Is it possible to assess this?
- Who are the stakeholders of this publishing mechanism?
- In what ways do the stakeholders influence the new publishing models?
- Does English language pose a problem for Greek biomedical scientists to publish in foreign language journals?
- What are the advantages of Greek researchers' participation in open access publishing?
- How easy is it for the researchers to find digital information on their own?
- How might the expectations of library users change as a consequence of open access publishing?

Some other sub-questions are more specific, and help to track the development and the usage of open access biomedical journals in Greece:

- Are Greek biomedical scientists informed about the characteristics of open access journals?
- What means do the Greek biomedical scientists use to inform themselves about the open access journals?
- What is meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?
- What are the attitudes of Greek biomedical scientists towards open access publishing and how are these changing?
- Are there open access biomedical journals in Greece?
- What do Greek biomedical publishers think of open access journals?
- How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods?
- What is the writing activity of Greek biomedical scientists in open access journals?

Finally, one of the desired outcomes of the research is to identify what health library services should do to support appropriate development of open access journals. This requires trying to address the following questions:

- Do institutions and libraries promote the open access journals?
- How could libraries contribute to the development and usage of open access journals?

As we can see by reading the questions we could divide them in two categories; the objective and the subjective ones. The questions which could be characterized as objective are those which concern open access publishing and its different models described as a structure, moreover, the social impact of different sides of open access sources and more specifically on scholarly communication, knowledge transmission and biomedical sciences. Questions such as the number of open access biomedical

journals in Greece, the percentage of biomedical scientists aware of open access publishing, can all be answered quantitatively. The second category depicts the questions in which the human factor is involved and the network of relations which are developing because of the way open access publishing is represented and developing. These refer to the relations between Greek agents and actors and the attitudes each of them has to open access journals. Even questions concerning awareness which may seem a simple counting exercise, yes or no, required more teasing out, to work out what matters to the biomedical scientists about publishing. Scholarly communication in Greece does not take place in a vacuum – there are external factors such as changes in international publishing and research that have an impact on what happens in smaller countries such as Greece. In fact one of the concerns that prompted the research was the apparent assumption among many people that open access is good, big publishers are bad. What happens in international biomedical publishing (predominantly in English) may have unpredictable side effects for small countries such as Greece where there is biomedical publishing in Greek, or dual language versions of journals.

These two different types of questions required two different types of research methodology as well. Theoretical approaches were carefully examined in order that the most appropriate was chosen for the question.

According to the principles of positivism, open access publishing should be studied as an external reality by using the method of observation. Furthermore, there was no experiment to be conducted, this research had to track what was happening. Data could be collected on the number of type of biomedical journals in Greece, the prominence of biomedical researchers from Greece in ISI Web of Science journals, and trends that were emerging. However, this approach covers only the objective meaning of the research object, to answer the "how much and when" type of question. The second theory of interpretivism emphasizes on the subjective meaning of the phenomenon, and so the questions around the mechanism of open access publishing would be ignored, if a purely bibliometric type of study was conducted. But a purely subjective approach would not be able to assess whether the trends were significant or not.

Accordingly, the research philosophical approach adopted for collecting, analyzing and explaining data was critical realism. According to critical realism theory, on the one hand, open access publishing (and open access journals) should be studied as an external reality in order to understand its function and the mechanism on which it relies, it is like a macro – level study of this social phenomenon and, on the other hand, the micro – level study requests the survey of the stakeholders of the open access publishing and journals in order to assess their attitudes and the effects on this new model for journals. Importantly, the open access model is influenced and changed by the stakeholders' actions. There is a reciprocal relation between stakeholders and the research object. Moreover, the longitudinal period of the research allowed illumination about the rhythm of changes, and provides a better explanation of what open access publishing in biomedical science means for Greek biomedical scientists.

The practical research strategy adopted was case study research methodology, as the case studied was biomedical research scientists in Greece. This research started at the end of 2006, almost four years after the establishment of Open Access Initiative in 2002. The novelty of open access publishing in international level and its inextricable link with the technological advancements made research planning more complicated. Because, on the one hand, open access publishing as a new type of publishing should be investigated in depth and on the other hand, its dependence on technology might be a risk factor for the whole research. The technology was changing subscription publishing as well, but it was difficult to predict how technology would be used (or abused) by major players in traditional publishing and open access publishing. There was the risk that open access publishing might just turn out to be a brief 'bubble'. Nevertheless, careful research planning was considered key to research that would provide new knowledge whatever the technological developments turned out to be.

A longitudinal case study was judged a useful contribution to understanding the development of open access within biomedicine in Greece (whatever the final outcomes might be). In addition the choice of a multi-method study provided the opportunity to examine the problem from several different angles.

Viewing the open access publishing as an innovation the planning, design and analysis were influenced by the theoretical frameworks of change. Rogers emphasized the individual role in the diffusion of the innovation. In addition, he defined the characteristics of the innovation itself which affect the adoption process positively or negatively. The benefits and the barriers emanated from the change may lead to recommendations for further research or improvements. The second theoretical framework used was originated from Lewin theory of change. Lewin promoted the group dynamics and their participation on the acceptance of the change. He analyzed the context in which the change is taking place and the optimal state after the freezing of the change. Force Field Analysis searches in depth the driving forces which move in favor of the change and the restraining forces which prevent the crystallization of the change. The careful study of the context and the proper information of the leader and change agents during unfreezing stage can lead to the enhancement of driving forces and the weakness of the restraining forces.

As far as the study of open access publishing in Greece concerned, the situation was very difficult because the terms “open access” and “open access publishing” seemed to be almost unknown at that period of time. So, the research was at the same time, inevitably, almost a campaign for awareness about open access sources. This fact made more challenging the work of posing the right question and selecting the suitable methodology to answer them. It is interesting, at this stage, the research methodology planning defined by the meaning of the research questions to be presented. So, the following table depicts the research questions in the left hand side and the research methods used to answer the question on the right hand side.

What is the meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?	Literature Review, Qualitative Methods (Interviews), Case Study (Questionnaire survey), Websites Research (Sections 3.4, 3.8, 3.9, 3.11.4, 3.12.1)
Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what main changes have been observed over the course of the last few years?	Case Study (Questionnaire survey), Bibliometrics (Sections 3.8, 3.9, 3.6)
What are the reasons that led to the establishment of open access publishing?	Literature Review (Section 3.4)
What means facilitated its proliferation? Its costs?	Literature Review, website research (Sections 3.4, 3.12)
In what ways do the different models work?	Literature Review (Section 3.4)
Does open access publishing influence the knowledge dissemination? Is it possible to assess this?	Case Study (Questionnaire Survey) (Section 3.9)
Who are the stakeholders of this publishing mechanism?	Literature Review (Section 3.4)
In what ways do the stakeholders influence the new publishing models?	Literature Review, Publisher Interviews, Website Research (Sections 3.4, 3.11.4, 3.12.1)
Does English language pose a problem for Greek biomedical scientists to publish in foreign journals?	Bibliometrics, Literature Review (Sections 3.6, 3.4)
What are the advantages of Greek researchers' participation in open access publishing?	Case Study (Questionnaire Survey) (Section 3.9)

How easy is for the researchers to detect digital information on his or her own?	Case Study (Questionnaire Survey) (Section 3.9)
How may the expectations of library users change because of the open access publishing?	Literature Review (Section 3.4)
Which models of open access publishing are used?	Literature Review (Section 3.4)
Are Greek biomedical scientists informed about the characteristics of the open access journals?	Case Study (Questionnaire Survey) (Section 3.9)
What are the attitudes of Greek biomedical scientists towards open access publishing (and how are these changing)?	Case Study (Questionnaire Survey) (Section 3.9)
Are there open access biomedical journals in Greece?	Websites Research (Section 3.12.1)
What do Greek biomedical publishers think of the open access journals?	Publisher Interviews, Websites Research (Sections 3.11.4, 3.12.1)
How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods?	Bibliometrics (Section 3.6)
What is the writing activity of Greek biomedical scientists in open access journals?	Case Study (Questionnaire Survey) (section 3.9)
What means do the Greek biomedical scientists use to inform themselves about open access journals?	Case Study (Questionnaire Survey) (Section 3.9)
Do the institutions and libraries promote the open access journals?	Case Study (Questionnaire Survey), Literature Review (Sections 3.9, 3.4)
How could the libraries contribute to the development and usage of open access journals?	Literature Review (Section 3.4)

Table 3.1 Research methods

In the following sections research questions are analysed according to the methods used for their answer.

3.3 Research Case Study Methodology

The main research tools were (Table 3.2)

- Literature review
- Bibliometric surveys
- Questionnaire surveys on attitudes and knowledge to help detect trends
- Publisher interviews and website analyses (cost analysis, copyright etc.)

As this was case study research of open access and Greek biomedical scientists, the mixed methods approach was appropriate, and a commonly used approach today, combining quantitative and qualitative methods to overcome the disadvantages of each Bryman (2008, p.604). Nevertheless, the choice of this research type may be risky for the researcher because if the research results from the alternative methods are contradictory, it is difficult to draw conclusions.

Yin (2009, p. 27) identified five components of research design that are important for case studies:

- A study's questions
- Its propositions, if any
- Its unit(s) of analysis
- The logic linking the data to the propositions
- The criteria for interpreting the findings

In this research firstly the questions were posed and then the research methods were chosen. So, although each method will be analytically explained separately in combination with the questions which it may answer (see table 3.2) and the applied procedure will be discussed in detail, the following brief description of the methodology provides an overview, showing how the elements complemented each other.

The literature review contributed to the analysis of open access publishing context by providing general information about the different models, their function and the cost of their implementation, but the questionnaire survey assessed the impact of open access publishing on Greek biomedical scientists' communication by answering the question "what are the attitudes of Greek biomedical scientists towards open access publishing and how are these changing?" The establishment of Greek institutional repositories was national policy but the awareness of the Greek biomedical scientists about the existence of an institutional repository in their institution was evaluated by questionnaire survey results. The three part questionnaire provided facts and figures for: the publishing activity of respondent; their awareness of open access publishing; and their familiarity with finding and reading open access journals. Repeating the survey allowed assessment of trends – and barriers to change, to be compared with other similar research studies elsewhere identified by the literature review. For example, the literature review provides suggestions on "how could libraries contribute to the development and usage of open access journals"; the questionnaire survey assessed "to what extent the Greek biomedical libraries contribute to the usage of open access journals"; and, together with the publishers' interviews, further actions of the Greek biomedical libraries could be recommended.

Publishers' websites research also provided more details about, for example, author instructions over copyright, a possible problem for open access identified in the literature review. Either the implementation of qualitative methods such as interviews with Greek medical publishers or searching publishers' websites can offer an explanation about the answers of Greek biomedical scientists to the question "are Greek biomedical scientists informed about the characteristics of the open access journals?.

The bibliometric survey examined the representation of Greece at international levels of biomedical publishing in different ways. Searching for citations of Greek scientists or Greek biomedical scientists in WoS not only provided an answer to the question "does Engish language pose a problem for the Greek biomedical scientists to publish in foreign language journals?" but it showed whether the Greek biomedical scientists could overcome foreign language problem and use the international scholarly

communication channels for example the social networks, in order to exchange ideas with other researchers. The participation of Greek researchers in ResearchGate and LinkedIn also confirmed the results of WoS bibliometric survey. Additionally, the survey in PubMed, BioMed Central and DOAJ examined the representation of Greek biomedical publishing in international scientific databases in a different way; by exploring the published in Greece journals and finding out some of their characteristics such as official language, impact factor, open access or hybrid open access. Finding the Greek open access or hybrid open access journals in international databases helped, together with publishers' interviews and websites research to answer the questions "what do Greek biomedical publishers think of the open access journals?" and "in what ways do the stakeholders influence the now models of publishing?". The survey in PubMed and BioMed Central for articles about open access publishing published by Greek scientists offered another view on the awareness of Greek biomedical scientists on open access publishing.

3.4Literature review

Each research project starts with the literature review, and this research started with the same way. The reasons were the following

- For better understanding of the theoretical background to open access publishing and open access biomedical journals
- The detection of related research projects in order to see and evaluate the research methodology applied on the specific related research topics
- The identification of gaps in the research evidence

So the questions which to be answered were:

- What is meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?
- What are the reasons that led to the establishment of open access publishing?
- Which models of open access publishing are used?

- In what ways do the different models work?
- What means facilitated its proliferation? Its costs?
- Who are the stakeholders of this publishing mechanism?
- In what ways do the stakeholders influence the new models of publishing?
- How might the expectations of library users change as a consequence of open access publishing?
- Do the institutions and libraries promote open access journals?
- How could libraries contribute to the development and usage of open access journals?
- Does English language pose a problem for the Greek biomedical scientists to publish in foreign language journals?

Indeed, the majority of the questions were answered but some gaps were found as well. At the beginning of the research, nothing found about the role of institutions and libraries related to the promotion of open access journals and open access biomedical journals in Greece. The emerging uncertainties over ownership of copyright with open access required a further literature search on intellectual property and different approaches to copyright. In addition, similar research projects were detected but not in Greece.

The literature review has been constantly updated because of the need for new information on several of the research topics.

Valuable information sources made me aware of the general topics. Background information was initially drawn from Borgman's *Scholarship in the digital age: information, infrastructure, and the Internet* (2007). The literature search strategy also involved monitoring relevant bibliographies and discussion lists and seminars on the relevant topics, for example the Sigmetrics and the Scholarly Electronic publishing bibliography and Open Access Tracking Project. The SIGMETRICS discussion list of the American Society of Information Science and Technology specialises in bibliometrics, scientometrics and informetrics. The Scholarly Electronic Publishing Bibliography provides access to subject areas such as digital copyright, digital

libraries, digital preservation, digital repositories, e-books, e-journals, license agreements, metadata, and open access developments. A valuable resource is Open Access Tracking Project which detects new Open Access developments comprehensively and in real time. The Library Connect Webinars of Elsevier organised a seminar entitled as "How librarians can help researchers navigate open access choices" on 18 October 2013, and this particular webinar helped me to understand how one of most important commercial biomedical publishers viewed open access.

There are also journals which provided me with current information and were checked them regularly. These were "Learned Publishing" and the "Against the Grain". Additionally blogs, which are created by people with very strong views on thesis topics such as the one of Peter Suber, the Open Access Overview, were regularly monitored, and the links followed to other blogs. I also kept in touch with developments (published and ongoing research) within Greece mainly via the National Documentation Centre website and the blogs which are included, as well through contact with the staff there.

3.5 Research Productivity Measurement

The evaluation of formal scholarly communication means has been of continuing interest for a variety of reasons such as the measurement of authors' productivity and journals' prestige. Funding bodies, and governments are interested in the outcomes of their funding and policy initiatives, to assess and compare the prestige of researchers, through the number of research grants, the impact from the number of papers published and the number of citations received.

Bibliometrics and scientometrics provide the research tools in order to assess the scholarly communication. But the question which has been posed many times is "how are these metrics interrelated in practice"? Ana Andres and Peter Vinkler studied the bibliometrics and scientometrics, respectively. An overview of their writings will

make clear the similarities and the differences between the two terms and associated approaches.

Ana Andres suggests that

> "The objective of bibliometrics is basically to assess scientific literature in a given field, hence its broad applicability to all manner of disciplines" (Andres, 2009, p. 1).

Peter Vinkler asserts in his book about bibliometrics

> "The term bibliometrics" here is concerned primarily with measuring the quantitative aspects of publications, whereas scientometrics represents a broader view" (Vinkler, 2010, p. 2).

According to the above mentioned definitions the objective of bibliometrics is the assessment of scientific literature and it happens by measuring the quantitative aspects of publications. Consequently, the evaluation of scholarly communication is accomplished via the quantitative measurements of formal communication channels.

As far as scientometrics concerned Vinkler highlights the broader character of scientometrics because

> "…scientometrics is a field of science dealing with the quantitative aspects of people or groups of people, matters and phenomena in science, and their relationships, but which do not primarily belong within the scope of a particular scientific discipline" (Vinkler, 2010, p. 2).

Ana Andres manipulates the two terms in her book

> "…without distinction to refer to the study of scientific literature" (Andres, 2009, p. 2).

The content analysis of the following books' titles is indicative of the above mentioned authors' conceptions

"Measuring academic research: how to undertake a bibliometric study"
Ana Andres (2009)
and

Vinkler's book (2010) "The evaluation of research by scientometric indicators"

Andres' book emphasizes the role of the bibliographic survey in bibliometric analysis. Bibliometric analysis is conducted by applying the laws of Lotka (1926) and Bradford (1934). Additionally, other bibliometric indicators are analyzed such as scientific collaborations, author citation analysis, journal citation analysis. Extensive reference is made to Science Citation Index and its tools as for many years it has been used as the only source of bibliometric analysis.

On the other hand, in Vinkler's book, bibliometrics as metric methodology seem to be limited in use because as he comments:

> "the processes in science and scientific research, however involve non-bibliometric data as well, human capacity, grants, cost of equipment, etc. (Vinkler, 2010, p. 2).

By following this principle and considering that "scientometrics covers different areas and aspects of all sciences", (p. 4) Vinkler includes and develops a great variety of indicators in order to analyse research assessment at different levels. Although he agrees that bibliometrics can contribute to the evaluation of research , he explains that bibliometric indicators can react in a different way in different fields or disciplines. His broader view of scientometrics does not prevent him from incorporating in the book the different approaches of bibliometric analysis, as there is an interrelation between the two terms. However, the structure of the chapters is different as Vinkler's book examines its objects in a systematic, mathematical and statistical way in contrast to Andres' book which could be characterized as more theoretical.

In addition, Vinkler defines evaluative scientometrics and states

> "Evaluative scientometrics is a special field of scientometrics which deals with the study of scientometric aspects of scientometric systems in order to draw quantitative conclusions on the performance of the organization assessed. Topics of interest are comparative studies of information production, and dissemination and information impact of the systems evaluated" (Vinkler, 2010, p. 9).

Scholarly communication, which is a topic of this thesis, could be characterized as a scientometric system consisting of formal (primary, secondary, tertiary) and informal channels (invisible college, e-mails, listservers, blogs, chat rooms) of communication. Within this system there are scientometric elements (which may be measured directly or indirectly depended on the type of bibliometric assessment) and these could be papers, conference speeches, journals. The study of scholarly communication of biomedical sciences is applied according to the principles of evaluative scientometrics. The vital point for scientometric assessment is the agreement on reference standards.

Vinkler's view-is illustrated in the following statement

> "Standards should be calculated with great care because the bibliometric factors influencing most scientometric indicators differ by field" (Vinkler, 2010, p. 170).

However, before conducting an evaluative scientometrics research, descriptive analysis is required in order to show the features of research objects, detect their relationships with the other scientometric elements, and set the reference standards according to their similarities. Glänzel et al. (2006) highlight the importance of the proper reference standards for drawing the correct conclusions. According to Andres (2009, p. 13) descriptive analyses of the features of documents included is indicated when beginning a bibliometric study, for example the descriptive analysis of the Greek journals as a formal means of scholarly communication before conducting the bibliometric study. In this way the categories of Greek scientific journals and their

common characteristics would be identified in order for the reference standards to be posed.

In conclusion, we can see that according to the authors cited above, scientometrics and bibliometrics are not the same or contrary research evaluation measures. They seem to function as complementary. In this way, bibliometrics provide the means for the evaluation of research productivity (through analysis of documents/publications) but scientometrics, on the one hand, manipulates bibliometric tools for publication measurements, and also includes other measurements which concern the evaluation of scientific productivity at regional, national or international level.

Bibliometric methods have multi-disciplinary application. Libraries conduct bibliometric studies in order to assess the quality of their current collection. By using these tools, the librarians can identify the collection gaps and fill them with the proper titles. Consequently, it is not accidental that the librarians created these tools in the middle of 19th century , which were used by statisticians as well, and in the middle of 20th century Eugene Garfield established the Institute for Scientific Information, and the Citation Indexes were inaugurated (Larivière Sugimoto & Cronin , 2012).

The need for bibliometric research is higher in sciences with intense research activity. This fact can be justified by the dependence of scientific progress of the specific sciences on previous research results, and the need for funders to assess whether their investment in expensive research is worthwhile.

Biomedical sciences belong to the bibliometrics–centered category of sciences. Health scientists do research for several reasons such as the trials of new therapeutic and diagnostic methods, the tests of more effective and less painful operative techniques. The research is deemed valuable by policymakers and the public – demand is limitless, but resource constraints mean that choices need to be made about funding (Alberts et al., 2014). Research would be pointless without publication of the results, and without reference to previous research. The research results must be evaluated in order for their novelty and their real value in biomedical practice to be proved. An indicator of the worth of the research is via assessment of the publications through the usage of the papers, conferences articles, via citations. The researcher who has obtained a high number of citations by other biomedical scientists is considered to be

more prestigious. However, the prestige of a health scientist is also dependent on publications in high impact factor journals. The increased usage of biomedical journals in writing activity facilitates the appliance of metrics methods as the bibliometric databases mainly to analyze data obtained by the journal papers. The most popular metrics tool in health sciences is citation analysis.

Citation analysis indicates the use of the documents published in different types of sources and fields. The analysis can be performed in two units and three levels. As far as the units of analysis concerned, they are the author citation analysis and the journal citation analysis. While, the citation analysis can be conducted in micro, meso and macro - level. Micro – level citation analysis refers to the assessment of individual authors. The meso – level one concerns the evaluation of the institutions and the macro – level analysis provides data for the research and writing activity of an entire discipline.

By conducting an author citation analysis, we can first ascertain who the active researchers are, and the apparent quality of their research. Additionally, the active research areas and their results can be determined. In this way, the subject areas which must become research objects are identified. However, different biomedical specialities may have different citation behaviour so if there is the need to evaluate the general publishing activity of an institution, the citation behaviour of specialities and sub-specialities must be analysed (Hendrix, 2008). Additionally, as Verbree et al. (2015) state, the scholarly activity of biomedical scientists depends on a range of organizational factors such as group size, synthesis, quality and quantity of communication. The role of leader as researcher and manager is very important and the variety of funding sources can affect the citation counts. Verbree et al. (2015) showed that research groups of 10-12 members composed by one or two leaders and PhD students can be very productive and attract more citations than larger research groups. The benefit is higher when the funding comes from different financial sources because the research topics covered may reflect distinct subject areas.

Another advantage of author citation analysis is the detection of scientific collaborations. Co-author citation analysis depicts the interdisciplinarity and the teamwork taking place and collaboration could be national and international.

In spite of some problems over the meaning and value of citation, author citation analysis remains a very important procedure for the measurement of biomedical research.

> "As part of the NIHR suite of funding streams, the Department of Health pledged circa £500 million to support research in biomedical research centres (BRCs) – centres of excellence for medical and health research across a variety of subject areas… Once prospective centres had applied for BRC status, the NIHR conducted a series of site visits. To support these site visits, RAND Europe and CWTS provided a citation analysis of publications submitted by the applicants" (Sharif et al., 2009).

Another bibliometric tool which measures the author productivity is Lotka's Law. In 1926, Alfred Lotka studied and created the Inverse Square Law on author productivity within a given field. It states that

> "...the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 60 percent" (Potter, 1988).

Andres (2009) writes that

> "The Law takes the number of authors who have contributed with a single study and then predicts how many authors would have published x studies, according to this inverse square law…Lotka's Law has been commonly applied in scientometrics and author productivity from many fields has been shown to fit the distribution it proposes" (Andres, 2009, p. 23-24).

Author productivity is also evaluated by h-index, which is measured by ordering an authors' publications according to the number of citations received and putting them in ranked order, with number one for the most cited article. According to the Hirsch index the author who has published 20 articles which have received at least 20 citations per article so h=20 (i.e the article ranked 20^{th} in the list has attracted 20 citations at least). If the next item in the list, rank 21, has attracted fewer citations than

its rank citation, the h-index is 20. This bibliometric tool was developed for the measurement of individual's productivity.

The other unit which can be analysed is the journal. The journal citation analysis provides the indicators for the assessment of journal titles. The most significant indicator is the Journal Impact Factor which is provided via the database Journal Citation Reports of Thomson Reuters. The journals of high impact factors are usually considered to be the most valuable and prestigious as they attract more citations. As far as the biomedical journals are concerned, Andres (2009, p. 87) points out that the journals which have high impact factors belong to biomedical areas which attract high citation rates as well.

High impact factor journals attract authors coming from non –English speaking countries, as their local journals may not be included in international databases. Therefore they try to promote their work via high impact factor journals and journals which are included in international databases such as PubMed even if they are not in their local language. Consequently, the descriptive analysis, of how many local journals are included in WoS or PubMed (through PubMed Central) provides a more complete view about the units which are assessed.

Citation analysis is considered at a national level contribute to the identification of the impact of local research on the international research activity. A very good example of national bibliometric analysis is the bibliometric analysis of Greek publications in international scientific journals for the period from 1996 to 2010, conducted by the Greek National Documentation Center. A previous study was conducted by the same organization for the period from 1993 to 2008. The data was drawn from the Web of Sciences databases of Thomson Reuters and specifically through the databases

- **National Science Indicators (NSI)**
- **InCites™ - Greece**

The indicators explored were the percentage of Greek publications and the citations to the European Union members and OECD countries, the citation impact for the periods

2004 – 2010, the highly cited publications, major field of sciences, scientific collaborations.

The Greek example is not the only one, as a literature research in LISTA database shows that bibliometric analysis has been applied to biomedical sciences by several countries, often non-English speaking such as Spain, Puerto Rico (bilingual), Malaysia, Turkey etc. The common feature of these bibliometric analyses is the measurement of research productivity. Often such analyses demonstrate the creation of invisible colleges, the means of scholarly communication in biomedical sciences (in particular) and the impact of national research productivity compared to world research activity.

Bibliometric research has been used in Library and Information Science as well for some years. Larivière, Sugimoto and Cronin (2012) followed the categorization which was defined in 1990 by Borgman in order to classify the bibliometric studies which are conducted in this discipline. Borgman (1990) identified the following categories of bibliometric studies according to the examined element of the scholarly communication system

- the producers as authors or aggregators (institutions or countries)
- the artefacts as the sources of scholarly communication (e.g. journals)
- the concepts as the subjects of studies

This analysis can be mapped to Borgman's categorization of bibliometric studies in the following way. The researchers and the countries represent the "producers" unit. The journals and conference articles fit in "artefacts" category and the research results of a special subject could be the "concepts" unit.

The majority of the bibliometrics studies are carried out on biomedical sciences. As Larivière, Sugimoto and Cronin (2012) observed, during the period 2007 -2011, the majority of the bibliometric papers which were outside the scope of LIS were published in medical journals, in equal number to LIS journal articles.

A bibliographic survey in Library, Information Science & Technology Abstracts Database confirmed Borgman's bibliometric studies classification. By searching in this database on bibliometrics subject 10 records were retrieved on 25/04/12 and could be classified according to their title in the following categories (Table 3.2)

Producers	**Artefacts**	**Concepts**
	Bordons, Maria, Fernandez, M. T., Gomez, Isabel 2002, "Advantages and limitations in the use of impact factor measures for the assessment of research performance in a peripheral country" *Scientometrics*, vol. 53, no. 2, pp. 195-206	
Hendrix, Dean 2008, "An analysis of bibliometric indicators, National Institutes of Health funding, and faculty size at Association of American Medical Colleges medical schools, 1997-2007", *Journal of the Medical Library Association*, vol. 26, no. 4, pp. 324-334		
		Ortiz, AP, Calo, WA, Suárez-Balseiro, C., Maura-Sardo, M., Suárez,E. 2009, "Bibliometric assessment of cancer research in Puerto Rico, 1903-2005**",** *Revista panamericana de salud pública*, vol. 25, no. 4, pp. 353-361
Zainal, H., Zainab, AN. 2011, "Biomedical and health sciences publication productivity from Malaysia", *Health Information and Libraries Journal*, vol. 28, no. 3, pp. 216-225		

Tonta, Yasar, Ilhan, Mustafa 2002, "Contribution of Hacettepe University Faculty of Medicine to the world's biomedical literature (1988-1997.)", *Scientometrics*, vol. 55, no. 1, pp. 123-136		
	Wiles, Louise, Olds, Timothy, Williams, Marie 2010, "Evidence base, quantitation and collaboration: three novel indices for bibliometric content analysis", *Scientometrics*, vol. 85, pp. 317-328	
Jimenez-Contreras, E., Ferreiro-Alaez 1996, "Publishing abroad: fair trade or short sell for non-English-speaking authors? A Spanish study", *Scientometrics*, vol. 36, no. 1, pp. 81-95		
		Lewison, Grant 2002, "Researchers' and users' perceptions of the relative standing of biomedical papers in different journals", *Scientometrics*, vol. 53, no. 2, pp. 229-240
	Ullah, M., Butt, IF., Haroon, M. 2008, "The Journal of Ayub Medical College: a 10-year bibliometric study", *Health Information and Libraries Journal*, vol. 25, no. 2, pp. 116-124	
		Mendoza-Parra, S., Paravic-Klijn, T., Muñoz-Muñoz, AM., Barriga, OA., Jiménez-Contreras, E. 2009, "Visibility of Latin American Nursing Research (1959–2005)", *Journal of Nursing Scholarship*, vol. 41, no. 1, pp. 54-63

Table 3.2 Classification of bibliometric studies

As it is depicted on the table the “producers” category is concerned with bibliometric studies which evaluate the publishing activity of authors, institutions or countries. “Artefacts” as unit of analysis assesses the productivity of specific type of information sources, mainly the journals, and their impact factors, and how the metric works. “Concepts” bibliometric studies deepen understanding of the publishing activity on specific scientific topics, and the meaning of bibliometric studies in context.

Bibliometric research provides useful findings for scholarly communication and scientific progress but the researcher must be careful with the following points

- Author citation analysis may hide some biases which are derived from self - citations and author co-citation within a team; the authors may create citations by doing references to older articles by them or obtain more citations because they belong in a team. In addition, the great number of co-authors of a paper can turn into a problem as Sharif et al. (2009) reports because the extent of individual or institution participation cannot properly be detected. In both cases, this fact provokes an inflated estimate of the real number of citations (from others) which an author obtains.
- Increased citations may be prestigious for the authors but the reality may be different if the paper may be cited many times but for negative reasons.
- Local journals in non-English language may be underrepresented in international databases so the author citation analysis is incomplete.
- H-index seems to be beneficial only for authors of high publishing activity because new researchers with low publishing activity will have low h-indices for a number of years.
- Although bibliometric factors have been used a lot to measure scientific activity and communication, there are some limits which skew the output measurements. An example of such a situation is the citation count. In this case, the majority of problems arise from human errors in bibliographic data entry that are liable to occur because of the great volume of references included in the databases, variations in the treatment of author names and titles, spelling errors and so on.

The calculations of research impact are not easy processes as mathematical and computing expertise are required as well as access to necessary software. In particular, the researchers must be expert in

- forming the appropriate research strategies in order to retrieve the proper bibliometric factors
- posing reference standards to draw reliable conclusions
- manipulating the different techniques of information retrieval via citation and bibliometric databases
- implementing maths
- interpreting statistical results

3.6 Alternative Approaches Considered

The bibliometric survey provided the opportunity for identifying changes in the appearance of Greek biomedical knowledge in open access sources and Greek biomedical research presentation in the world research community. However the bibliometric survey in a longitudinal case study may be a complicated procedure because the way data are recorded might change, and in some cases the application of the same research procedures was difficult to replicate as the databases used had changed in crucial ways. Specifically, the changes of inclusion policies in PubMed changed the information retrieval strategy and research results as well. Additionally, bibliometric analysis as an evaluation method has some limitations which could be considered as disadvantages. First of all citation analysis is mostly based on journal articles, and other types of documents are not included such as books, unpublished works, and conference proceedings (although Google Scholar takes these into account). In addition, as already mentioned the reasons for citing are not measured either, inflating negative comments, and a great number of co-authors may create an exaggerated picture of scientific impact. Self–citations are also another problem, when trying to separate out author self-citation that reflects the system of scholarly communication, author self-citation that may (partly) be gaming the citation indexes, and citations that genuinely reflect other researchers' comments on previous work by

the author (Glänzel et al. 2006). In addition, the language of the articles and the metrics used by citation database may affect the citation analysis as presented by Bornmann and Leydesdorff (2013) who conducted a comparative study among six countries; China, Japan, Germany, United States and the UK from 1981 to 2010 by using the InCites tool of Thomson Reuters. The results for medical and health sciences showed a steady but high state for the USA, and lower steady state for Japan in terms of impact. The UK presented an increase and overtook the USA in 2008. The increased citation impact of France and Germany from 1981 to 2010 was explained because of the internationalization of the two countries by writing more in English. However, as the authors state, the use of InCites (see also section 3.7) is subject to some limitations because metrics for country-specific comparisons are created based on address criteria using the whole-counting method (i.e. all addresses attributed to the papers are counted). Therefore papers with multiple addresses will count more than papers with only one address.

3.7 Biomedical Scholarly Communication in Greece: bibliometric study

The contribution of the biomedical scientists to research activity at national and international level was evaluated. In addition, the impact of open access publishing on scholarly communication among Greek biomedical scientists through the years was measured. Also, the language issues which may emerge because of publishing in a foreign language were examined. The bibliometric analysis took place in two phases. The first one was conducted at the beginning of the research period (2006) and the second phase at the end of research period (2011) in order for trends to be detected. The following questions were the focus of the bibliometric study

- How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods?
- Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what main changes have been observed over the course of the last few years?
- Does English language pose a problem for the Greek biomedical scientists to publish in foreign language journals?

The questions determined the units of measurements which were the following

- The number of Greek biomedical journals included in the international databases
- The language of Greek biomedical journals indexed in the international databases
- The number of Greek journals which have an Impact Factor Indicator
- The number of Greek biomedical scientists' documents in WoS
- The number of Greek biomedical scientists' documents in WoS in English language
- The number of Greek scientists' documents in WoS
- The number of Greek scientists' documents in WoS in English language
- The number of Greek open access journals indexed in foreign databases
- The number of Greek published papers related to open access publishing

As has already been mentioned, similar bibliometric indicators have been used as an evaluation tool of research performance in other surveys (see section 3.5).
The main formal means of scholarly communication is the journal, the bibliometric analysis was focused on Greek journals' representation and Greek authors' publishing activity (an indicator of productivity). Specifically, the major unit chosen was the "Greek biomedical journal" as a formal channel of scholarly communication in Greece. For this purpose a Greek biomedical journal was defined as a biomedical journal published in Greece. The biomedical journal published in Greece includes the following journal categories

- Greek – language biomedical journals
- English-language biomedical journals published in Greece by international organizations (English and foreign authors)
- Greek-language journals published simultaneously in English language mostly by Greek scientific companies or universities (dual language journals)

The purpose was to identify the representation of Greek open access biomedical journals at international level in order to see their importance for the scholarly communication, at two different periods of time. For this, the number of Greek biomedical journals their participation_in the international bibliographic databases such as PubMed and PubMed Central were evaluated. In addition, the number of Greek language biomedical journals (and the extent of their coverage) in PubMed was included.

The descriptive analyses of the Greek biomedical journals started with the bibliographic survey for the collection of the representative data. As it has already mentioned, five worldwide sources, PUBMED, SCI, BIOMED CENTRAL, DOAJ (Directory of Open Access Journals), GOOGLE were sought. Although the target was common, the search strategy differed because of the particularities of each database.

The first phase searches were conducted in the above-mentioned databases during October of 2006 excepting SCI for which the research was continued at the beginning of January in 2007. The second phase was conducted from April to May of 2011. In both phases the research strategy concerned the lifespan of the databases in order the differences which may have happened across the years on the structure or the policies to be detected.

The research began from PUBMED and the survey took place in two levels, firstly, in JOURNALS engine of PUBMED by typing the keywords Greece, Greek, Hellenic, Hellenika, Athens, Thessaloniki, Thessalonica, for example and other variations and then, searching for the journal titles, retrieved by JOURNALS engine, in PUBMED. So, we can know, not only the Greek journals indexed in PUBMED but also to what extent they participate in the database by identifying the articles chosen for inclusion. Not all journals have blanket coverage in PUBMED. The representation of each journal depends on the number of articles included. A great number of articles chosen by PUBMED may be an indication of the prestige for the journal.

There were differences in research methodology between the first and the second phase. In the first phase the information retrieval was simpler because the research using the specific keywords in the database “journals” and its combination with the

limits “currently indexed in MEDLINE” was enough to have a broader view of the Greek journals in PubMed. On the second phase although the same keywords were used the information retrieval process changed because of the new NLM inclusion policy. The changes made the procedure more complicated as a variety of indexed journal categories was detected. More specifically, the following basic journal subsets in NLM catalogue had been developed:

- Journals currently indexed in Medline
- Journals currently or previously indexed in Medline
- Only PubMed Journals
- PubMed Central Journals
- Journals as Cancer therapy which are not currently indexed in Medline but some of their articles are included as author manuscripts in PMC via PubMed

So, the research by using the above mentioned limits led to different results and it was necessary to compare the results carefully in order to be able to understand and come to sensible conclusions.

Using Science Citation Index, the bibliometric study aimed to measure trends in the productivity of Greek biomedical researchers and the contribution of Greek biomedical scientists to the national research output. The indicator for productivity of Greek researchers was the total annual number of publications in WoS of both Greek scientists and Greek biomedical scientists but it could not be evaluated because only the first five hundreds authors were presented. WoS was accessed via the Server of National Documentation Center (http://portal.wok.ekt.gr/ intranet access). The raw data of Greek biomedical scientists were measured according to the scientific activity in “medicine and health sciences” categories. Initially, the total number of Greek papers was retrieved by typing in “address” field the term “Greece” and posing the year limitations in four timespans (1970-1979, 1980-1999, 2000-2008, 2009-2011) to assess trends. Further limitations were posed on Greek papers by using the subcategories included in “medical and health sciences” as defined in Classification of the Subject fields of the NSI and Incites Thomson Reuters databases (EKT,2006-2010) in order that only the papers of Greek biomedical papers were retrieved from

the total. Moreover, the "analyze results" function of WoS enables indication of the international cooperation among Greek scientists and others by ranking the records according to "Country/Territory". It may be a way the invisible colleges can be detected and impact of collaborations on the citation counts to be illustrated.

Another method would have been to examine the raw data in "InCites" and "Essential Science Indicators" databases of WoS to assess the effect of Greek research activity to the world knowledge but the University of Athens has no access to these databases. But, there are related studies which may offer indications that can complement the research for the thesis.

The representation of Greek journals in Web of Knowledge database was sought within its additional source "Journal Citation Reports". It was accessed and the option "view a group of journals by Country / Territory" selected. This indicated the number of published in Greece journals which have an Impact Factor so they can be evaluated according to accepted international standards. There were no limits on language of journals. Meanwhile, the results concerned the journals which were published in Greece, in Greek or/and English language for example the journal *Hellenic journal of nuclear medicine* which is a bilingual journal in English and Greek language. Additionally, it also included journals which are not biomedical ones such as the *Global NEST journal.* Furthermore, this indicator shows that the journals indexed have the prestige which the citation counts provide to the journal. But it is also important to see how many of them are open access.

The next step was the survey in DOAJ. All the journals concerned health sciences were sought to find Greek open access biomedical journals. The journal titles of BIOMED CENTRAL were searched one by one in order to find evidence of a Greek editorial board. However, this was not possible for a minority of Biomed Central titles.

Finally, the subject keywords Greek medical journals were explored in GOOGLE in order to check additional details about the electronic journals. With access to the webpages of electronic journals, it was possible to check which of them were open access (and what form the open access took).

Although both surveys were conducted in same way in order to have a comparison measurement, it is important to emphasize that in phase two procedures had to differ because of changes made by the publisher of PubMed, the National Library of Medicine (NLM) in the USA, to the structure of their publications. However, I was able to use a subset of the NLM catalog, the "journals referenced in the NCBI databases". So, although the same keywords were used, this time I used limits and specifically the limits "only PubMed Journals".

The descriptive analysis was completed with a research in PubMed and BioMed Central. The object of this survey was to retrieve articles which would concern open access in biomedicine in Greece. It would be another way to see the awareness of Greek biomedical scientists on open access publishing topics. The search strings which used in both databases were "OPEN ACCESS PUBLISHING AND GREECE", "OPEN ACCESS JOURNALS AND GREECE", "FREE ACCESS PUBLISHING AND GREECE", "FREE ACCESS JOURNALS", "OPEN ACCESS PUBLISHING", "FREE ACCESS PUBLISHING", "OPEN ACCESS JOURNALS". The common keywords would contribute to the results comparison.

3.8 Case Study Research Methodology – Reflections

The empirical research used case study methodology. According to Yin

> "In brief, the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events – such as individual life cycles, small group behavior, organizational and managerial processes, neighborhood change, school performance, international relations, and the maturation of industries" (Yin, 2009, p. 4).

Case study research, was first used in France and became popular in the USA.

> “The methodology in the United States was most closely associated with The University of Chicago Department of Sociology. From the early 1900's until 1935, The Chicago School was preeminent in the field and the source of a great deal of the literature (Winston, 1997).

Case study research could be considered invalid as a methodology because of the external factors which cannot be predicted from the beginning of the research and may affect the research process. The careful planning of the research, the choice of proper sources for collecting data and the definition of the appropriate criteria for interpreting the findings may adequately reduce the risk factors. Another disadvantage of this tool of research is the lack of wide implementation of research results.
Case studies are categorized in exploratory, descriptive and explanatory (Yin, 1984). The exploratory case study may be the beginning for large scale research, the descriptive case study used for an in-depth analysis of the phenomenon described. Key to the implementation is the existence of a descriptive theory for the description of the phenomenon. Otherwise, researcher will be unable to distinguish the priorities for data collection and problems may hamper the completion of the case study research (Yin, 2012). The explanatory case study explains the reasons why a phenomenon happens.

One of the application fields of case study methodology is Library and Information Science (LIS). Fidel (1984) commented in her article that case studies as methodology have been implemented in library and information research for the study of the information behaviour and firstly used for the study of online searching.

A search in LISTA 25/04/12 looking for research articles in Library and Information Science which use the case study methodology showed that the majority focused on the analysis of new information systems. The six articles described case studies that could be classified according to their types to the following categories

Exploratory	**Descriptive**	**Explanatory**
	Sicotte, Glaude, Pare, Guy, Moreault, Marie-Pierre, Paccioni, Andre 2006, "A risk assessment of two Interorganizational Clinical Information Systems" *Journal of the American Medical Informatics Association*, vol. 13, no. 5, pp. 557-566	
		Martini, Antonella, Corso, Mariano, Pellegrini, Luisa 2009, "An empirical roadmap for intranet evolution", *Journal of Information Management*, vol. 29, no. 4, pp. 295-308
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Table 3.3 Categories of case study research

In our case, the target was to explain the attitudes and needs of Greek biomedical scientists to open access journals and publishing. Greek biomedical scientists could be characterized as the most important stakeholders of this research because they have dual roles as authors and readers. The questions answered were the following

- Does open access publishing influence knowledge dissemination? Is it possible to assess this?
- What are the advantages of Greek researchers' participation in open access publishing?
- How easy is it for researchers to find digital information on their own?

- Are Greek biomedical scientists informed about the characteristics of the open access journals?
- What are the attitudes of Greek biomedical scientists towards open access publishing and how are these changing?
- What is the writing activity of Greek biomedical scientists in open access journals?
- What means do the Greek biomedical scientists use to inform themselves about open access journals?
- Do the institutions and libraries promote open access journals?

Additionally, the following hypotheses were out:

- Is a preference for publishing in high impact factor journals associated with familiarity with the idea of open access publishing?
- Is a preference for publishing in high impact factor journals associated with awareness of using open access journals?
- Is familiarity with open access journals associated with familiarity with open access publishing idea?
- Is awareness of using open access journals connected with familiarity with the idea of open access publishing?
- Is uncertainty around copyright issues of open access journals associated with familiarity with the idea of open access publishing?
- Is awareness of using open access journals associated with uncertainty around copyright issues with open access journals?

The following sets of associations were therefore tested (see the appendices 4.7- 4.9)

- Question 3 (Q3) * Question 19 (Q19)
- Question 3 (Q3) * Question 40 (Q40)
- Question 19 (Q19) * Question 28 (Q28)
- Question 40 (Q40) * Question 19 (Q19)
- Question 35 (Q35) * Question 19 (Q19)

- Question 40 (Q40) * Question 35 (Q35)

All the above mentioned questions contributed to answering the major questions

- What is the meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?
- Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what main changes have been observed over the course of the last few years?

Answering these questions would fulfill the requirements of explanatory case study methodology.

3.9 Questionnaire Survey

Before preparing the questionnaire, a literature research took place for similar surveys conducted in other countries. The search revealed similar research conducted in Spain with the title "Awareness and attitude of Spanish medical authors to open access publishing and "author pays" model" by Hernández-Borges et al., 2006. After consideration, I decided to use the same questions in this survey but with minor adaptations. The questionnaire is in English (appendix 3.2), so for the best understanding of questions I translated the questions into Greek (appendix 3.2). As far as the choice of the specific questionnaire concerned, there were three reasons for this. Firstly, there was a very close fit with my own research topic, secondly, that questionnaire had already been tested and thus, thirdly, using the same questionnaire offered the opportunity for comparisons. As Saxton (2006) has pointed out, the problem with synthesizing much library and information sci
ence research is the lack of validated survey instruments that are accepted and used by several researchers.

Basic research methods textbooks such as Oppenheim (1992) and Bryman (2008) compare the interview with questionnaire research method by analyzing their

advantages and disadvantages. The selection of the questionnaire as a research method can be justified based on a variety of criteria. According to Bryman (2008, p. 217) a questionnaire presents the following advantages:

- Low cost of transmission
- Quicker transmission
- Less possibility of bias because of interviewer's absence
- More convenient for respondents who are able to fill it in wherever they want and at whatever speed and time they need

However, the advantages of structured interview can be considered as the disadvantages of the questionnaire as Bryman (2008) explains that in a questionnaire survey the questionnaire

- Cannot be explained during its completion in order for the respondents to be helped over meaning
- Cannot be probed
- Must include a limited number of "difficult" questions unknown to the respondents
- Cannot present many open questions
- May be read in the wrong order
- May be filled in by unknown respondents
- Provides a limited quantity of information
- Includes a limited number of questions as it cannot be too long
- May include questions unsuitable for some respondents
- May be not answered in whole
- May have lower response rate

In spite all the above mentioned advantages and disadvantages of the questionnaire Oppenheim (1992) mentions that the final choice between interview and questionnaire may be based on irrelevant reasons to the content of the research tool such as the survey cost and lack of free time.

Moreover, Bryman (2008, p. 248) presents as a useful point of the survey the usage of existing questions whether these concern a questionnaire or an interview survey. As far as the successful usage of a questionnaire, I consulted an article that has systematically reviewed the evidence on what works for successful questionnaires (Weightman et al., 2008). The authors highlight the more important points which secure the success of the questionnaire survey which are the following

- Conduct of a pilot survey
- Highlight the importance of the research in an accompanying letter
- Confirmation of the research confidentiality
- Identification of ways to enhance response rates
- Creation of a brief questionnaire
- The usage of reminders

Trials have been conducted to assess whether, for example, the colour of a printed questionnaire increases the response rate. The overview of the evidence (Weightman et al. 2008) suggests that incentives may, but only may, increase response rate. On balance, shorter questionnaires seem preferable, and this was a consideration for the participants in this research who were busy health professionals. Personalization could be effective, and this influenced how the survey was administered.

However, there are often practical reasons for using one mode over another, but first we should look at some of the possible sources of error in sample surveys, which affect our confidence in the precision of the sample survey estimates (Groves, 1989). These errors are: 1) coverage error: the result of all units in a defined population not having a known nonzero probability of being included in the sample drawn to represent the population: 2) sampling error: the result of surveying a sample of the population rather than the entire population; 3) measurement error: the result of inaccurate responses that stem from poor question wording, poor interviewing, survey mode effects and/or some aspect of the respondent's behaviour; and 4) nonresponse error: the result of nonresponse from people in the sample, who, if they had responded, would have provided different answers to the survey questions than those who did respond to the survey.

Consequently, the final choice of the main method for data collection depends on the case and the possibilities of fewer errors. In this survey, questionnaire was chosen as the most proper method in order to avoid the nonresponse error, the measurement error was lessened as the questionnaire had already been successfully used, although in a different language and context.

Moreover, a questionnaire survey of Greek biomedical researchers would offer a more complete idea about the feelings of biomedical researchers for author activity, publishing activity and readership of open access journals.

The questionnaire survey would be conducted in two phases as the bibliometric survey, in different time periods in order to assess whether there were any changes. However, national and international developments on open access and open access publishing affected the timeline of the questionnaire survey. A third phase was deemed necessary after completion of the second phase to assess whether changes were in fact occurring.

The reliability analysis (Cronbach Alpha test) was conducted for all the phases in order to evaluate the questionnaire's internal reliability. As mentioned in the specific paper (Hernández-Borges et al., 2006) the item relevance and face validity was agreed among researchers. The importance of Cronbach alpha for assessing the internal consistency of the questionnaire is obvious.

The first survey conducted early in 2007, the second phase early in 2010 and the last one from September 2010 to May 2011. The periods of time were not chosen incidentally. At the beginning of this thesis the questionnaire survey had to be conducted in order that an initial idea about Greek biomedical scientists' knowledge on open access issues be formed. Although a pilot study was not planned to be conducted as the questionnaire had already been used in similar survey, the researcher intended to distribute on her own the questionnaire and asking the initial respondents' opinions about the appropriateness of the questionnaire (see section 3.11.2).

The second phase took place in early 2010 because from 2008 there was an intense activity in the context of open access developments at the national level (see table Table 5.1), so it was considered as necessary to see to what extent the Greek biomedical scientists were affected by the new developments (digital libraries, open access journals, institutional repositories). The third phase of the last questionnaire survey (from September 2010 to May 2011) was chosen as by that stage repositories had started, and it was judged that Greek biomedical scientists could have a more complete idea or experience on open access.

3.10 Ethical Review

The key principle for the conduct of a survey is the informed consent. It means that the researcher is obliged to gain the approval of the participants in order to be lawful to the ethical principles. Research participants agreement is a result of their adequate inform for all research process. They must be informed for

- The identity of the researcher
- The research goals
- The usage of the collected data
- The ensure of the anonymity
- The re-obtain of participants' approval for a new process

Although, the informed decision of the research participants theoretically seems to be easily applicable, in practice it is dubious. It happens because it is difficult for full information for the nature of the research to be provided as Homan cited in Bryman's book (2008, p. 121).

Knowing the essential character of the informed consent for the quality of the research, before distributing the questionnaire a covering letter was prepared which informed the participants about myself, the aims of the survey and the confidentiality that would be maintained for the answers, in order for respondents to be as fully informed as possible (see appendix 3.3). The informed consent letter was attached to

the questionnaire provided that, previously, the questionnaires were reviewed by the Director of Research for the department and the secondary supervisor. Consequently, the participants were free to decide about the completion or not of the questionnaire. Additionally, it was not requested that respondents write down personal data such as name, age, address. In this way the recognition of participant's identity was impossible.

Another level of the informed consent concerns the organizations which participate in the research. Meanwhile, in this case, the researcher must ask for the approval of the organization and then of the individual. This research could not be conducted without the approval of the hospital administration and University of Athens. So, first of all, an application (appendix 3.4) form was prepared in order for the scientific committees and the administration of the institutions to be informed about my identity, the aim of my research, the specialties of the proposed participants and the specific clinics in which they work. It was accompanied by letter confirming my status as a PhD student (appendix 3.3) and the questionnaire (appendix 3.2). After the approval of the scientific committee and the administration of the institutions, the questionnaire could be distributed to the specific clinics and the specific staff categories.

3.11 Research Surveys – Practical Issues

3.11.1 Introduction

In the following sub-sections describe the sampling and the distribution methodology which can be followed during an investigation and the methodology which was used for the specific survey. Furthermore, the presentation and the justification of the questions included in the questionnaire and interview survey contribute to the better understanding of the whole procedure.

3.11.2 Sampling and Distribution of the Questionnaires

The need to consider sampling is very important in quantitative research. The purpose of the research defines the units from which the sample is to be selected. There two

kinds of sampling, probability and the non-probability sampling. The main type of probability sampling is random sampling. The random sample presumes all the units as possible participants in the survey. It means that the sample size can become larger and larger and more representative of the population. A large sample size increases the precision and according to Bryman (2008, p. 177) research results can be representative of the general condition.

However there are disadvantages which cannot be ignored because it is a time and cost consuming procedure as sample size increases, with possible effects on the rate of non-response as well. Nevertheless, the disadvantages of probability sampling may be overcome if the researcher chooses the proper type of sampling design which represents better the aims of the investigation. Burns et al. (2008) provides a helpful table which illustrates the pros and the cons of each.

Sampling Design	**Advantages**	**Disadvantages**
Simple random	- Needs little advance knowledge of population	- May some groups to be accidentally excluded - May not be adequate
Systematic random	- High precision - Easy to analyze data and compute sampling Errors	- Ordering of elements in sampling frame may create biases - May some groups to be accidentally excluded - May not be adequate
Stratified random	- Includes particular groups - Incommensurate sampling feasible - Highest precision	- Needs advance knowledge of population - Complicated to data analysis and sampling errors computing
Cluster	- Lower field costs - Feasible group Sampling	- Complicated to data analysis and sampling errors computing - Lowest precision

Table 3.4 Random sample advantages and disadvantages

Non–probability sampling includes all the types of sampling which are not formed according to the principles of probability sampling. Their major shared characteristic dissimilarity is that the sample is not random. In three types of non–probability sample, meanwhile, the convenience sample, the snowball sample and the quota sample, the sample is selected by the researcher. Although these processes are often justifiable for practical and ethical reasons, they are criticized because the findings for the sample cannot easily be generalised to the population. In this survey a convenience sample was used, as the aim was to obtain opinions quickly from a range of biomedical specialties (physicians, nurses and dentists).

Perhaps, according to the table 3.5, in this survey could have been used a stratified random design because of its advantages. However, it requires advance knowledge of population, and their likely response rate as well. The choice of a non-probability sampling design was indicated. As Burns et al. (2008) mentions the researcher cannot predict in advance the participation of specific individuals so non-probability sampling design enables him or her to investigate population groups which may be difficult to be identify or access.

As far as the distribution concerned there is a variety of methods to approach the sample and distribute the questionnaires such as professional newsletter or premailed letter (Burns et al., 2008). Advance notices provide a good opportunity to inform the target group but there needs to be a recognised communication route and this was not at my disposal, as there is no a library newsletter and the library's website was redesigned only at the end of the survey. Additionally, a pre-mailed letter could not be used because the research was conducted by implementing a convenience sample. Involving some clinical "champions" gave greater credibility to the questionnaire, and would increase the response, it was hoped. The distribution of the questionnaire could take place via internet or by mail. Burns et al. (2008) concludes that electronic surveys may have lower response rates than the postal ones, and additionally, there are difficulties over access to technology. For these reasons, printed questionnaires were used.

The survey was conducted in hospitals and the University of Athens. The distribution of questionnaires took place in two ways. First, I shared out, and collected the

questionnaires from departments in the hospitals and the University and, second, some questionnaires were shared out, and collected with the help of a physician and a nurse, after their training (by me) on the specific survey. By handing the questionnaires to the sample I had the chance to hear participants' comments about the quality of the questionnaire and make minor changes in the questionnaires (see also 3.11.3). Additionally, in the majority of the participants completed the questionnaire at once or they gave them back to me a specific predefined date. The "research team" of the physician and nurse functioned in the same way. Therefore I did not need to send reminders and most people approached completed the questionnaire. Certainly, this procedure was a bit time consuming but it suited the target groups' needs.

At the beginning of the research, I found that it was not so easy for me to approach the participants, despite mentioning that the survey was approved by the hospital administration. Although the non-response rate was low, but there were not many responses in total. After discussing the difficulties of the survey with the above mentioned biomedical scientists, they agreed to help as "clinical champions". They were given some guidelines and they then distributed and collected additional questionnaires. It was easier for them to approach their colleagues, as they spend more time together. Biomedical professionals could not be characterized as the simplest research sample, as they are very busy and their free time is limited. Their participation in surveys is difficult especially surveys which are not apparently directly linked with their scientific interests. When the research started, the topic of "open access" was almost unknown in Greece. Therefore the completion of the questionnaire requested some care. The collaboration with the physician and the nurse contributed to the increase of the sample size for the specific specialties. For the dentists, this was not possible and their percentage in the sample is lower than the other professional groups, despite efforts to ensure as fair a sample as possible.

These reasons are enough to prevent the investigator from using other research tools except questionnaire such as interviews and focus groups**.** Indeed, alternative methods could produce different and complementary results but probably for future research on the topic. Focus groups could create a more complete picture about the attitudes of Greek biomedical scientists towards open access issues allowing for interactions

among group members but the question of awareness of the participants would be difficult. According to Bryman (2008, p.475) focus group interviews are composed of people who have previous experience but how many Greek biomedical scientists knew and had experience of open access publishing? The aim of the survey work was to assess trends in awareness. Focus groups for future research might explore some of the barriers, but they would not have been appropriate for the first stages of the survey work. In the same way, the critical incident interview relies on a previous memorable experience as Bryman and Bell (2011, p. 219) emphasise, for the discussion of a critical incident in order for the attitudes to be analyzed. It might have been useful to discover more about the attitudes of those who had published in open access journals, by sampling from the Greek authors in some open access biomedical journals. In hindsight, given what the questionnaire survey revealed, some of these authors may not have been fully aware that their chosen outlet was open access in some way. Critical incident and focus groups could be used in a later phase as complementary research methods when the open access and open access publishing would be at the "refreeze" stage.

3.11.3 Content of the Questionnaire Survey

The questionnaire (see also appendix 3.2) is structured into three sections. The first one is generally about the publishing activity of participants. The second section includes questions about the open access publishing activity and the third one concerns open access readership. The main target is to study the reaction of the scientists towards free access in double role of author and reader. Additionally, it pinpoints scientists' behaviour in relation to publishing and the means of their awareness about new publishing modes. Thus the questionnaire allowed an in-depth analysis of the different topic areas, and permitted identification of the subject areas which needed further investigation.

The questions about the existence of an institutional repository and the inclusion of open access journals in the libraries' collections help towards evaluation of the library role in the promotion of open access sources. While, the questions about the copyright issues (and the responses) provided another motive for conducting publisher website

analyses and further research via publishers' interviews, as the responses in phase one showed such lack of awareness or lack of concern. The questionnaire could be considered as quite long (several pages) but most questions only required ticking boxes.

Which is your specialty?

[ ] Physician [ ] Dentist [ ] Nurse

This question was included at the beginning of the first survey because there was the need to know the participation percentage of each professional group in order to ensure as fair a sample as possible, and to assess if there were any differences (if possible).

1. **Publishing Activity**

The first part concerns the general attitude of the Greek biomedical authors.

A1. ***Have you published an article in clinical journal within the last 18 months?***

[ ] Yes [ ] No

The answer let us know if he or she is an active author.

A2. ***Which of the following criteria do you use when selecting a journal for publication?***

[ ] High Impact Factor
[ ] High Prestige (journal well known, high circulation)
[ ] Great similarity to your scientific interests
[ ] Quick publication
[ ] Frequency of publication
[ ] Quality of the review process

[ ] Invitation for writing a paper by editor

[ ] General call for papers

[ ] All of them

[ ] Other (Please specify):……

Usually the authors have some criteria on which they rely for choosing a journal for publication. So if an open access journal contains the above mentioned characteristics or some of them, it will be more likely for it to be chosen for publishing.

A3. ***Have you made your work accessible by the Internet?***

[ ] Yes

[ ] No

The ability of the participant to make his or her work accessible by the Internet may have essential role for the dissemination of the open access movement. In this way, the author can make freely available the pre-print or the post-print of the paper. Additionally, it would be very interesting to understand the reasons for which someone is discouraged to make work accessible. The lack of skills, the lack of the appropriate tools and the limited free time are problems which can be easily overcome. But the copyright restrictions originated by the publishers and the progress on this point means the change of publishers' culture and acceptance of the open access principles.

2. <u>Open Access Publishing</u>

This group of questions is concerned with the awareness of the Open Access Publishing Activity.

B1. **Are** ***you familiar with the idea of Open Access Publishing?***

(**Open Access Publishing includes all the electronic information sources, for example articles, that may be freely available through the Internet for the**

readers authors or other organizations might bear the publication costs.)

[ ] Yes [ ] No

Familiarity with Open Access Publishing could be more possible for the active authors. However after the requests of participants at the initial stage the definition of the Open Access Publishing was added. It may be an indication of ignorance or a lack of terminology knowledge, but adding the definition helped to distinguish those who were ignorant of the idea from those who were not.

B2**.** ***Are you aware of European and US open access initiatives?***

[ ] Yes
[ ] No

An evidence of familiarity with Open Access Publishing may be the awareness of European and US open access initiatives. However, we cannot forget the fact that the participants are not specialized in information sciences. Their free time is limited. So they may know about the Open Access Publishing but they do not care to learn more about the movement.

B3. ***Are you aware of publishing in an open access journal?***

[ ] Yes
[ ] No

The awareness of publishing in an open access journal requires some knowledge about any publication fees. Someone may know about the charges without being an author.

B4. ***How many articles have you published in open access journals within the last 18 months?***

(Check one)

[ ] 0
[ ] 1

[ ] 2-3

[ ] 4-

The question is interrelated with A1 as someone who has published his or her work in a clinical journal within the last 18 months could have selected open access journals to publish it or not.

B5. ***Please indicate your opinion on the following statements***

	Yes	**No**	**Don't Know/ No Opinion**
No familiarity with open access journals			
Low impact factor			
Low prestige			
Low readership			
Lack of funding			
Institution influence			
Author charges			
Uncertainty about the copyright			
Uncertainty about the quality of review process			

This question explores Greek biomedical scientists' opinion and knowledge about the open access journals. Additionally, it refers to other variables which can contribute to the form the scientists' view such as institutions, copyright, quality of review process. The statement which is about author charges for better understanding in Greek language changed as "the author charges prevent the author from publishing in an open access journal"

B6. ***Has your institution got an institutional repository (the database which includes the writing activity of your institution such as your paper)***

[ ] Yes [ ] No [ ] Don't know

As the term "institutional repository" was not known its explanation was added later. The existence of other type of open access sources, except from journals, can contribute to their promotion in Greece. Additionally, the positive answer is a sign that a progress is taking place on the development of open access sources.

B7**. Have you ever made your work accessible by internet via an institutional web page or subject repository such as PubMed Central?**

[ ] Yes [ ] No

The accessibility of someone's work via an open access sources illustrates an author's need for free disposal of his or her work.

C3. <u>Open Access Readership</u>

The last section of this questionnaire concerns the usage of open access sources in order to find biomedical information.

C1. ***Do you consider Open Access Publishing as a means for wider information dissemination?***

[ ] Yes [ ] No

The question is if the Open Access Publishing could be a means for wider information dissemination and consequently a very effective means of scholarly communication.

C2. ***Are you aware of using open access journals?***

[ ] Yes [ ] No

The awareness of using open access journals may lead to the publication in these journals.

C3. ***How have you become aware of open access journals?***

[ ] Scientific Company
[ ] Institution such as University
[ ] Colleagues
[ ] Not aware until I received the questionnaire
[ ] Other (please specify)……..

The ways in which the participant has been informed about the open access journals provides a good idea about the ways others can be informed about this new type of publishing.

C4. ***How easy is for you to detect open access information on your own?***

[ ] Very easy [ ] Easy [ ] Very Difficult [ ] Difficult

We can see the ability of the participant to detect open access information without help. It may happen because on the one hand someone is skillful to the information retrieval of such a kind of information or because it is easy to find open access information via web.

C5. ***How easy is for you to detect information on Greek biomedical research in open access journals?***

[ ] Very easy [ ] Easy [ ] Very Difficult [ ] Difficult

We can see the ability of the participant to detect open access information without help again. But the type of information is different. It is about Greek biomedical research in open access journals. It means that there are open access journals which publish Greek biomedical research and the authors publish their research results in open access journals.

C6. ***Does your library provide access to open access journals?***

[ ] Yes [ ] No [ ] Sometimes [ ] Don't know
[ ] Other(please specify)…….
…….

The last question refers to the role of the library in the promotion of open access journals.

3.11.4 Publishers' Interviews

Biomedical publishers as the traditional disseminators of the knowledge may affect the development of information sources and the creation and management of biomedical open access sources as well. So it was considered as very important to understand Greek biomedical publishers' opinion towards open access journals and the new models of publishing. In addition, it would be useful to see to what extent the Greek biomedical publishers can contribute to the quick and effective access to the biomedical research.

So the aim was to answer the following questions

- In what ways do the stakeholders influence the new publishing models?
- What do Greek biomedical publishers think of open access journals?

- What is meaning of ‘Free at the point of access’: do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?

The structured interview was considered to be the most suitable research method because as Bryman (2008, p. 194) explains in his book the questions are standard. Consequently, this tool secures better and more accurate results for responses.
Fourteen publishers were identified and contacted mostly by telephone, and of these ten agreed to participate.
The sample of Greek scholarly biomedical publishers was chosen to include the following:

- High quality journals based on age and/or regularity of publication.
- Open access journals (Greek, and international but with Greek editors).

The structured interview was based on a Spanish questionnaire (appendix 3.5) to Spanish biomedical publishers (Dulcinea Project, 2008). The questionnaire was translated into English (appendix 3.6) by Dr. Christine Urquhart and then translated into Greek (appendix 3.7) by me. Initial contacts emphasized the need for reducing the time required for the interview. Accordingly, the initial section of the questionnaire which asked for factual data about the journal was completed in advance by me, and only checked for accuracy in the interview. Covering letters (appendix 3.8) attached to the questionnaires (including the part completed version) were sent to the interviewees prior to the telephone interview. Interviews were conducted between January and February 2010. Interviewees were generally very helpful and contributed additional comments on publishing procedures.

The title of the questionnaire is “Greek biomedical journals and rights to self-archive their work”. The interview was divided into four parts. The first one collects “**Data relating to the identification of the journal**”. The second part is about **“Data relating to access to the work of the journal via the Internet”.** The third section gathers information on “**the editorial policies of licenses for use of the published articles”** and the last one refers to **“Policies on self-archiving (self-archiving)”**. It

was very important to hear Greek biomedical publishers' opinion about some almost new publishing topics such as licenses for use and self–archiving policies, to map these to authors' perceptions.

Data relating to the identification of the journal

Although the initial title of this group of question was "Data relating to the identification of the journal in its electronic version" the final part of it, meanwhile the "in its electronic version" was omitted to make the survey more inclusive.

A1. Name of the journal

……..

The reference to the name of the journal is very important as the rest of the answers can be checked. There may be some name changes of journal titles.

A2. Publishers

…….

The name of the publishers also helps the check the name against the title.

A3. Does the journal belong to an institution, or academic, cultural or scientific society (learned society)

[ ] Yes [ ] No

This question enables us to know how many biomedical journals are published by learned societies and then to compare opinions of the scientific societies against those of private publishers.

A4. If the previous response was 'yes', please indicate the name of the society.

……

It is also helpful to know the name of the society in order to detect any differences among the societies.

A5. Please give the electronic ISSN

…….

It is an identification indication that the electronic form of the journal meets the international standards for having an ISSN

A6. Please give the paper ISSN

……..

It is an identification indication that the paper form of the journal meets the international standards for having an ISSN

A7. Please give the URL of the journal (the direct hyperlink)

……

The knowledge of the direct hyperlink provides the opportunity for immediate access to the journal.

A8. Please indicate a contact person in the editorial team

……

A contact person in the editorial team can provide more information about the editorial policies of the journal in the future.

A9. Please provide the email address of the contact

……

An e-mail message may be more effective way of communication sometimes

A10. Please provide a telephone number for the contact

(Only numbers allowed in this field)

……

The absence of an e-mail communication can be replaced by a phone contact.

A11. Do you provide instructions for authors that may be consulted through your website?

[ ] Yes [ ] No

It is important for all the persons concerned to have easy and quick access to the instructions for authors in order to accept or reject the publication in the specific journal. Additionally, it would be interested to see if all the facts and figures such as copyright data are publicly available.

Information about access to published works in the journal through the Internet

B12. Indicate the type of access to published works in your journal Select one of the following options

[ ] Free Internet access, immediately on publication

[ ] Free Internet access after an embargo period set by your publication

[ ] Restricted access, only by subscription

[ ] If there is an embargo period (option two, above), indicate the number of months required

(only numbers allowed in this field)

…….

[ ] No access via Internet

This question aims at the identification of open access models which may be, or may not implemented by the publishers or their inexistence. In addition the answer about the lack of access via Internet was added before conducting the survey because we needed to know how many publishers do not provide the articles via web, thus not implementing open access (at present).

C. Details about copyright conditions in the journal

These questions concern the editorial policies about licensing practices for the published works.

C13. In any part of the journal website, do you mention author rights for the published works?

[ ] Yes [ ] No

The author rights must be respected by the publisher even after the publication of the article. Consequently, it should be important for authors to find these details via the journal website. The question is how important the publisher considers this information.

C14. If so, in which place in the website are they mentioned?

Indicate the corresponding entry points

[ ] On the home page
[ ] Among the author guidelines
[ ] Through a specific link
[ ] No mention, but there is a 'contact the editor' link
[ ] Other

The answers include all the possible places in which this type of data may be included. However, the details may not be provided publicly and this possibility is provided among the categories.

C15. Please indicate, according to the response given in the previous question, the URL where mention of the journal's copyright conditions are held.

…….

The evidence that indeed the copyright data are publicly announced is requested via URL address

C16. Do you use any type of usage licence for published works in your journal, for example, of the Creative Commons type?

[ ] Yes [ ] No

This is a question which shows to which extent the publisher protects the published works against any illegal action by using licences.

If you have replied 'yes' please indicate the type of licence used, and if it is not a standard licence please indicate the URL where it may be consulted.

……..

The usage and knowledge of licence or any other similar sources is proved by answering this question

D. Policies for self-archiving

Self-archiving of scientific publications is a way of attaining open access to the scientific production of our researchers.

D17. Does the journal permit self-archiving of published works?

[ ] Yes [ ] No

This question explores if journals are considering self-archiving in institutional or subject-based repositories as publishing policy and how this is arranged.

D18. If so, indicate from these options which version of the published work has permission for self-archiving.

Check/tick the corresponding entries

[ ] The preprint version (author version, not reviewed)
[ ] The post-print version of the author (author version with corrections made after reviewing)
[ ] The post-print version published in the journal
[ ] Other

Even if the self-archiving is permitted the question concerns which form(s) of the published work can be self-archived. It answers the question "how the self-archiving" is arranged.

D19. Where is self-archiving permitted? Choose as many options as apply to your publishing policy.

Check/tick the corresponding entries

[ ] On a personal web-page
[ ] In an institutional repository
[ ] In a subject-based repository
[ ] Other

The next crucial point is to know the places where the self-archived work may be announced. The existence or the lack of limits will be detected.

D20. When, or at which point is self-archiving permitted? In the case where permission is granted after an embargo period, indicate in the comments box the number of months that apply

[ ] Not mentioned
[ ] After acceptance of the manuscript

[ ] Immediately after publication of the manuscript

[ ] After an embargo period

[ ] Other

The current information which an article offers requests for quick availability to the public. The answers depicts publishers' need to respect this fact

D21. ROMEO-SHERPA define four categories of journal corresponding to their self-archiving policies

These categories are described by colour
White: No self-archiving permitted in any circumstance
Yellow: Self-archiving of the preprint version of the article permitted
Blue: Self-archiving of the post-print version of the article permitted
Green: Self-archiving of both the pre-print and the post-print permitted.

According to the classification – which colour defines your journal?
Choose one of the following options.

[ ] White

[ ] Yellow

[ ] Blue

[ ] Green

[ ] No response

By answering this question, on the one hand, publishers are informed about ROMEO-SHERPA if they do not already know and on the other hand they are urged to classify their journal according to an international categorization.

Respondent details

Thank you for your participation. Please indicate your contact details in case it is necessary to contact you.

Name, email, telephone number

3.12 Publishers Agreements and Cost Analyses

3.12.1 Publishers Agreements

Another type of bibliometric survey took place in 2010. The target was to examine and assess the terms and the limits which publishers put in their cooperation with the authors of the papers published in their journals. Additionally, it intended to fully answer the questions

- Are there open access biomedical journals in Greece?
- What do Greek biomedical publishers think of open access journals?
- What is meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively?

The journals were chosen according to their age and the regularity of publication. Additionally, some journals were added to the set because they are published electronically with open access options. Electronic (web pages) and printed sources (journal) were searched in order to identify the essential information. In the case that the latest print issue of the journal was not available locally, a recent copy of the journal was ordered from another library.

The first round of data collection was conducted in July 2010. Later in November 2010, a follow-up study took place in order to check the latest sources for any differences. In March of 2013, another study of the open access Greek biomedical journals was conducted in order to see if any information about author-pay fees was included in their instructions.

The titles which are published in both electronic and paper form were both checked for any variations. Some journal titles presented some additional information in electronic form, for example, the journal "Pneumon" provides more information in

the electronic form about “Conflict of Interests”. The journal “Archives of Hellenic Medicine” provided data in electronic form about the “termination” and the “permitted use”. However, the journal *Applied Clinical Microbiology and Laboratory Diagnosis* mentioned the need for the originality of the submitted papers only in printed form. The following journals which were explored:

- *Acta Microbiologica Hellenica*
- *Acta Orthopaedica et Traumatologica Hellenica*
- *Applied Clinical Microbiology and Laboratory Diagnosis*
- *Archives of Hellenic Medicine*
- *Forum of Clinical Oncology*
- *Galenus Journal : Panhellenic Bimonthly Medical Edition*
- *Greek Annals of Ophthalmology*
- *Hellenic Radiology*
- *Hellenic Stomatological Review*
- *Hellenic Surgical Oncology*
- *Hellenic Urology*
- *Hippokratia*
- *Hormones*
- *Iatriki*
- *In Vivo*
- *Nosileftiki*
- *Paediatriki of Northern Greece*
- *Pneumon*
- *Vima tou Asklipiou - (Rostrum of Asclepius)*

The agreements were examined one by one and their similarities and the differences were observed. SPSS was used for the statistical analysis of the results.

This analysis focused on the terms included in the documents and concern the following parameters:

- Copyright transfer
- Termination Terms
- Citation
- Work for Hire
- Permitted Use
- Government
- Permission
- Original Unpublished
- Further Use
- Liability
- Law Court
- Proprietary Rights
- Fair Use
- Authorship

The above mentioned variables were used in a similar study conducted in USA by Benoit (2009). Only one parameter was added and it was the "authorship" which concerned publisher's definition of authorship identity.

Benoit defines the following variables

- *Termination*—Refers to specific events which terminate the agreement.
- *Citation*—A clause requiring the author to either use a specific or general citation of the published work when reprinting.
- *Work-for-Hire*—Specific clauses regarding rights of institutions when the work falls under a work-made-for-hire situation.
- *Permitted Use*—Signifies if the document contains language regarding the author's rights to reproduction.

- *Gov't*—A clause specifying rights for governmental employees as works made for governments are usually in the public domain.
- *Permission*—Requires the author to obtain copyright permissions for any copyright protected materials contained within the work.
- *Original/Unpublished*—Publisher's statement requiring the author's agree the submitted work is both original and unpublished.
- *Further Use*—Specifics on the types of permissions the publisher will obtain for their future use of the work ranging from consent to a good faith effort to contact.
- *Liability*—Publisher's statement releasing themselves from being liable for the contents of the work.
- *Law/Court*—An indication of what country's laws the publisher adheres to and/or what court shall be used for any legal action.
- *Fair Use*—A clause requiring author's provide information regarding any item within the work used within the bounds of either fair use (US) or fair dealing (UK).

3.12.2 Cost Analyses

The purpose of cost analysis has a dual character. On the one hand, we can discern any differences in financial policy between profit and non – profit publishers. On the other hand, it is possible to compare the prices between the international and the Greek biomedical journals. This analysis will be based on some representative international and Greek biomedical journals of profit and non – profit publishers. The representative journals which were chosen are the following:

- British Medical Journal
- New England Journal of Medicine
- Lancet
- Cell
- In vivo (Athens)
- International Journal of Oncology
- Iatriki

- Archives of Hellenic Medicine

The international journals were chosen because of the following criteria:

- High impact factor
- Prestige
- Popularity

The selection of Greek biomedical journals took place according to the following options:

- Prestige
- Popularity

Journal cost analysis conducted in two different periods in 2007 and 2013. In 2007, the detection of prices for institutional subscriptions was easily accessible via their publishers' websites. For 2013, the majority of publishers, especially the foreign ones, had changed their marketing policy and the pricing information was not only available via representatives (library and publisher). Consequently, the prices for the journals: *British Medical Journal*, *New England Journal of Medicine* and *Lancet* are derived by the subscription pricing for the National and Kapodistrian University of Athens. Otherwise, I could have used the personal subscription prices but it would not be useful because the point is to have an idea about the total cost of journal subscriptions which burden a library's budget, and institutional prices are higher than personal subscriptions.

3.13 Summary Conclusions

My desire to help health sciences libraries to support open access in an appropriate way led me to choose critical realism which would explore the theoretical context of open access publishing, explore and assess the attitudes and impact of the stakeholders to the adoption of open access as an innovation, and assist librarians to support and promote open access publishing in an appropriate way.

Case study methodology often underpins mixed methods research. This methodology provided a useful framework for collecting data about the attitudes of Greek biomedical scientists, and the longitudinal character of case study research helped me to evaluate whether any changes had happened. Bibliometrics, publishers' websites research and publishers' interviews functioned as complementary research procedures to questionnaire survey to provide alternative perspectives on publication and publishers.

Bibliometrics evaluated the representation of the published in Greece open access journals in international databases, whether Greek biomedical scientists were represented in WoS (giving some indication of the need to write in English) and the social network studies examined newer and alternative approaches to scholarly communication.

The questionnaire included some information about open access journals' characteristics and this was mapped to data from interviews with publishers to assess the extent to which Greek biomedical publishers inform biomedical scientists about these characteristics in authors' instructions. Additionally, interviews allowed further discussion with publishers on open access topics. The survey of journals' websites also provided information on the subscription costs. In this way, the cost analysis could be conducted.

Each method posed its own limitations. In the questionnaire survey the respondents could freely express their opinions because of the anonymity but the problem of null answers could not be avoided. A reason which led to the publishers' interviews and journals' websites research was the great number of null answers and "don't know/no opinion" to the statements about the characteristics of open access journals included in questionnaire survey. The bibliometric survey presented problems, due to database content and structure changes, which required some adjustment to the methods.

The need for the production of some generalizable/transferable findings was the motive to use previously validated questionnaires, and the choice of a convenience sample, and use of clinical champions helped to reach a greater number of Greek biomedical and probably helped to increase the response rate.

Chapter 4

Results

4.0 Introduction

This chapter presents the findings of the research for the two phases of the bibliometric survey (Sections 4.1-4.3), supplementary survey in ResearchGate, LinkedIn and Google blogs (Section 4.4), publishing activity of Greek scientists survey (Section 4.5), the three phases of the questionnaire survey (Sections 4.6), the publishers' interviews (Section 4.7), website analysis (Section 4.8), cost analysis (Section 4.9), and themes of change (Section 4.10). The results for each component of the research are presented separately at first, with a later section (Section 4.10) for synthesis.

4.1 Bibliometric Survey

The bibliometric research results are presented via figures, Tables and text. In most of the cases (except the research in the Google search engine) the Tables provide the same type of information. There are journal titles which were included in phase one and phase two separately, titles which were retrieved in both phases so they were common and titles which were currently indexed in the databases during the second phase, in 2011. The importance of Impact Factor as an indication of journal assessment explains the presence of this column. The specific data originated from the survey conducted in Web of Science and Journal Citation Report during the period 2006-2007 and 2011. In June of 2015 a further check was made to reconfirm the data. PubMed is a database which is continually adjusting to advancements in scholarly practice, but this may make the comparative survey of its sources difficult, especially, when it has been conducted in distinctly different periods. For the first phase which took place in October of 2006, PubMed primarily contained MEDLINE, but a few years later (April to May of 2011), the second phase reflected the expanded content of PubMed to include some journal articles from journals not currently indexed for MEDLINE

Journals	**Phase 1**	**Phase 2**	**Common journals**	**Currently indexed for MEDLINE**	**Journal Citation Reports**	**OPEN ACCESS/ HYBRID OPEN ACCES**
Acta chirurgica hellenica	x					NON OPEN ACCESS
Akademaike iatrike		x				
Anticancer research			x	x	**1.725**(2011)	HYBRID OPEN ACCESS
Archeion iatrikon epistemon	x					TERMINATED
Archives de l'Institut Pasteur hellénique		x				NO INFORMATION
Archives of the Hellenic medical societies			x			OPEN ACCESS
Cancer genomics and proteomics			x	x		OPEN ACCESS
Cancer therapy		x		x		OPEN ACCESS
Deltion Hellenikes Mikrobiologikes kai Hygieinologikes Hetaireias		x				NEW TITLE OPEN ACCESS
Deltion tes Paidiatrikes Klinikes tou Panepistemiou Athenon		x				NEW TITLE OPEN ACCESS

Deltion. Iatrocheirourgikē Hetaireia Athēnōn		x				TERMINATED
Diotima		x				NON OPEN ACCESS
Dōdōnē		x				TERMINATED
Ekistics; reviews on the problems and science of human settlements		x				NO INFORMATION
Ēpeirōtikē hestia		x				NO INFORMATION
Epetēris Hetaireias Stereoelladikōn Meletōn		x				NO INFORMATION
Epitheorese klinikes farmakologias kai farmakokinetikes	x					NON OPEN ACCESS
Epitheorese koinonikon ereunon			x			OPEN ACCESS
Epopteia		x				OPEN ACCESS
Experimental and therapeutic medicine		x		x		HYBRID OPEN ACCESS
Greek economic review			x			NO INFORMATION
Hellenic journal of cardiology			x	x		OPEN ACCESS
Hellenic journal of nuclear medicine			x	x	**0.805**(2011)	HYBRID OPEN ACCESS

Hellenika stomatologika chronika.		x				OPEN ACCESS
Hellenike iatrike			x			OPEN ACCESS
Hellenis adelphe		x				TERMINATED
Hepato –gastroenterology		x		x		HYBRID OPEN ACCESS
Hippocrates	x					NO INFORMATION
Hippokratia		x		x		OPEN ACCESS
Hormones			x	x		OPEN ACCESS
In vivo			x	x	**1.264**(2011)	HYBRID OPEN ACCESS
International journal of molecular medicine			x	x		HYBRID OPEN ACCESS
International journal of oncology			x	x	**2.399**(2011)	HYBRID OPEN ACCESS
Journal of B.U.ON.: official journal of the Balkan Union of Oncology		x		x	**0.607**(2011)	OPEN ACCESS
Journal of musculoskeletal and neuronal interactions			x	x		OPEN ACCESS
Materia medica greca		x				INTERRUPTED
Molecular medicine reports		x		x	**0.418**(2011)	HYBRID OPEN ACCESS
Nosēleutikē		x				NON OPEN ACCESS

Nosokomeiaka chronika		x				OPEN ACCESS
Odontiatrike		x				No information
Odontostomatologike proodos		x				NON OPEN ACCESS
Oncology letters		x		x		HYBRID OPEN ACCESS
Oncology reports			x	x	**1.835**(2011)	HYBRID OPEN ACCESS
Orthodontikē epitheōrēsē		x				NON PUBLISHED
Paediatriki		x				OPEN ACCESS
Platon			x			NON OPEN ACCESS
Pneumonologike kai phymatiologike epitheoresis		x				NO INFORMATION
Psychiatrikē = Psychiatriki		x		x		OPEN ACCESS
Stoma			x			OPEN ACCESS
Stomatologia		x				NON OPEN ACCESS
To Helliniko periodiko gia stomatiki and gnathoprosopiki chirourgiki			x			NO INFORMATION

Table 4.1 Greek biomedical journals included in PubMed

4.1.1 Phase one and Phase two PubMed Journals

A total of twenty – one Greek journals were found in the Journals Database in the first phase. Only ten Greek journals were currently indexed in MEDLINE and all of them were in English language. Greek – language journals indexed in OLDMEDLINE were included in PubMed as well.

A total of forty seven journals were found in the NLM Catalog in the second phase. The retrieved journal titles could be classified in three categories; the currently indexed for MEDLINE journals, the non-currently indexed for MEDLINE journals and the PUBMED Central (PMC) journals. Table 4.1 presents the eighteen journals which were currently indexed in MEDLINE; ten journals belonged to the category of hybrid open access and the eight were open access journals. As far as the language of the journals concerned, as depicted in Table 4.2, the majority of currently indexed journals in PubMed were in English and only *Psychiatrike* and *Hellenic journal of nuclear medicine* were bi-lingual (see Table 4.4). In addition, Table 4.2 shows that the open access to the published articles was mainly provided via publisher's website, as, for example, PubMed included the citations of five hundred and seventy six articles from journal *Hormones,* but four hundred and ninety two articles were freely accessible via publisher's website and only two of them via PMC. Journals such as *Hepato-gastroenterology* and *Journal of B.U.O.N.* were extensively indexed in PubMed, but the access to the full text form of the articles was not provided.

Thirty four journals were not currently indexed by MEDLINE and one journal title was excluded by the results as it was not published in Greece. The *Mediterranean studies* came up when the research was taking place because one of its other titles was *Greece and Mediterranean*. As the Tables 4.3 and 4.4 present the majority of not currently indexed by MEDLINE journals were in Greek modern language (thirteen) and bi-lingual (seventeen). In the category of not currently indexed journals were also included the journals which are not published (five Greek language journals and six bi-lingual) anymore but some citations were included.

As illustrated in Fig. 4.1 the representation of dentistry in OLDMEDLINE was higher than the other biomedical sciences because in PubMed the majority of citations (68%) concerned the following six journals

- Hellenika stomatologika chronika
- Odontiatriki
- Odontostomatologike proodos
- Orthodontike epitheorese
- Stoma
- Stomatologia
- To Helliniko periodiko gia stomatiki and gnathoprosopiki chirourgiki

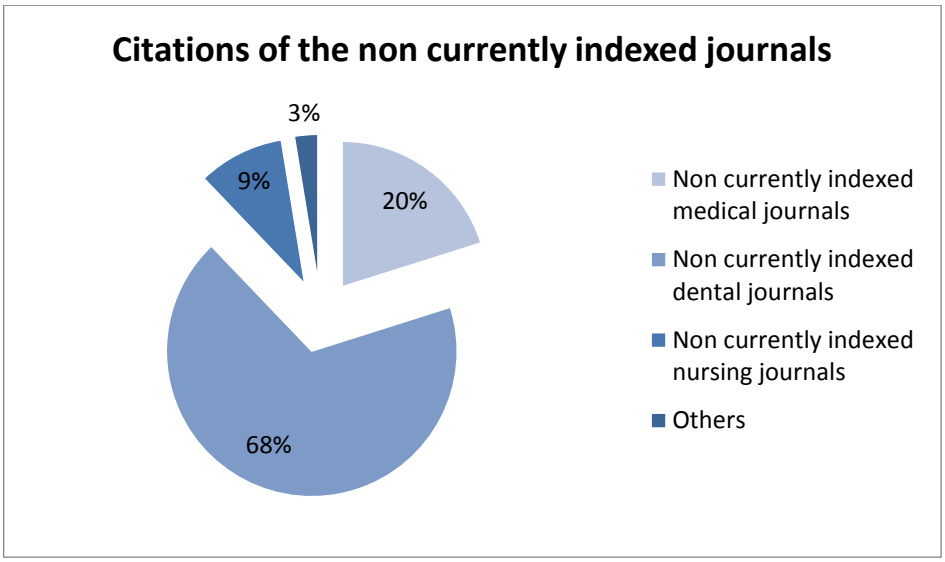

Figure 4.1 *Number of citations of non-currently indexed journals*

The currently indexed journals in PubMed provide a different view of the Greek biomedical publishing activity. As the Table 4.2 depicts the main Greek biomedical journals were published in English language. Additionally, journals published by Greek commercial publishers (CP) contribute more to PubMed although the number of journals published by learned societies (LS) was greater (see Fig. 4.2).

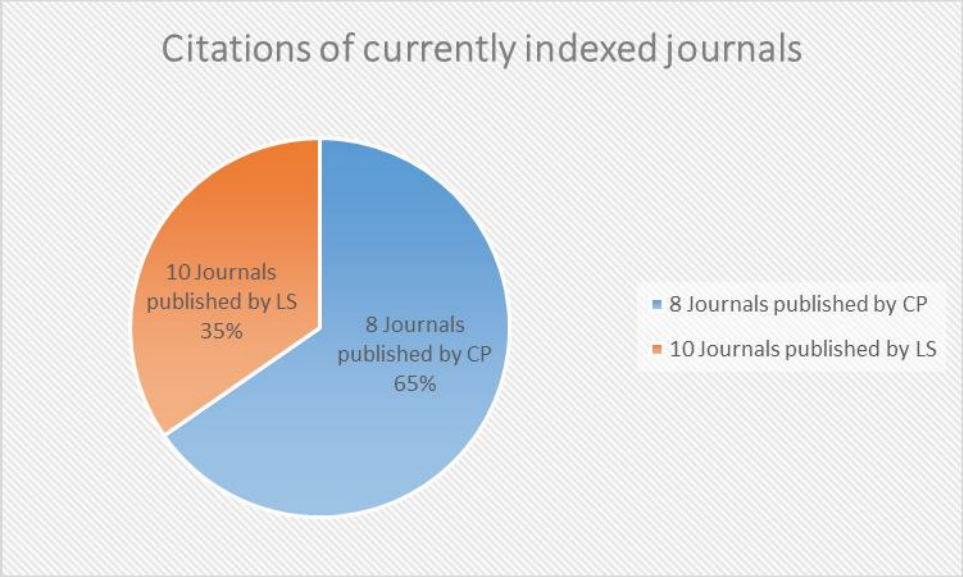

Figure 4.2 *Number of citations of currently indexed journals*

Tables 4.3 and 4.4 provide some information about the characteristics of non - currently indexed in PubMed journals which may help to the explanation of the publishing changes. As far as the increased number of non currently indexed in PUBMED journals is concerned, this may be an indication of the influence of political and financial status of the state of Greek biomedical publishing. As the scholarly societies have traditionally been the major publishers, the journals' circulation has been critical to the publishers' income. The lack of state funding and the insufficiency of a scientific society's budget often hampered the production of the journals. Consequently, it is not incidental that the old journals included in PUBMED present a picture of discontinuity and instability. The Greek journal titles were further explored in Google and Greek journal union catalog of National Documentation Center to track their history, especially the continuity of their title and the circulation. In addition, Rigatos, Apaki and Samios (1988) in their book with the title *Ελληνικός ιατρικός τύπος 1811-1988* offer important information on the medical journals published in Greece from 1811-1988.

In the following random sample of Greek journals, name changes were not the exception:

- *Hellenis Adelphe* continued by *Noseleutike*. The exact starting date and the ending date of the journal *Hellenis Adelphe* could not be detected in Greek bibliographical sources, approximately, *Hellenis Adelphe* had been published

from 196? to 197?. *Noseleutike* is an electronic journal provided via publisher's website.

- *Minerva Medica Greca* was first published in 1973 by the publisher G. Parisianos and scientific director Spiro Marketo. It published also some supplements under the title *Minerva Endocrinologica Greca, Minerva Nefrologica Greca.* In 1976 the fourth volume was circulated under the title *Materia Medica Greca* possibly published until 1992.
- *Stomatologica Chronika* was published from 1957 to 1969. In 1970 it was renamed as *Hellenika Stomatologica Chronica* and continues, and from 2004 is free.
- *Orthodontike epitheorese* first published in 1988. In 1998 it was entitled as *Hellenike Orthodontike Epitheorese* and since then it has been publishing until today. It is an open access bi-ligual journal which is included in DOAJ and HEALlink.
- The journal *Hellenike Cheirourgike* first appeared as the journal *Deltion. Cheirourgike Hetaireia* in 1928 and is not included in NLM records. Later, it was renamed as *Deltion. Hellenike Cheirourgike Hetaireia* and from 1954 to 2010 as *Hellenike Cheirourgike*. Since 2010 it has been publishing by Springer under the title *Hellenic Journal of Surgery*.
- *Soteria* is a journal which first published in 1940 but since then has changed many titles and interrupted and republished many times as well. Specifically, it was circulated as Soteria during the periods:
    - 1940 – 1941
    - 1946 – 1948
    - 1950 – 1958
    - 1979 – 1982
- It was published under the title *Hellenike Pneumonologike & Phymatiologike Epitheoresis* for the periods
    - 1960 – 1968
    - 1971 – 1972

    - 1974 – 1976

- As *Thorax* it circulated only for the year 1978
- From 1983 the journal has been published under the name *Hellenike Pneumonologike Epitheoresis.*
- According to information presented in journal's website *Ekistics* was first issued in October 1955 as *Tropical Housing & Planning Monthly Bulletin.* In 1956 was re-named as *Tropical Housing & Planning Monthly Information Bulletin*. In October 1957 became *Ekistics: Housing & Planning Abstracts*. In May 1959, it came out as *Ekistics: Abstracts of the Problems and Science of Human Settlements*. in January 1961, the journal appeared as *Ekistics: Reviews on the Problems and Science of Human Settlements* and finally in January 1965 and for the last thirty years, it has been published as *Ekistics: The Problems and Science of Human Settlements.*

However, as Table 4.3 and Table 4.4 show there are journals that changed title but their publication has regularly been continued until present such as *Deltion tes A' Paidiatrikes Klinikes tou Panepistemiou Athenon* or journals which have not changed title and were regularly published until present, but they are not included in PubMed such as *Stoma* and *Stomatologia.*

The details about the title changes are different according to the sources checked. The NLM record appears to be based on the Union Journals Catalog of the National Documentation Center except for *Thorax* which is included in the Union Catalog but not in the NLM records. However, there are differences between Union Catalog and the NLM records for the dates. For example, the NLM record indicates that *Soteria* finished in 1959 but Union Catalog shows holdings to 1952. Rigatos, Apaki, and Samios (1988) mentions *Soteria, Hellenike Pneumonologike & Phymatiologike Epitheoresis, Thorax* and *Hellenike Pneumonologike Epitheoresis* and gives a fuller account of the name changes and dates.

Journals	**Other titles**	**Publishers (CP: Commercial Publishers; LS: Learned Societies)**	**Publication Years (PubMed Chronological coverage)**	**Citations**
Anticancer research		LS	1981- (1981- 2015)	17670 (3864 free full text via publisher's website, 167 in PMC)
Cancer genomics and proteomics		LS	2004- (2007-2015)	269 (92 free full text via publisher's website, 18 in PMC)
Cancer therapy		LS	2003- (2003-2009)	17 in PMC
Ekistics : the problems and science of human settlements		LS	1965- (1976-1991)	51
Epitheorese klinikes farmakologias kai farmakokinetikes (international ed.)	Epitheorese klinikes farmakologias kai farmakokinetikes (Greek ed.; 1983) No citation available Review of clinical pharmacology and pharmacokinetics	CP	1987-	No citation available

Experimental and therapeutic medicine		CP	2010- (2010-2015)	2251 in PMC
Greek economic review		LS	1979- (1980)	2
Hellenic journal of cardiology	Hellēnikē kardiologikē epitheōrēsis (Greek ed.; 1960-) No citation available	LS	2002- (2005-2015)	952 (942 free full text via publisher's website)
Hepato-gastroenterology		CP	1980- (1980-2015)	9881 (4in PMC)
Hippokratia		LS	1997- (2006-2014)	655 (628 in PMC)
Hormones		LS	2002- (2005-2015)	576 (492 free full text via publisher's website; 2 in PMC)
In vivo		CP	1987- (1987-2015)	3223(856 free full text via publisher's website; 45 in PMC)
International journal of molecular medicine		CP	1998- (1998-2015)	4875 (317 in PMC)

International journal of oncology		CP	1992- (2002-2015)	8689 (557 in PMC)
Journal of B.U.O.N.	JBUON from 2012 published only electronic form	LS	1996- (2002-2015)	1639 (1 free full text via publisher's website)
Journal of musculoskeletal and neuronal interactions		LS	2000- (2004-2015)	852 (814 free full via publisher's website; 31 in PMC)
Molecular medicine reports		CP	2008- (2008-2015)	3981 (476 in PMC)
Oncology letters		CP	2010- (2010-2015)	2949 (2949 in PMC)
Oncology reports		CP	1994- (1994-2015)	8521 (351 in PMC)

Table 4.2 English – language Greek biomedical journals retrieved from PubMed

Journals	**Other titles**	**Publishers (CP: Commercial Publishers; LS: Learned Societies)**	**Publication Years (PubMed Chronological Coverage)**	**Citations**
Archeion iatrikon epistemon		CP	1945-196? (1960-1961)	4
Deltion Hellenikes Mikrobiologikes kai Hygieinologikes Hetaireias	New title *Deltion Hellenikes Mikrobiologikes Hetaireias;Acta Microbiologica Hellenica* (Greek articles with English summaries; 1973-) No citation available	LS	1955-1972 (1956-1964)	97
Deltion tes Paidiatrikes Klinikes tou Panepistemiou Athenon	Previous titles: *Archeia Paidiatrikes Klinikes* New title: *Deltion tes A' Paidiatrikes Klinikes tou Panepistemiou Athenon*	LS	1954- (1959-1962)	4
Deltion. Iatrocheirourgikē Hetaireia Athēnōn		LS	1931?-1982 (1953)	16
Ēpeirōtikē hestia		UNKNOWN	1952?- (1975)	1 (Italian by Greek author)

Epopteia		CP	1976-1994 (1977)	1
Hellenis adelphe	New title *Nosileftiki*	LS	196-?-1978 (1965-1976)	120
Materia medica greca	Previous title *Minerva medica greca* (1973-1975) No citation available	CP	1976- (1981)	7
Odontostomatologike proodos		LS	1947- (1961-1990)	741
Orthodontike epitheorese	Hellenic orthodontike epitheorese (Articles in Greek and English; 1998 -) No citation available	LS	1988-1997 (1988-1990)	30
Stoma		LS	1969- (1969-1971)	43
Stomatologia	Since 2013 it has been published on in electronic form	LS	1938- (1989-1990)	5
To Helliniko periodiko gia stomatiki and gnathoprosopiki chirourgiki		LS	1986- (1986-1990)	142

Table 4.3 Greek – language biomedical journals retrieved from PubMed

Journals	**Other titles**	**Languages**	**Publishers (CP: Commercial Publishers; LS: Learned Societies)**	**Publication Years**	**Citations**
Akademaike iatrike		Greek, English, French	CP	1929-1976 (1960-1961)	2
Archeia iatrikōn hetaireōn	New title *Archeia Hellēnikēs iatrikēs* No citation available	Greek articles with English summaries	LS	1975-1983 (1981)	1
Archives de l'Institut Pasteur hellénique		1923-1931 articles in French, since 1955- articles in Greek or French	LS	1923- (1961-1963)	32 (31 in French; 1 in Greek)
Dōdōnē		Articles in Greek, English, French, German	LS	1972- (1986)	1 in German
Epetēris Hetaireias Stereoelladikōn Meletōn		Greek articles with French summaries	LS	1965-1990 (1974-1975)	1
Epitheorese koinonikon ereunon		Greek articles with summa-ries in English	LS	1969- (1978-1979)	4
Hellenic journal of nuclear medicine		The English version includes articles in English and separate Greek section The Greek edition includes Greek summaries of the articles of English version	LS	2004- (2004-2015)	632 (567 in English & 65 in Greek ;104 free full text via publisher's website)
Hellenic journal of surgery	Previous title *Hellēnikē cheirourgikē*	Articles in English with Greek summaries	LS	2010-	No citation available
Hellenika stomatologika chronika	*Stomatologica chronica*	Greek articles with English summaries, titles, Table of contents and bibliographical references until the end of 2011; since 2012 the articles are in Greek and English	LS	1970- (1989-1990)	432 (79 include abstracts) articles only Greek modern (1989-1990)

Hellēnikē cheirourgikē	Parallel title: *Acta chirurgica hellenica* New title: *Hellenic Journal of Surgery*	Greek articles with English summaries Includes articles of Greek authors in Swedish	LS	1954-2009 (1960-1964)	205 from (111 Swedish, 90 Greek modern, 2 English)
Hellenike iatrike		Greek articles with English summaries and bibliographical references, Tables of contents in English, since 2012 it has been only in electronic form and articles in English language have been also accepted	LS	1927- (1960-1964)	120 (119 Greek, 1 German)
Hippocrates		Articles in Greek or English	LS	1972- (1988)	1
Nosēleutikē		Articles in Greek modern, English	LS	1979- (1979-1992)	110 (109 Greek, 57 of them with abstracts)
Nosokomeiaka chronika	Hospital chronicles (English ed.; 2006 -) No citation available	Articles in Greek modern with English summaries	LS	1946- (1961-1962)	4
Odontiatriki	Scientific dental review	Articles in Greek modern, Table of contents and summaries in English	CP	1968- (1968-1976)	263 (259 in Greek)
Paediatriki	Previous titles: *Deltion Hellenikes Paidiatrikes Hetaireia;* *Archeia Hellenikes, Paidiatrikes Hetaireias (*Greek articles with English or French summaries; 1947-1973) No citation available	Greek articles with English summaries and English Table of contents	LS	1974- (2008)	1 in PMC

Platon		Articles in Greek, English, French, German, Italian, Spanish	CP	1949- (1971-1972)	2
Pneumonologike kai phymatiologike epitheoresis	Hellenic review of tuberculosis and respiratory diseases; Acta pneumo-tuberculosea Hellenica; Pneumologikē kai fumatologikē epitheōrēsis	Articles in Greek modern, summaries in English, French and Greek	LS	1961-1962	2 (1in Greek & 1 in German from Greek author)
Psychiatrikē = Psychiatriki		Articles in Greek and English with English or Greek summaries respectively	LS	1990- (2007-2015)	245 (171 greek modern, 109 English , some in Greek and English)

Table 4.4 Bi-lingual biomedical journals retrieved from PubMed

4.1.2 PubMed Central Journals

It is worth mentioning some details of the two journal titles *Hippokratia* and *Cancer therapy* which may be indicative of the new inclusion policy of the National Library of Medicine. Neither was indexed by MEDLINE, but available at least partially via PubMed Central.

Hippokratia is published in Greece but its official language is English and although it was not a part of MEDLINE was provided via PUBMED CENTRAL.

Cancer therapy was another journal covered by PubMed Central but in a different way than Hippokratia. Only seventeen author manuscripts were freely available, as we can see in Table 4.2, and these were available due to the NIH Public Access Policy.

As depicted in Fig. 4.3 the Greek publishers and PUBMED CENTRAL collaborate in order the papers to be openly accessible as the 9% of the citations of currently indexed journals are available via PUBMED CENTRAL. However, publishers (8%) also prefer to provide open access of articles via their website. Nevertheless, the percentage of inaccessible articles remain high.

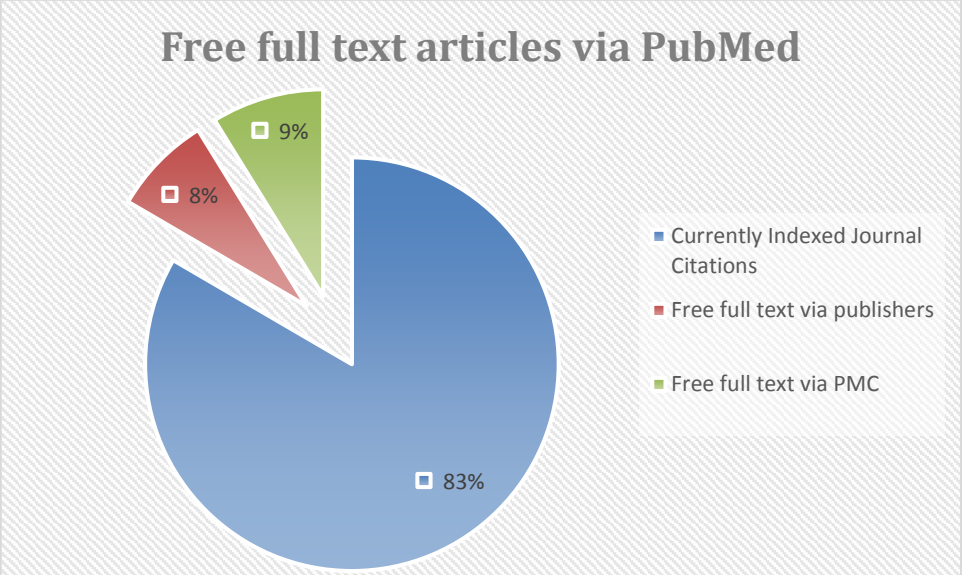

Figure 4.3 *Free full text articles accessible via PubMed*

4.1.3 Summary Conclusions

By observing the bibliographic data of the journals different categories can be identified. There are journals which have been publishing until today under the same title. Other journals changed title at least once, although the data from different catalogues vary in the dates provided. But the fact is that the majority of journals continued to publish. The survey indicated that only eight journals had a short life. Although ten journals changed titles, they remained active. A representative example of journal bibliographic changes because of the political situation is the *Soteria* journal.

The bibliographic survey shows that the number of NLM currently indexed journals has increased from ten to eighteen journal titles. Ten journals belong to the category of common journals (for phase one and phase two). This fact may be indicative of their quality. Thirty titles were added in the second phase. Progress in terms of publication is limited to English language information sources. But also, surprisingly, there are more "historic" non-currently indexed journals, resulting from changes in the inclusion criteria by the NLM catalogue to cover non-biomedical journals (Fig. 4.4). Although some of the NIH-funded manuscripts were published in "out of the scope" National Library of Medicine journals the specific articles were included in PUBMED. So journals which do not belong to the subject coverage of NLM collection are included, to some extent in the NLM catalogue. Some journal titles of this category as presented in Table one are

- Diotima
- Dōdōnē
- Epopteia

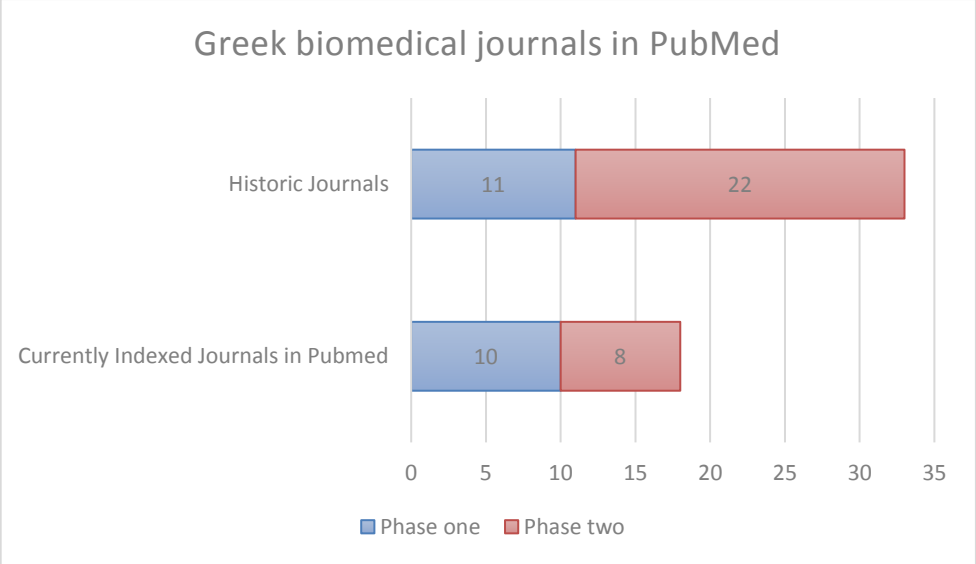

Figure 4.4 *Greek biomedical journal inclusion in PubMed*

4.2 Science Citation Index Survey

The following Table (Table 4.5) provides data on the journal titles included in Science Citation Index and Journal Citation Reports.

Journal titles	Phase 1	Phase 2	Common titles	Currently indexed	Journal Citation Reports	OPEN ACCESS/HYBRID OPEN ACCESS
International journal of oncology			x	x	2.399(2011)	HYBRID OPEN ACCESS
Oncology reports			x	x	1.835(2011)	HYBRID OPEN ACCESS
Anticancer research			x	x	1.725(2011)	HYBRID OPEN ACCESS
In vivo			x	x	1.264(2011)	HYBRID OPEN ACCESS
Hellenic journal of nuclear medicine		x		x	0.805(2011)	HYBRID OPEN ACCESS
Gene therapy & molecular biology		x		x	0.724(2011)	OPEN ACCESS
Journal of biological research		x		x	0.619(2011)	OPEN ACCESS
Global NEST journal		x		x	0.536(2011)	NON-BIOMEDICAL JOURNAL
Journal of BUON		x		x	0.607(2011)	OPEN ACCESS
Molecular medicine reports		x		x	0.418(2011)	HYBRID OPEN ACCESS
Journal of the Hellenic Veterinary Medical Society		x		x		OPEN ACCESS

Table 4.5 Science Citation Index Journals

4.2.1 Phase one and Phase two

As far as the Science Citation Index database is concerned in the first phase only four English – language journals published in Greece are indexed.

In phase two, as we can see in Table 4.5, there are 11 journal titles published in Greece and all of them are English – language journals.

4.2.2 Summary Conclusions

As it is illustrated in Fig. 4.5 the number of currently indexed journals in Science Citation Index is increased from four journals in first phase to eleven in the second phase. Additionally, all have or will have an Impact Factor. None of the journal titles included in the first phase was excluded in the second phase. However, we cannot ignore the fact that only English language journals are included.

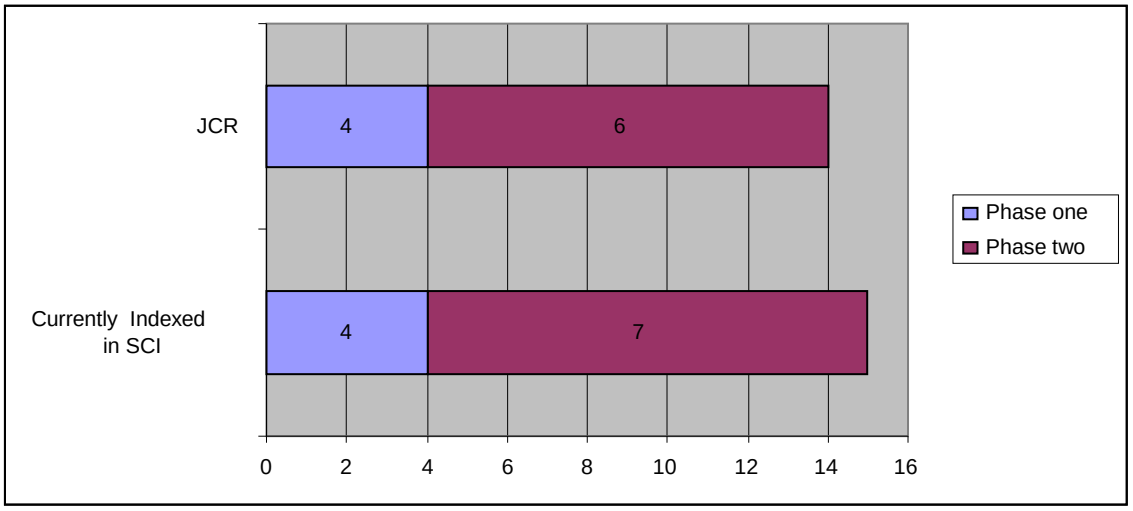

Figure 4.5 *Greek biomedical journals in Science Citation Index*

4.3 Open Access Sources: DOAJ, BioMed Central and Google

4.3.1 Open Access Survey

DOAJ

Table 4.6 illustrates the journals included in DOAJ for the respective phases.

Journal titles	Phase 1	Phase 2	Common titles	Currently indexed	Journal Citation Reports
Hellenic orthodontic review			x	x	
Journal of biological research			x	x	0.619(2011)
Inquiries in sport & physical education			x	x	
Hellenic journal of cardiology			x	x	
Journal of musculoskeletal and neuronal interactions			x	x	
Gastric and breast cancer	X				
Archives of hellenic medicine		x		x	
Hospital chronicles		x		x	
International journal of caring sciences		x		x	
To Vima tou Asklipiou		x		x	
Rhythmos		x		x	
Pneumon		x		x	

Table 4.6 DOAJ journals

4.3.2 Phase one and Phase two Comparisons

As it is illustrated in Fig. 4.6 six journals were included in the Directory of Open Access Journals (DOAJ) in 2006.

In 2011 six additional journals of Greek publishers were listed in the Directory of Open Access. However the total number of journal titles is eleven because journal "*Gastric and Breast Cancer*" was excluded in the second phase.

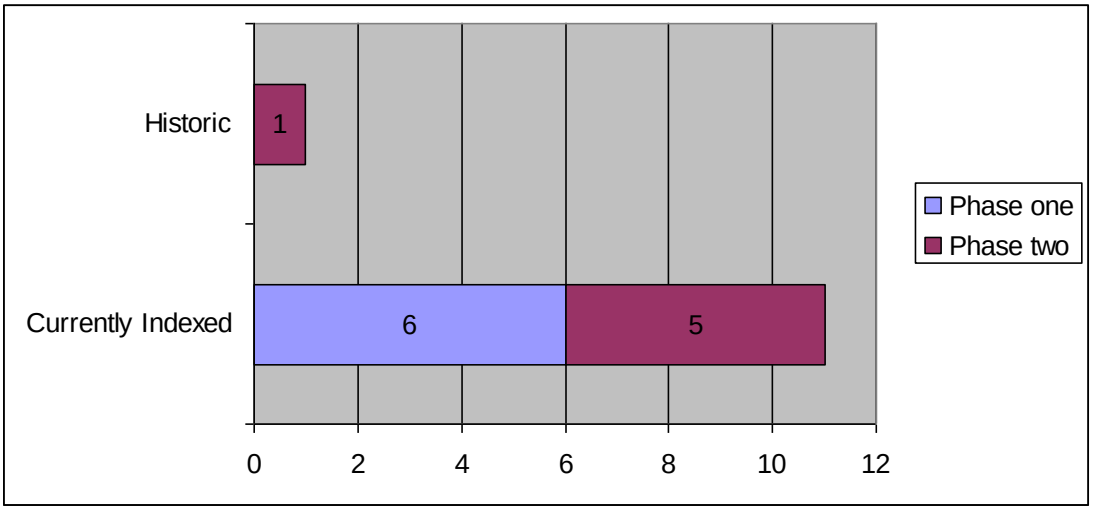

Figure 4.6 *Greek biomedical journals in DOAJ*

BiomedCentral

Journal titles	Phase 1	Phase 2	Common titles	Currently indexed	Journal Citation Reports	OPEN ACCESS/HYBRID OPEN ACCESS
Annals of general psychiatry			X	x		OPEN ACCESS
Scoliosis			X	x		OPEN ACCESS
Thyroid research		x		x		OPEN ACCESS

Table 4.7 BioMed journals

As far as the BiomedCentral journals (Table 4.7) concerned, the results include these titles for which the editorial board is Greek. Annals of General Psychiatry –Aristotle University of Thessaloniki and Scoliosis—"Thriasion" General Hospital were identified in both phases. The journal Thyroid Research –Athens University School of Medicine was added in the second phase.

Google search engine

Journal titles	Phase 1	Phase 2	Common titles	PubMed	DOAJ	Currently indexed	Journal Citation Reports	OPEN ACCESS/HYBRID OPEN ACCESS
Archives of pathology	x							NON- OPEN ACCESS SINCE 2011
Acta microbiologica hellenica			x			x		HYBRID OPEN ACCESS
Applied clinical microbiology and laboratory			x			x		OPEN ACCESS
Forum of clinical oncology			x			x		OPEN ACCESS
Hellenic urology			x			x		
Hippokratia			x	x		x		OPEN ACCESS
Archives of hellenic medicine			x		x	x		OPEN ACCESS
Hormones			x	x		x		OPEN ACCESS
In vivo			x	x		x	1.264(2011)	HYBRID OPEN ACCESS
To Vima tou Asklipiou		x			x	x		OPEN ACCESS
Nosileftiki			x			x		OPEN ACCESS
Pneumon			x		x	x		OPEN ACCESS
Paediatriki of Northern Greece			x			x		NON-OPEN ACCESS

Table 4.8 Google journals

Twelve journals were freely available via the Google search engine (Table 4.8). However one of them, the A*rchives of pathology* is not freely available any more.
In the second phase twelve journals were found to be open access because *To Vima tou Asklipiou* was added.

4.3.3 Summary Conclusions

Six new journals were added in DOAJ from the beginning of 2007 to 2011. As far as their language is concerned there are journals from three categories: Greek language journals such as *To Vima tou Asklipiou* and the *Rythmos*; bi-language journals such as *Pneumon*, and English language journals such as *International Journal of Caring Sciences*.

The common Biomed Central journals in both phases have the same characteristic the editor-in-chief is a Greek scientist, based in Greece. Additionally, although, Greece was not a member of BioMed Central at the time, Greek biomedical scientists express their interest and participate in the editorial board of its journals.

Although, the aim of this part of survey was the detection of Greek biomedical open access journals not included in any database, the survey results show that the situation for the electronic biomedical journals is unsTable. We can see that some of the Greek journals which were only available via a Google search in 2006 are now recorded in international databases. For example, the *Archives of Hellenic Medicine* which belongs to DOAJ now and *Hippokratia* is included in PUMED CENTRAL. However there are journal titles such as *Hormones* and *In vivo* which were covered by PUBMED from the first phase of google engine research.

4.4 Supplementary Survey in ResearchGate, LinkedIn and Google Blog Search

ResearchGate enables the researchers to detect their institution status and be aware of the status of staff according to Departments. Meanwhile, database structure facilitates the retrieval about the participation of biomedical scientists as members affiliated to

the University of Athens in ResearchGate. Additionally, the indicator of "Total Impact Points" evaluates the status of the institution among the world rank of institutions according to the status of journals in which the researchers publish. By exploring the publishing activity, the impact points and the member numbers of biomedical departments to the overall of the members and the rest of the departments of the National and Kapodistrian of Athens the research results showed that 754 members of the 1804 scientists who work in University Departments are biomedical scientists. Their writing activity is evaluated to 2897 in comparison with 4114 of the total publishing activity of the University. While the impact points of the biomedical departments were 8197 to the total of 10749.

LinkedIn has a different structure and function. It provides information about the followers of an institute and in each follower's profile can be detected information related to their writing and scientific knowledge. Consequently another research methodology should be used. So the survey showed that the University of Athens has 3222 followers. The research could have been conducted in different ways for example by typing the phrase "University of Athens" in company field of advanced search. However, the results would not be objective because scientists from other Universities would be included such as the Harokopio University of Athens.
As far as the Google blog search concerned a simple research on "National and Kapodistrian University of Athens Medical School" presented 4.290 results included blogs and announcements. And searching for the "National and Kapodistrian University of Athens" gave 21.300 results.

All the above mentioned data may provide useful information for institutional rankings and countries rankings. Conducting similar surveys in other Greek Universities the progress and the deficiencies would become visible and the comparison would help the two Universities to improve. In particular, by comparing the impact points and the member numbers of biomedical departments of the National and Kapodistrian University of Athens with the impact points and the member numbers of biomedical departments of the Aristotelian University of Thessaloniki the academic and the research activity could be evaluated. Thelwall and Kousha (2015) highlight the importance of acceptance of ResearchGate from the Universities as University Ranking Schemes and the acceptance of this role by ResearchGate as well.

4.4.1 Summary Conclusions

The research in social networks showed that the members of National and Kapodistrian University of Athens actively participate in these. Specifically, as far as ResearchGate is concerned the biomedical scientists of the University of Athens, making up less than half of the total number of staff through the number of their publications and the impact points contribute much more to the general status of the University than other Departments. Additionally, participation in LinkedIn and the Google blogs may be an indication that the scientists associated with University of Athens are familiar with social networking as a means of informal scholarly communication.

4.5 Publishing Activity of Greek Scientists Survey

4.5.1 Introduction

The contribution of the Greek biomedical scientists to the national research output could not be estimated without an indicator of the productivity of the Greek scientists in general. Consequently, the presentations of the results retrieved by Science Citation Index in both phases provide information which enables us to conclude "how important" the biomedical scientists are to the Greek research profile.

In addition, as one of the aims of this PhD thesis was to study the attitudes of the Greek biomedical scientists towards open access publishing, research in PubMed and BioMedCentral for papers by Greek biomedical scientists about open access publishing was considered to be imperative as well in order to show how informed they may be or what their opinions are on this topic.

So, the following sections present the results retrieved by Science Citation Index, PubMed and BioMedCentral.

4.5.2 Phase one and Phase two

According to the Table 4.9 in phase one (1970-2007) 128600 papers indexed in SCI were written by all Greek scientists and almost the one third of them (40970 papers) were published by Greek biomedical scientists. In phase two (1970-2011) 185124 papers were published by Greek scientists and 66159 papers were written by Greek biomedical scientists. The above research results could be indicative of the tendency of Greek writing activity and the contribution of Greek biomedical publishing in the national research output. As we can see in the Fig. 4.7 the writing activity from 2000 to 2007 rose significantly while during the period from 2008 to 2011 there was a slight decrease. Furthermore, the facts and figures show that Greek scientists do write in English to transmit their knowledge or exchange ideas.

Research time periods	**Total Number of Greek articles/Total Number of English language Greek articles**	**Total Number of Greek biomedical articles /Total Number of English Greek biomedical articles**
1970-1979	4590/ 4129	1218/ 1092
1980-1999	54136/ 52901	12243/ 10377
2000-2007	69874/ 69682	27509/ 25956
2008-2011	56524/ 56348	25189/ 24995

Table 4.9 Greek publishing activity presented in Science Citation Index

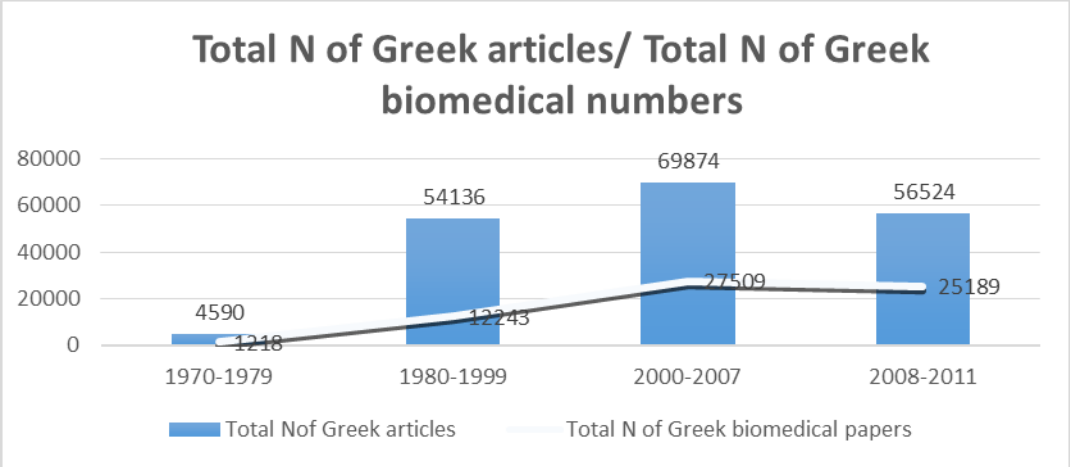

Figure 4.7 *Greek articles in Science Citation Index*

Keywords searching in PubMed and BioMed Central

The keywords survey in both databases gave zero results in phase one. In phase two, a small number of articles were found by typing keywords combinations with Greece, in particular, eight articles in PubMed and three articles in BioMed Central. These articles do not refer to the Greek biomedical journals but to open access journals and open access sources on specific topics.

4.5.3 Summary Conclusions

The data show publications, from all Greek scientists, added into the Web of Science. In addition dual language journals offer the opportunity for Greek language articles to be included as well. The number of 183060 articles (second phase period from 1970 to 2011) compared to 126712 articles retrieved for the period of the first phase from 1970 to 2007 suggests that Greek scientists are becoming more and more active researchers and writers and that the language obstacle is not serious.

As far as the PubMed and BioMed Central keyword search on open access is concerned, the results indicate a little more interest in open access as a topic of discussion in phase two.

4.5.4 Comparison of Bibliographic Results across the Two Phases

The aim of the bibliometric research was to identify any changes which might have happened to the representation of Greek biomedical journals in international databases across the two phases, at the beginning of the survey (2006) and the end of it (2011). However, the research results in PubMed and DOAJ provided different options for assessing survey trends, and emerging patterns. As far as PubMed was concerned the changes in inclusion policy changed the evaluation criteria as well. This was because, in the second phase, six social sciences journals published in Greece were added as they published biomedical papers. On the other hand, in the first phase there were only two social sciences journals. Certainly, these titles are not new titles in PubMed, as they had already been indexed in OLDMEDLINE.

In addition, in the first phase in DOAJ the journal *Inquiries in sport & physical education* seems to be a non-biomedical journal but it belongs to the category of sport medicine and it was retrieved as "biomedical journals". In Science Citation Index the bibliometric survey conducted in order to detect the number of Greek journals published in Greece which had an Impact Factor Indicator. Consequently non-biomedical journals would be represented as well.

From the Table 4.10 we can see that the representation of Greek biomedical journals has increased in all databases. The number of total journal titles retrieved was seventy-one and of these sixty journals were biomedical, while, some journal titles which are indexed in a variety of databases. The thirteen journal titles highlighted in green color can be accessible via more than one database. Specifically, the journals *International Journal of Oncology, Oncology Reports, Anticancer Research, Hellenic Journal of Nuclear Medicine, Journal of BUON and Molecular Medicine Reports* were retrieved in PubMed and Science Citation Index. The journal title *In Vivo* represented in PubMed, Science Citation Index and Google. *The Hellenic Journal of Cardiology, Journal of Musculoskeletal and Neuronal Interactions, Hospital Chronicles* are presented in PubMed and DOAJ. However, the *Archives of Hellenic Medicine* is accessible via PubMed, DOAJ and Google. *Archives of the Hellenic Medical Societies. Hippokratia, Hormones* and *Nosileftiki* were detected in PubMed

and Google. *Journal of Biological Research* is an open access journal which has an Impact Factor indicator as it was found both in DOAJ and Science Citation Index. *Vima tou Asclipiou* and *Pneumon* are open access journals accessible via DOAJ and Google.

PUBMED	SCI	DOAJ	BIOMED CENTRAL	GOOGLE
Oncology reports	International journal of oncology	Hellenic orthodontic review	Annals of general psychiatry	Archives of pathology
Archives of the Hellenic medical societies	Oncology reports	Journal of biological research	Scoliosis	Acta microbiologica hellenica
Stoma	Anticancer research	Inquiries in sport & physical education	Thyroid research	Applied clinical microbiology and laboratory
Epitheorese koinonikon ereunon	In vivo	Hellenic journal of cardiology		Forum of clinical oncology
Platon	Hellenic journal of nuclear medicine	Journal of musculoskeletal and neuronal interactions		Hellenic urology
Hellenike iatrike	Gene therapy & molecular biology	Gastric and breast cancer		Hippokratia
Hellenic journal of cardiology	Journal of biological research	Archives of hellenic medicine		Archives of hellenic medicine
In vivo	Global NEST journal	Hospital chronicles		Hormones
To Helliniko periodiko gia stomatiki and gnathoprosopiki chirourgiki	Journal of BUON	International journal of caring sciences		In vivo
Anticancer research	Molecular medicine reports	To Vima tou Asklipiou		To Vima tou Asklipiou
International journal of oncology	Journal of the Hellenic Veterinary Medical Society	Rhythmos		Nosileftiki
Hellenic journal of nuclear medicine		Pneumon		Pneumon

Journal of musculoskeletal and neuronal interactions				Paediatriki of Northern Greece
International journal of molecular medicine				
Cancer genomics and proteomics				
Hormones				
Archeion iatrikon epistemon				
Acta chirurgica hellenica				
Hippocrates				
Epitheorese klinikes farmakologias kai farmakokinetikes				
Greek economic review				
Experimental and therapeutic medicine				
Oncology letters				
Nosēleutikē				
Paediatriki				
Diotima				
Dōdōnē				
Epopteia				
Hellenika stomatologika chronika.				
Stomatologia				
Odontiatrike				
Hellenis adelphe				
Pneumonologike kai phymatiologike epitheoresis				

Ekistics; reviews on the problems and science of human settlements				
Deltion Hellenikes Mikrobiologikes kai Hygieinologikes Hetaireias				
Deltion tes Paidiatrikes Klinikes tou Panepistemiou Athenon				
Odontostomatologike proodos				
Akademaike iatrike				
Nosokomeiaka chronika				
Archives de l'Institut Pasteur hellénique				
Materia medica greca				
Molecular medicine reports				
Hippokratia				
Cancer therapy				
Hepato –gastroenterology				
Journal of B.U.ON.: official journal of the Balkan Union of Oncology				
Psychiatrikē = Psychiatriki				
Ēpeirōtikē hestia				
Epetēris Hetaireias Stereoelladikōn Meletōn				
Deltion. Iatrocheirourgikē Hetaireia Athēnōn				
Orthodontikē epitheōrēsē				

Table 4.10 Greek biomedical journals retrieved from the databases across the two phases

In the first phase (see Table 4.11) the total number of Greek journals was thirty-six and of these there were the thirty-two biomedical journals. The journals highlighted in Green color the *International Journal of Oncology, Oncology Reports, Anticancer Research and In Vivo* which were indexed in Science Citation Index were included in PubMed as well. The *Hellenic Journal of Cardiology* and *Journal of Musculoskeletal and Neuronal Interaction* were common in PubMed and DOAJ and three titles *Archives of Hellenic Medicine, Hormones* and *In Vivo* were retrieved in PubMed and Google as well. It must be clear that the journal *Archives of Hellenic Medicine* continues the journal indexed in PubMed.

In the second phase (see Table 4.12) forty-two new Greek journal titles were added in the databases and of these there were thirty-five biomedical journals. Two journals, *Journal of BUON* and *Molecular Medicine Reports,* were indexed in PubMed and Science Citation Index as well. The journal *To Vima tou Ascklipiou* was retrieved in DOAJ and Google as well.

PubMed Phase ONE	SCI	DOAJ	BIOMED CENTRAL	GOOGLE
Oncology reports	International journal of oncology	Hellenic orthodontic review	Annals of general psychiatry	Archives of pathology
Archives of the Hellenic medical societies	Oncology reports	Journal of biological research	Scoliosis	Acta microbiologica hellenica
Stoma	Anticancer research	Inquiries in sport & physical education		Applied clinical microbiology and laboratory
Epitheorese koinonikon ereunon	In vivo	Hellenic journal of cardiology		Forum of clinical oncology
Platon		Journal of musculoskeletal and neuronal interactions		Hellenic urology
Hellenike iatrike		Gastric and breast cancer		Hippokratia
Hellenic journal of cardiology				Archives of hellenic medicine
In vivo				Hormones
To Helliniko periodiko gia stomatiki and gnathoprosopiki chirourgiki				In vivo
Anticancer research				Nosileftiki
International journal of oncology				Pneumon
Hellenic journal of nuclear medicine				Paediatriki fo Northern Greece
Journal of musculoskeletal and neuronal interactions				

International journal of molecular medicine				
Cancer genomics and proteomics				
Hormones				
Archeion iatrikon epistemon				
Acta chirurgica hellenica				
Hippocrates				
Epitheorese klinikes farmakologias kai farmakokinetikes				
Greek economic review				

Table 4.11 Greek biomedical journals retrieved in phase one

PUBMED PHASE TWO	SCI	DOAJ	BIOMED CENTRAL	GOOGLE
Experimental and therapeutic medicine	Hellenic journal of nuclear medicine	Archives of hellenic medicine	Thyroid research	To Vima tou Asklipiou
Oncology letters	Gene therapy & molecular biology	Hospital chronicles		
Nosēleutikē	Journal of biological research	International journal of caring sciences		
Paediatriki	Global NEST journal	To Vima tou Asklipiou		
Diotima	Journal of BUON	Rhythmos		
Dōdōnē	Molecular medicine reports	Pneumon		
Epopteia	Journal of the Hellenic Veterinary Medical Society			
Hellenika stomatologika chronika.				
Stomatologia				
Odontiatrike				
Hellenis adelphe				
Pneumonologike kai phymatiologike epitheoresis				
Ekistics; reviews on the problems and science of human settlements				
Deltion Hellenikes Mikrobiologikes kai Hygieinologikes Hetaireias				

Deltion tes Paidiatrikes Klinikes tou Panepistemiou Athenon				
Odontostomatologike proodos				
Akademaike iatrike				
Nosokomeiaka chronika				
Archives de l'Institut Pasteur hellénique				
Materia medica greca				
Molecular medicine reports				
Hippokratia				
Cancer therapy				
Hepato –gastroenterology				
Journal of B.U.ON. : official journal of the Balkan Union of Oncology				
Psychiatrikē = Psychiatriki				
Ēpeirōtikē hestia				
Epetēris Hetaireias Stereoelladikōn Meletōn				
Deltion. Iatrocheirourgikē Hetaireia Athēnōn				
Orthodontikē epitheōrēsē				

Table 4.12 Greek biomedical journals retrieved in phase two

4.6 Questionnaire Survey

4.6.1 Phase one

In phase one the number of distributed questionnaires was 70. Although the response rate was 62/70, there were only 59 usable responses (effective overall response rate of 84.3%). Forty – three physicians (72. 9%), ten nurses (10. 9%) and six dentists (10. 2%) responded to the survey (Q1). The responses were therefore dominated by physicians. The response rate could be characterized generally as satisfactory.
The presentation in this section will highlight some of the key findings from the survey, as indicated from questions from all three sections of the survey (see frequency Tables in appendix 4.1).

The **first part of the questionnaire** was used by the respondents to rate their publishing activity. The majority of the respondents (71.2%) answered that they had published an article in a clinical journal within the last 18 months. Participants selected a journal for publication according to the criteria of high prestige (journal well known, high circulation) and great similarity to your scientific interests- responses were equally rated at 54.2 %- followed by high impact factor at 45.8%. The majority of the respondents (61.0%) had made their work accessible via the Internet, and almost the rest of the participants (20.3%) coped with the problem of "limited free time" for publishing.

The **second part of the questionnaire** assessed the awareness of the participants on open access publishing issues. The questions could be further categorized in two types according to the knowledge level which participants must possess for answering them: the theoretical ones which can be answered by the participants who just gained some information through their general awareness and the practical ones which cannot be answered without their having obtained experience of publishing in open access journals. Both of them function as complementary to each other. Moreover, the second category of answers confirms responses to the more theoretical questions.

At the beginning of the second part a minority of respondents (42.4%) claimed familiarity about open access publishing in principle. The majority of respondents (64.4%) was not aware of publishing in open access journals, while, the respondents (35.6%) who were aware, they should be also aware about who pays for the publication fees too. The response rate for the following questions was low as well as they are illustrated in Table 4.13

If so, who paid the publication fee? Q22 – Q26	**Responses**
Scientific Company	6
Institution	2
Author (yourself)	7
All of them (mixture)	6
Other (please specify):	0

Table 4.13 Sponsor of open access publication – phase one

Participants were also asked to express their opinions on significant statements about open access journals. Table 4.14 (Q28 – Q36) depicts the different statements and the percentages of the responses. The general picture of unawareness was confirmed by the answers to these questions. Most of the participants (44.1%) felt unfamiliar with publishing in open access journals or were unsure (18.6%). Consequently, the high percentages of "Don't Know/No opinion" answers in the following questions had a logical explanation. This pattern of response suggested that as the participants had not tried to publish in an open access journal, they did not know, or were unsure that the charges for the publication in open access journals may be paid by the author (55.9%). They did not have an opinion about the possibility of funding in order to be able to publish in open access journals (62.7%). Additionally, they did not know about copyright protection in open access journals (52.5%) and the quality of peer review process (42.6%).

Please indicate your opinion on the following statements Q28 – Q36	**Yes (%)**	**No (%)**	**Don't Know (%)**	**Null (%)**
I am not familiar with open access journals	**44.1**	35.6	18.6	1.7
Open access journals tend to have low impact factor	23.7	28.8	**39.0**	8.5
Usually open access journals are not known	27.1	**37.3**	27.1	8.5
Open access journals are estimated as low readership journals	16.9	**35.6**	**35.6**	11.9
Publication in open access journals suffers from lack of funding	11.9	13.6	**62.7**	11.9
My Institution does not encourage me to publish in open access journals	15.3	33.9	**40.7**	10.2
Author charges prevent me from publishing in open access journals	13.6	22.0	**55.9**	8.5
I am uncertain about the copyright restrictions of open access journals	18.6	18.6	**52.5**	10.2
I am uncertain about the quality of review process for open access journals	16.9	30.5	**42.6**	10.2
Notes: Percentages based on n=59 respondents in total				

Table 4.14 Opinions on the statements about open access journals (phase one)

The **third section of the questionnaire** was used in order to rate the value of open access journals to knowledge dissemination through use by readership. First of all, the participants should express their opinion about the importance of open access publishing as a means for wider information dissemination. The majority of the respondents (89.8%) considered open access publishing as a means for wider information dissemination. However, the percentage of the Greek biomedical scientists who were aware of reading open access journals was lower (61.0%). The main means that contributed to the respondents' awareness about the existence of open access journals were: colleagues (40.7%), this specific questionnaire (33.9%)

and their institution (30.5%). Many participants (45.8%) considered the detection of open access information as easy, but the percentage of participants (33.9%) who easily found information on Greek biomedical research in open access journals was lower, and more (35.6%) considered finding Greek biomedical research in open access journals as difficult. The identification of the library's role in providing open access journals was also explored. The difference between the informed participants and the uninformed one was slight. Most respondents (40.7%) answered that the library provided access to open access journals, and 39.0% of the respondents were ignorant about the role of the library.

Data analysis aimed to check whether there were any significant associations, as a first stage to exploring some correlations. The literature review had indicated that researchers might prefer, for career reasons, to publish in high impact (and high prestige) journals, and that open access journals without a high impact factor would be less attractive, although that has to be balanced against the likelihood of reaching a wider audience through open access (at the time the first phase was conducted, the evidence on citation behaviour around open access journals was very limited). Awareness about open access journals and open access publishing (including repositories) can also arise from usage of open access material by reading. Copyright (as the literature review confirms) is a very complex area with different expectations and assumptions, but the advent of open access has made some of these complexities more visible. So, the hypotheses set out were the following:

- Is a preference for publishing in high impact factor journals associated with familiarity with the idea of open access publishing?
- Is a preference for publishing in high impact factor journals associated with awareness of using open access journals?
- Is familiarity with open access journals associated with familiarity with open access publishing idea?
- Is awareness of using open access journals connected with familiarity with the idea of open access publishing?
- Is uncertainty around copyright issues of open access journals associated with familiarity with the idea of open access publishing?

- Is awareness of using open access journals associated with uncertainty around copyright issues with open access journals?

The following sets of associations were therefore tested (see the appendix 4.7)

- Question 3 (Q3) * Question 19 (Q19)
- Question 3 (Q3) * Question 40 (Q40)
- Question 19 (Q19) * Question 28 (Q28)
- Question 40 (Q40) * Question 19 (Q19)
- Question 35 (Q35) * Question 19 (Q19)
- Question 40 (Q40) * Question 35 (Q35)

The outputs for chi-square and other tests of association of the above variables are given in the following Tables. For each Table the chi-square results are presented (with the continuity correction, for a 2x2 Table, as long as these are valid (i.e. no cells with less than five). For the chi square analysis it was also necessary to merge the "don't know/no opinion" groups into the appropriate groups for the statement. For the positive statements, "don't know/no opinion" belong logically with "NO", but for the negative statements, "don't know/no opinion" belong logically with the "YES" group.

However, the fifth and the sixth hypotheses are manipulated in a slight different way because of the existence of two cells with expected count less than 5, which invalidates the chi-square test. The Fisher exact test findings are used in this case, and are also noted in all the other Tables too, for consistency.

In addition, as far as the Tables concerned, the frequency Tables are in Excel formats and the statistical Tables are from the SPSS output. SPSS Tables, figures and Excel formats are presented as my software outputs using the European format for the decimal point (a comma). The UK and North American formats are used when presenting the results of calculations done separately.

Hypothesis one

	Familiarity with open access publishing	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**13**	**13**	26
	No	**12**	**19**	31
	Totals	25	32	57

Table 4.15 OA publishing familiarity against high impact journal publishing preference

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,732[a]	1	,392		
Continuity Correction[b]	,345	1	,557		
Likelihood Ratio	,733	1	,392		
Fisher's Exact Test				,432	,278
Linear-by-Linear Association	,719	1	,396		
N of Valid Cases	57				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,40.					
b. Computed only for a 2x2 Table					

Table 4.16 Tests of association for Table 4.15

As we can see in Table 4.16, there was no association between the selection criterion for publishing in a high impact factor journal (Q3) and familiarity with the idea of open access publishing activity (Q19) ($\chi 2$=0,345, p=0,557, df=1) (Fisher exact test 0,278, one sided). The effect size of publishing in a high impact factor journal on the familiarity with the idea of open access publishing was estimated via odds ratio (OR) calculations and it also confirmed that the impact factor has no significant effect on open publishing activity as OR = 1.6.

Consequently, the hypothesis (Table 4.15) about connection to the selection of a high impact factor journal to publish in and the familiarity with the idea of Open Access Publishing was rejected. It might be assumed that the active and eminent researchers, who would be expected to seek out high impact journals for publishing, would be more familiar with the idea of open access publishing than other researchers, but this hypothesis is rejected in phase one.

Hypothesis two

	Awareness of using open access journals	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**17**	**10**	27
	No	**19**	**13**	32
	Totals	36	23	59

Table 4.17 Impact factor publishing criterion for against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,079[a]	1	,778		
Continuity Correction[b]	,000	1	,989		
Likelihood Ratio	,079	1	,778		
Fisher's Exact Test				,796	,495
Linear-by-Linear Association	,078	1	,780		
N of Valid Cases	59				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,53.					
b. Computed only for a 2x2 Table					

Table 4.18 Tests of association for Table 4.17

The second hypothesis (Table 4.17) concerned the possible association between the awareness of using (reading) an open access journals (Q40) and preference for publishing in a high impact factor journal (Q3) was rejected as there was no association between them according to chi-square test ($\chi 2$=0,000, p= 0,989, df=1) (Fisher exact test 0,495) as illustrated in Table 4.18.

Additionally, the odds calculations showed that someone who publishes in a high impact factor journal has the same level of awareness of using open access journals with someone who does not as OR=1.2. Clearly, for phase one, the active researchers seeking publication in a high impact factor journal are not more aware of reading open access journals than researchers for whom publication in a high impact factor journal is not a major preference.

Hypothesis three

	Familiarity with open access publishing idea	Yes	No	Totals
Familiarity with open access journals	Yes	**9**	**16**	25
	No	28	3	31
	Totals	37	19	56

Table 4.19 Familiarity with the idea of OA publishing against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	18,218[a]	1	,000		
Continuity Correction[b]	15,875	1	,000		
Likelihood Ratio	19,360	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	17,892	1	,000		
N of Valid Cases	56				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,48.					
b. Computed only for a 2x2 Table					

Table 4.20 Tests of association for Table 4.19

The third hypothesis (Table 4.19) examined the association between awareness of open access publishing idea (Q.19) and familiarity with open access journals (Q.28). For the analysis of this question, it should be noted that Q.28 was phrased (in English) as "no familiarity with open access journals", so that the negative answers were in fact positive, indicating familiarity. For consistency reasons the "don't know/no opinion" were grouped with the "yes" answers as this made more logical sense, as the don't know/no opinion were grouped with the "no" answers for the positive statement.

Tables 4.20 indicates that there is a significant association between the familiarity with the idea of open access publishing idea and familiarity with open access journals ($\chi 2$=15,875 p=0,000, df=1) (Fisher exact test 0,000). This association would be expected, and it helps to confirm that the phrasing of Q.28 was understood correctly by the respondents. In fact, looking at the frequencies in the cells, the largest cell frequency is 28 (those who were not familiar with the idea of open access publishing, and who were not familiar, or didn't know about open access journals).

The next hypothesis (Table 4.21) concerned any relationship between awareness of using (reading) open access journals and familiarity with the idea of open access publishing.

Hypothesis four

	Awareness of using open access journals	Yes	No	Totals
Familiarity with open access publishing idea	Yes	**22**	**3**	25
	No	**12**	**20**	32
	Totals	34	23	57

Table 4.21 Familiarity with the idea of OA publishing against awareness of using (reading) OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14,871[a]	1	,000		
Continuity Correction[b]	12,847	1	,000		
Likelihood Ratio	16,196	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	14,610	1	,000		
N of Valid Cases	57				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,09.					
b. Computed only for a 2x2 Table					

Table 4.22 Tests of association for Table 4.21

Table 4.22 indicates that there is a significant association between the familiarity with the idea of open access publishing idea (Q19) and the awareness of using (reading) open access journals (Q40) ($\chi 2$=12,847 p= 0,000, df=1) (Fisher exact test 0,000). Using the Odds Ratio (OR=12.22), those who are unfamiliar with the idea of open access publishing are also unaware of using open access journals.

Hypothesis five

	Uncertainty around copyright issues of open access journals	Yes	No	Totals
Familiarity with the open access publishing idea	Yes	**19**	**6**	25
	No	**28**	**4**	32
	Totals	47	10	57

Table 4.23 Familiarity with the idea of open access publishing against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,283[a]	1	,257		
Continuity Correction[b]	,611	1	,434		
Likelihood Ratio	1,275	1	,259		
Fisher's Exact Test				,308	,217
Linear-by-Linear Association	1,261	1	,262		
N of Valid Cases	57				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,39.
b. Computed only for a 2x2 Table

Table 4.24 Tests for Table 4.23

Table 4.23 concerned any relationship between the familiarity with the idea of open access publishing and the uncertainty around copyright issues of open access journals.

Table 4.24 depicts no significant association between uncertainty about the copyright issues of open access journals (Q35) and familiarity with the idea of open access publishing (Q19) (χ2=0,611, p= 0,434, df=1) (Fisher exact test 0,217). As one of expected count cell frequencies is less than 5, the Fisher exact test results must be used. The largest group in the two by two Table were those who were uncertain about copyright, or who had no opinion on the topic, and who were not familiar with the idea open access publishing (n=28). In fact, the "yes" responses were dominant even in the case the participants had an idea about open access publishing as this percentage was approximately 33,3% versus the 10,53% of biomedical scientists who knew about open access publishing. The majority of the respondents (82,5%) were uncertain or unaware about copyright issues for open access journals.

Hypothesis six

	Awareness of using open access journals	Yes	No	Totals
Uncertainty around copyright issues with open access journals	Yes	**27**	**8**	35
	No	**19**	**0**	19
	Totals	46	8	54

Table 4.25 Awareness of using open access journals against uncertainty about copyright

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,098[a]	1	,024		
Continuity Correction[b]	3,448	1	,063		
Likelihood Ratio	7,676	1	,006		
Fisher's Exact Test				,040	,023
Linear-by-Linear Association	5,004	1	,025		
N of Valid Cases	54				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,81.

b. Computed only for a 2x2 Table

Table 4.26 Tests of association for Table 4.25

As far as the hypothesis six (Table 4.25) concerned which is about the awareness of reading open access journals (Q40) associated with the uncertainty of copyright issues of the open access journals (Q35), the chi-square test (Table 4.26) depicts no association between them ($\chi 2=3,448$, p= 0,063 df=1) (Fisher exact test 0,023). As one cell has an expected count less than 5, it makes the reliability of chi-square test doubtful. The Fisher exact test should be used, and this does indicate an association. Again, as in the previous hypothesis, the "yes" responses dominate, denoting uncertainty about copyright. The cell with the largest group in the two by two Table belongs to those who are aware of reading open access journals but who have no opinion at copyright in open access journals or who believe that that they are uncertain. The most plausible interpretation of this is that even those who use open access journals are most likely not to have opinions about copyright issues around open access journals because the greatest percentage of uncertainty about copyright respondents are derived from those who read open access journals (49,15%, n=29), but it does seem a borderline association. A measure which identifies the association between the two variables is Cramer's V=0,050, which is not high, and again a little doubtful because of the relationship between Cramer's V and chi-square

4.6.2 Phase two

In phase two the number of distributed questionnaires was 70. Although the sample was different the response rate was coincidentally the same as that of the first phase, being 59/70 (84.3%). Thirty – seven physicians (62.7%), sixteen nurses (27.1%) and six dentists (10. 2%) responded to the survey (Q1). The responses were therefore dominated by physicians again. The response rate could be characterized generally as satisfactory.

The presentation in this section will highlight some of the key findings from the survey, as indicated from questions from all three sections of the survey (see frequency Tables in appendix 4.2).

The **first part of the questionnaire** was used by the respondents to rate their publishing activity. The majority of the respondents (50.8%) answered that they had not published an article in a clinical journal within the last 18 months. The most common criteria for selecting a journal for publishing in were the high prestige (journal well known, high circulation) (47.5%), great similarity to your scientific interests (44.1%) followed by high impact factor (40.7%). The majority of the respondents (58.8%) had little free time (23.7%), although the 49.2% had done so.

The **second part of the questionnaire** assessed the awareness of the participants on open access publishing issues, using the same rationale as in phase one.

A minority of respondents (42.4%) claimed familiarity about open access publishing in principle. Additionally, the majority of respondents (71.2%) were not aware of publishing in open access journals. However, the few respondents (27.1%) who were aware of publishing in open access journals, knew who paid for the publication fees they should be also aware about who pays for the publication fees (Table 4.27). The response rate for the following questions was low as well as they are illustrated in Table 4.27

If so, who paid the publication fee? Q22 – Q26	Responses
Scientific Company	2
Institution	2
Author (yourself)	4
All of them (mixture)	4
Other (please specify):	4

Table 4.27 Sponsor of open access publication-phase two

Participants were also asked to express their opinions on statements about open access journals (Table 4.28 (Q28-Q36)). The general picture of unawareness was evident, with many respondents (50.8%) stating that they had no experience of publishing in open access journals. Consequently, the high percentages of "Don't Know/No opinion" answers in the other questions had a logical explanation. If participants had not tried to publish in an open access journal, then it was not surprising that. 32.2% of respondents did not know that the charges for the publication in open access journals may be paid by the author. Similarly, 50.8% of the respondents did not know about possible funding problems. 37.3% did not know about copyright protection in open access journals and 33.9% did not know or had no opinion on the quality of peer review process. However, more (42.6%) did believe that open access journals were not low readership journals although 23.7% of the participants were uncertain about this. Opinion was divided on the visibility of open access journals – about as many claimed they were not known (32.2%) as those who disagreed (30.5%).

Please indicate your opinion on the following statements Q28 – Q36	Yes (%)	No (%)	Don't Know (%)	Null (%)
I am not familiar with open access journals	**50.8**	25.4	13.6	10.2
Open access journals tend to have low impact factor	**27.1**	23.7	**27.1**	22.0
Usually open access journals are not known	**32.2**	30.5	18.6	18.6
Open access journals are estimated as low readership journals	13.6	**42.6**	**23.7**	20.3
The publication in open access journals is not funded (lack of funding)	15.3	10.2	**50.8**	23.7
My Institution does not encourage me to publish in open access journals	22.0	20.3	**33.9**	23.7
Author charges prevent me from publishing in open access journals	28.8	15.3	**32.2**	23.7
I am uncertain about the copyright restrictions of open access journals	27.1	15.3	**37.3**	20.3
I am uncertain about the quality of review process for open access journals	32.2	11.9	**33.9**	22.0
Notes: Percentages based on n=59 respondents in total				

Table 4.28 Opinions on the statements about open access journals (Phase two)

The **third section of the questionnaire** was used in order to rate the value of open access journals to knowledge dissemination through use by readership. The majority of the respondents (89.8%) considered open access publishing as a means for wider information dissemination. However, the percentage of the Greek biomedical scientists (59.3%) who were aware of reading open access journals was lower. Respondents were mainly informed about the existence of open access journals from colleagues (40.7%), this specific questionnaire (27.1%) and their institution (25.4%). The majority of the participants (59.3%) easily detect the open access information, 23.7% of the respondents found it difficult. More participants (47.5%) considered it

difficult to find Greek biomedical research in open access journals although 33.9%, of respondents found this procedure as easy. More participants (45.8%) were ignorant about library provision of open access journals, whereas, the 39.0% of the respondents answered that the library provided access to open access journals.

Data analysis aimed to check whether there were any significant associations, as a first stage to exploring some correlations. These were the same as in phase one, but are repeated here for ease of reading.

So, the hypotheses set out were the following (see appendix 4.8):

- Is a preference for publishing in high impact factor journals associated with familiarity with the idea of open access publishing?
- Is a preference for publishing in high impact factor journals associated with awareness of using open access journals?
- Is familiarity with open access journals associated with familiarity with open access publishing idea?
- Is awareness of using open access journals connected with familiarity with the idea of open access publishing?
- Is uncertainty around copyright issues of open access journals associated with familiarity with the idea of open access publishing?
- Is awareness of using open access journals associated with uncertainty around copyright issues with open access journals?

The outputs are set out as for phase one.

The first hypothesis (Table 4.29) explored any association between preference for publishing in a high impact journal and familiarity with the idea of open access publishing.

Hypothesis one

	Familiarity with open access publishing idea	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**9**	**15**	24
	No	**16**	**19**	35
	Totals	25	34	59

Table 4.29 OA publishing familiarity against high impact journal publishing preference

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,393[a]	1	,531		
Continuity Correction[b]	,129	1	,720		
Likelihood Ratio	,395	1	,530		
Fisher's Exact Test				,598	,361
Linear-by-Linear Association	,387	1	,534		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,17.

b. Computed only for a 2x2 Table

Table 4.30 Tests of association for Table 4.29

As we can see in Table 4.30, there was no association between the preference of publishing in high impact factor journal (Q3) and the familiarity with the idea of open access publishing activity (Q19) ($\chi 2$=0,129, p=0,720, df=1) (Fisher exact test 0,361 one sided). The effect size of publishing in high impact factor journal on the familiarity with the idea of Open Access Publishing was estimated via odds ratio (OR) calculations and it also confirmed that the impact factor has no significant effect on open publishing activity as OR = 0,7125. Consequently, the hypothesis (Table 4.29) suggesting that those biomedical scientists who favoured high impact journals for publishing, would also be familiar with the idea of Open Access Publishing, much more so than other biomedical scientists, was rejected.

The second hypothesis (Table 4.31) explored the association between awareness of using (reading) open access journals and preference for publishing in a high impact factor journal.

Hypothesis two

	Awareness of using open access journals	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**12**	**12**	24
	No	**23**	**12**	35
	Totals	35	24	59

Table 4.31 Impact factor criterion for publishing against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,457[a]	1	,227		
Continuity Correction[b]	,878	1	,349		
Likelihood Ratio	1,454	1	,228		
Fisher's Exact Test				,285	,174
Linear-by-Linear Association	1,432	1	,231		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,76.

b. Computed only for a 2x2 Table

Table 4.32 Tests of association for Table 4.31

This second hypothesis (Table 4.32) which concerned the relation between the awareness of using open access journals (Q40) and the experience of previous publishing in a high impact factor journal (Q3) was rejected as there was no association between them according to chi-square test ($\chi 2$=0,878, p= 0,349, df=1) (Fisher exact test 0,174 one sided).

Additionally, the odds calculations showed that there is a marginally negative effect of publishing in a high impact factor journal on the awareness of using open access journals as OR=0, 5217.

The next hypothesis (Table 4.33) examined the relationship between familiarity with the idea of open access publishing and familiarity with open access journals.

Hypothesis three

	Familiarity with open access publishing idea	Yes	No	Totals
Familiarity with open access journals	Yes	**8**	**14**	22
	No	30	1	31
	Totals	38	15	53

Table 4.33 Familiarity with the idea of OA publishing against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23,143[a]	1	,000		
Continuity Correction[b]	20,261	1	,000		
Likelihood Ratio	25,476	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	22,706	1	,000		
N of Valid Cases	53				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,23.

b. Computed only for a 2x2 Table

Table 4.34 Tests of association for Table 4.33

The third hypothesis (Table 4.33) examined the association between the familiarity with publishing in open access journals (Q.28) and awareness of open access

publishing (Q.19). For the analysis of this question, it should be noted that Q.28 was phrased (in English) as “no familiarity with open access journals”, so that the negative answers were in fact positive, indicating familiarity. For consistency reasons all of the questions the “don’t know/no opinions” with grouped with the “Yes” responses for the analysis for consistency, as the don't know/no opinion were grouped with the "no" answers for the positive statement.

Table 4.34 indicates that there is a significant association between the familiarity with the idea of Open Access Publishing and familiarity of publishing in open access journals ($\chi 2$=23,143 p=0,000, df=1) (Fisher exact test 0,000). This association would be expected. Again, as in phase one, the largest group (by cell frequency, 30) were those who were not familiar with the idea of open access publishing and also not familiar with open access journals.

The next hypothesis (Table 4.35) considered whether there was an association between awareness of using (reading) open access journals and awareness of open access publishing.

Hypothesis four

	Awareness of using open access journals	Yes	No	Totals
Familiarity with open access publishing idea	Yes	**24**	**1**	25
	No	**11**	**23**	34
	Totals	35	24	59

Table 4.35 Awareness of using (reading) OA journals against awareness of OA publishing

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24,185[a]	1	,000		
Continuity Correction[b]	21,619	1	,000		
Likelihood Ratio	28,525	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	23,775	1	,000		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,17.

b. Computed only for a 2x2 Table

Table 4.36 Tests of association for Table 4.35

Table 4.36 indicates that there is a significant association between the familiarity with the idea of open access publishing (Q19) and the awareness of using open access journals (Q40) ($\chi 2$=21,619 p= 0,000, df=1) (Fisher exact test 0,000 one sided).

The Odds Ratio (50.1818) shows a strong effect of the familiarity with the idea of open access publishing on the usage of open access journals. Consequently, there is an association between usage of open access journals and knowledge about open access publishing activity and the hypothesis is accepted. It is a little difficult to be sure which comes first, usage of open access journals leading to familiarity with open access publishing, or the other way around, but the Table 4.35 indicates that the community is largely split between those who do use open access journals and who are aware of open access publishing (cell count 24), and those who are not aware of using open access journals and who are not aware of open access publishing (cell count 23). Eleven individuals were aware of using open access journals but not aware of open access publishing as an idea – suggesting that awareness of the principle may come from use by reading open access journals.

The next hypothesis (Table 4.37) concerned familiarity with open access publishing and the copyright changes.

Hypothesis five

	Uncertainty around copyright issues of open access journals	Yes	No	Totals
Familiarity with the open access publishing idea	Yes	**18**	**6**	24
	No	**20**	**3**	23
	Totals	38	9	47

Table 4.37 Familiarity with the idea of open access publishing against uncertainty about copyright

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,084[a]	1	,298		
Continuity Correction[b]	,450	1	,502		
Likelihood Ratio	1,103	1	,294		
Fisher's Exact Test				,461	,253
Linear-by-Linear Association	1,061	1	,303		
N of Valid Cases	47				
a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 4,40.					
b. Computed only for a 2x2 Table					

Table 4.38 Tests of association for Table 4.37

Table 4.38 depicts that there is no association between uncertainty about the copyright issues of open access journals (Q35) and familiarity with the idea of open access publishing (Q19) ($\chi 2$=0,450, p= 0,502 , df=1, 2 cells have expected count less than 5) (Fisher exact test 0,253 one sided). The imbalance between the uncertain and don't know and the certain answers remain. The percentage of the biomedical scientists who are uncertain or do not know about copyright issues of open access journals is higher to the category of respondents (n=20, 42,55%) who are not familiar with the idea of open access publishing activity as well.

Hypothesis six

	Awareness of using open access journals	Yes	No	Totals
Uncertainty around copyright issues with open access journals	Yes	**24**	**8**	32
	No	**14**	**1**	15
	Totals	38	9	47

Table 4.39 Awareness of using open access journals against the uncertainty about copyright

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,217[a]	1	,136		
Continuity Correction[b]	1,191	1	,275		
Likelihood Ratio	2,570	1	,109		
Fisher's Exact Test				,236	,136
Linear-by-Linear Association	2,170	1	,141		
N of Valid Cases	47				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,87

b. Computed only for a 2x2 Table

Table 4.40 Tests of association for Table 4.39

As far as the hypothesis six (Table 4.39) concerned which is about the awareness of using open access journals (Q40), and possible relationship with uncertainty over copyright issues of the open access journals (Q35), the chi-square test (Table 4.40) depicts no association between them ($\chi 2$=1,191, p= 0,275, df=1, one cell has an expected count less than 5) (Fisher exact test 0,136 one sided).
In other words, awareness of using open access journals is not associated with uncertainty around copyright those aware of using open access journals are not more likely to be certain about copyright issues than those who don't use open access journals as the largest group of uncertain/unaware biomedical scientists belongs to the category of readers of open access journals (n=24, 51,06%).

4.6.3 Phase three

In phase three the number of distributed questionnaires was 92, a larger sample than in phases one and two, with a response rate of 81/92 (88.0%). Thirty – nine physicians (48.1%), forty-one nurses (50.6%) and one dentist (1.2%) responded to the survey (Q1). Phase three, therefore, has proportionally more nurses than the previous phases. As a whole, the response rate could be characterized generally as satisfactory, although the proportion of doctors is lower than would be ideal for comparison with the other phases.

The presentation in this section will highlight some of the key findings from the survey, as indicated from questions from all three sections of the survey (see frequency Tables in appendix 4.3).

The **first part of the questionnaire** was used by the respondents to rate their publishing activity. The majority of the respondents (60.5%) had not published any article in clinical journal within the last 18 months. The majority of participants (46.9%) selected a journal for publishing in according to the high impact factor criterion, the next frequent response (44.4%) was great similarity to your scientific interests followed by high prestige (journal well known, high circulation)(39.5%). Although the top three factors are the same as in phase two, the order is different as high prestige was the most important criterion in phase two. Additionally, the

majority of participants (60.5%) had made their works accessible via the Internet and 37.0% of participants had not make their work accessible via the Internet and the most common reason was limited free time (17.3%).

The **second part of the questionnaire** assessed the awareness of the participants on open access publishing issues, using the same rational as phase one and phase two. More than half, the 56.8% of the participants had some awareness about open access publishing idea. The majority of the respondents, the 55.6% seem not to be aware of publishing in an open access journal. However, the respondents (42.0%) who were aware of publishing in open access journals, were aware about who paid for the publication fees (Table 4.41)

If so, who paid the publication fee? (Q22-Q26)	**Responses**
Scientific Company	3
Institution	2
Author (yourself)	9
All of them (mixture)	16
Other (please specify):	1

Table 4.41 Sponsor of open access publication-phase three

Table 4.42 (Q28 – Q36) illustrates responses to different statements about open access. The general picture of unawareness was confirmed by the answers for these questions. The majority of participants (49.4%) felt unfamiliar with open access journals. Consequently, the high percentages of "Don't Know/No opinion" answers in the following questions were again, like the first and second phases, unsurprising. This demonstrated that the participants generally have no experience of publishing in an open access journal. They may be discouraged from publishing in open access journals because charges for the publication in open access journals may be paid by the author (43.2%). They did not have an opinion about the possibility of institutional funding in order to be able to publish in open access journals (63.0%). Additionally, they did not know about copyright protection in open access journals (53.1%) and the quality of peer review process (40.7%).

Please indicate your opinion on the following statements Q28 – Q36	Yes (%)	No (%)	Don't Know (%)	Null (%)
I am not familiar with open access journals	**49.4**	28.4	17.3	4.9
Open access journals tend to have low impact factor	28.4	22.2	**45.7**	3.7
Usually open access journals are not known	28.4	**40.7**	25.9	4.9
Open access journals are estimated as low readership journals	23.5	**44.4**	29.6	2.5
The publication in open access journals is not funded (lack of funding)	24.7	6.2	**63.0**	6.2
My Institution does not encourage me to publish in open access journals	34.6	24.7	**37.0**	3.7
Author charges prevent me from publishing in open access journals	**43.2**	12.3	39.5	4.9
I am uncertain about the copyright restrictions of open access journals	32.1	9.9	**53.1**	4.9
I am uncertain about the quality of review process for open access journals	34.6	23.5	**40.7**	1.2
Notes: Percentages based on n=81 respondents in total				

Table 4.42 Opinions on the statements about open access journals (phase three)

The **third section of the questionnaire** was used in order to rate the value of open access journals to the knowledge dissemination through use by readership. The majority of the respondents (90.1%) considered open access publishing as a means for

wider information dissemination. However, the percentage of the respondents who were aware of using (reading) open access journals was lower (60.5%). The main means that contributed to the respondents' information about the existence of open access journals were: colleagues (45.7%), this specific questionnaire (25.9%) and their institution (22.2%). However, the detection of open access information seems to be easy for the majority of the respondents (51.9%), whereas 22.2%, of the participants found it difficult. Some 33.3% of respondents considered finding Greek biomedical research in open access journals easy, 6.2% of the participants found it as very easy, but mostly the respondents (46.9%) characterized it as difficult or very difficult (9.9%). The identification of the library's role in providing open access journals was also explored. The difference between the informed participants and the uninformed one is slight. A large proportion of the respondents (39.5%) knew that the library that the library provided access to open access journals, to those who were ignorant (32.1%).

Data analysis aimed to check whether there were any significant associations, as a first stage to exploring some correlations. These were the same tests as used in previous phases, repeated here for easier reading.

So, the hypotheses set out were the following (see appendix 4.9):

- Is a preference for publishing in high impact factor journals associated with familiarity with the idea of open access publishing?
- Is a preference for publishing in high impact factor journals associated with awareness of using open access journals?
- Is familiarity with open access journals associated with familiarity with open access publishing idea?
- Is awareness of using open access journals connected with familiarity with the idea of open access publishing?
- Is uncertainty around copyright issues of open access journals associated with familiarity with the idea of open access publishing?
- Is awareness of using open access journals associated with uncertainty around copyright issues with open access journals?

The outputs for chi-square and other tests of association of the above variables are given in the following Tables. For each Table the chi-square results are presented (with the continuity correction, for a 2x2 Table). The Fisher exact test findings are also noted, as these are used if the chi-square test is invalid.

The first hypothesis (Table 4.43) explored any association between the preference for publishing in a high impact factor journal and awareness of the idea of open access publishing.

Hypothesis one

	Familiarity with open access publishing idea	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**26**	**12**	38
	No	**18**	**20**	38
	Totals	44	32	76

Table 4.43 Familiarity with OA publishing against preference for publishing in high impact journals

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,455[a]	1	,063		
Continuity Correction[b]	2,645	1	,104		
Likelihood Ratio	3,484	1	,062		
Fisher's Exact Test				,103	,052
Linear-by-Linear Association	3,409	1	,065		
N of Valid Cases	76				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 16,00.					
b. Computed only for a 2x2 Table					

Table 4.44 Tests of association for Table 4.43

As we can see in Table 4.44, there was a marginal association between publishing in a high impact factor journal (Q3) and familiarity with the open access publishing idea (Q19) ($\chi 2$=2,645, p= 0,104, df=1) (Fisher exact test 0,052 one sided, marginally significant).

The effect size of publishing in high impact factor journal on the familiarity with the idea of open access publishing was estimated via odds ratio (OR) calculations and it confirmed that the preference for a high impact factor is associated with greater open publishing activity as OR =2.4074. Consequently, the hypothesis about the selection of a high impact factor journal for publishing and the familiarity with the idea of Open Access Publishing was accepted. Those biomedical scientists who preferred to publish in a high impact factor journal were more likely to be familiar with the idea of open access publishing. Tentatively, this suggests that the more active and eminent researchers are aware of open access publishing.

The next hypothesis (Table 4.45) considered whether there was a relationship between using (reading) open access journals and a preference for publishing in a high impact factor journal.

Hypothesis two

	Awareness of using open access journals	Yes	No	Totals
Preference to select high impact factor journals for publishing	Yes	**29**	**9**	38
	No	**19**	**19**	38
	Totals	48	28	76

Table 4.45 Impact factor publishing preference against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,655[a]	1	,017		
Continuity Correction[b]	4,580	1	,032		
Likelihood Ratio	5,750	1	,016		
Fisher's Exact Test				,031	,016
Linear-by-Linear Association	5,580	1	,018		
N of Valid Cases	76				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 14,00.					
b. Computed only for a 2x2 Table					

Table 4.46 Tests of association for Table 4.45

The second hypothesis (Table 4.46) which concerned the relation between the awareness of reading open access journals (Q40), and preference for publishing in a high impact factor journal (Q3) was accepted according to chi-square test ($\chi 2$=4,580, p= 0,032, df=1) (Fisher exact test 0,016 one sided).

Additionally, the odds calculations showed that there is a positive effect of preference for publishing in a high impact journal on the awareness of using open access journals is as OR=3.2222. This ties in with the findings from the previous hypothesis test. The active and eminent researchers are, in phase three, aware of using (reading) open access journals.

Hypothesis three

	Familiarity with open access publishing idea	Yes	No	Totals
Familiarity with open access journals	Yes	**23**	**20**	43
	No	30	3	33
	Totals	53	23	76

Table 4.47 Familiarity with the idea of OA publishing activity against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12,388[a]	1	,000		
Continuity Correction[b]	10,679	1	,001		
Likelihood Ratio	13,681	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	12,225	1	,000		
N of Valid Cases	76				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,99.

b. Computed only for a 2x2 Table

Table 4.48 Tests of association for Table 4.47

The third hypothesis (Table 4.47) examined the association between familiarity with open access journals (Q28) and awareness of open access publishing activity idea (Q19). For the analysis of this question, it should be noted that Q28 was phrased (in English) as "no familiarity with open access journals", so that the negative answers were in fact positive, indicating familiarity. For consistency reasons the questions "don't knows/no opinions" were grouped with the "yes" answers and the don't knows/no opinions were grouped with the "no" answers for the positive statement..

Table 4.48 indicates that there is a significant association between the familiarity with the idea of Open Access Publishing and familiarity with open access journals ($\chi 2$=10,679 p=0,001, df=1) (Fisher exact test 0,000 one sided). This association would be expected, and it helps to confirm that the meaning of Q.28 was correctly apprehended by the respondents.

The next hypothesis (Table 4.49) examined the relationship between awareness of using (reading) open access journals and familiarity with the idea of open access publishing.

Hypothesis four

	Awareness of using open access journals	Yes	No	Totals
Familiarity with open access publishing idea	Yes	**37**	**8**	45
	No	**11**	**23**	34
	Totals	48	31	79

Table 4.49 Familiarity with the idea of OA publishing against awareness of using (reading) OA journals

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20,201[a]	1	,000		
Continuity Correction[b]	18,164	1	,000		
Likelihood Ratio	20,904	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	19,946	1	,000		
N of Valid Cases	79				
a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 13,34.					
b. Computed only for a 2x2 Table					

Table 4.50 Tests of association for Table 4.49

Table 4.50 indicates that there is a significant association between the familiarity with the idea of Open Access Publishing (Q19) and the awareness of reading open access journals (Q40) (χ2=18,164 p= 0,000, df=1) (Fisher exact test 0,000 one sided).
The effect of the familiarity with the idea of Open Access Publishing on the familiarity with open access journals seemed to be high as OR=9.6705. Inspection of the cell frequencies suggests the existence of two distinct groups, those who use open access journals and are aware of open access publishing as an idea, and those who are not aware of the open access publishing idea, and are not aware of using open access journals.

The next hypothesis (Table 4.51) explored that state of certainty about copyright in open access journals and familiarity with the open publishing idea.

Hypothesis five

	Uncertainty around copyright issues of open access journals	Yes	No	Totals
Familiarity with the open access publishing idea	Yes	**36**	**7**	43
	No	**33**	**1**	34
	Totals	69	8	77

Table 4.51 Familiarity with the idea of OA publishing against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,628[a]	1	,057		
Continuity Correction[b]	2,337	1	,126		
Likelihood Ratio	4,138	1	,042		
Fisher's Exact Test				,071	,059
Linear-by-Linear Association	3,581	1	,058		
N of Valid Cases	77				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 3,53.

b. Computed only for a 2x2 Table

Table 4.52 Tests of association for Table 4.51

Table 4.52 show that there is no association between the uncertainty about the copyright issues of open access journals (Q35) and familiarity with the idea of open access publishing (Q19) ($\chi 2$=2,337, p= 0,126, df=1, but as 2 cells have expected count less than 5 the Fisher exact test p=0,059 one sided is used. The uncertainty about copyright in open access journals prevails, whether or not the respondents are familiar with open access publishing.

The next hypothesis (Table 4.53) checked whether using (reading) open access journals was associated with the state of certainty about copyright in open access journals.

Hypothesis six

	Awareness of using open access journals	Yes	No	Totals
Uncertainty around copyright issues with open access journals	Yes	**40**	**7**	47
	No	**29**	**1**	30
	Totals	69	8	77

Table 4.53 Awareness of using OA journals against uncertainty about copyright

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,628[a]	1	,105		
Continuity Correction[b]	1,533	1	,216		
Likelihood Ratio	3,039	1	,081		
Fisher's Exact Test				,140	,105
Linear-by-Linear Association	2,594	1	,107		
N of Valid Cases	77				
a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 3,12. b. Computed only for a 2x2 Table					

Table 4.54 Tests of association for Table 4.53

For hypothesis six (Table 4.54) which was concerned with a possible association between perceived use of open access journals (Q40) associated and certainty or uncertainty of copyright issues of the open access journals (Q35), the chi-square test depicts no association between them ($\chi 2$=1,533, p= 0,216, df=1, 2 cells have expected count less than 5) (Fisher exact test 0,105 one sided).

Again, reflecting the previous hypothesis, using open access journals is not associated with a state of certainty or uncertainty about copyright in open access journals. However, again, the greatest percentage of uncertain or "do not know" respondents (51.95%) belongs to the biomedical scientists who read open access journals.

4.6.4 Comparisons Across Phases

The longitudinal questionnaire surveys, divided into three phases (see frequency Tables in appendices 4.1–4.3), proved useful in identifying changes throughout. As a convenience sample was used in each instance, there were differences both in distribution of professional representation and in sample size. Accordingly, it is

observed that in the first phase the majority of respondents were physicians (72.9%), a percentage which in the second phase decreased to 62.9%. Conversely, the percentage of nurses almost doubled from 16.9% in the first phase to 27.1% in the second phase, while the percentage of dentists remained sTable at 10.2%. Nonetheless, in the third phase, the percentage of nurse respondents was dominant at 50.6% over that of physicians at 48.1% and dentists at 1.2%.

The data in Table 4.55 show a decrease in publishing activity. In the first phase, the majority of respondents were physicians and most (71.2%) had published. In the second phase, the majority of respondents (50.8%), had not published, though only by a slight margin, while in the third phase, the percentage of those who had not published was highest (60.5%).

Have you published an article in clinical journal within the last 18 months? (Q1)	Phase 1	Phase 2	Phase 3
Yes	**71.2**	49.2	39.5
No	28.8	**50.8**	**60.5**
NV	0	0	0

Table 4.55 Publishing activity in clinical journals

Nurses publish, particularly when working in academic centres and university hospitals, but the most likely explanation for such differences in publishing activity across the phases was the different distribution of the sample. This was verified by ascertaining whether those in phase three who had indicated being published were doctors, dentists or nurses. Analysis revealed that of those in phase three who claimed to have published, only 33.33% of doctors had in fact done so (Fig. 4.8). This is far more similar to the publishing activity figures in the phase one sample where doctors predominated. With respect to phase two, percentages differ slightly as the majority of physicians (76%) do not publish versus those (29.3%) who do. Nevertheless, research indicates that overall, physicians tend to publish more than nurses all phases. When considering changes across the phases, the different distribution of the sample each time needs to be taken into consideration. However,

as biomedical publishing does seem quite competitive, it would be expected that attitudes towards some aspects of publishing and open access journals would not vary substantially among health care professionals working in the context of an academic environment.

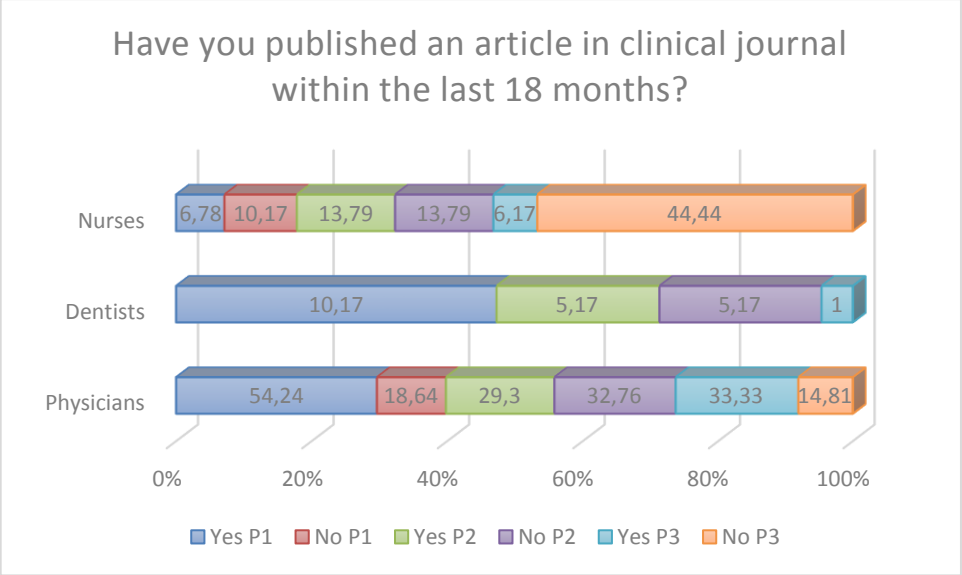

Figure 4.8 *Publishing activity according to biomedical specialities*

There were some changes across the phases in the selection criteria (Table 4.56) used to determine which journals should be targeted as possible publication outlets. In phase one, the answers "high prestige" and "similarity to your scientific interests" were given equal preference (both 54.2%), followed by "high impact factor" (45.8%). In phase two, "high prestige" is selected as the most important criterion among respondents (47.5%), followed by "great similarity to your scientific interests" (44.1%), and "high impact factor" (40.7%). In phase three, the majority of respondents (46.9%) justify their choice of journal based on its impact factor, with the next criterion being "great similarity to your scientific interests" (44.4%), and "high prestige" ranking last, with 39.5%. However, it appears that the differences are actually quite negligible; around half of all participants respond "yes" while the other half respond "no" per criterion. Moreover, the order of the criteria is not substantially different. With respect to the hypothesis testing set up in phase one, the choice of "preference for publishing in a high impact factor journal" was selected as the best

indicator of the "active researcher", and seems a reasonable choice to have made, although "high prestige" might have worked equally well.

Q3-Q5	YesP1	YesP2	YesP3	NoP1	NoP2	NoP3	NVP1	NVP2	NVP3
Impact factor	45.8	40.7	**46.9**	54.2	59.3	48.1	0	0	4.9
High prestige	**54.2**	**47.5**	39.5	45.8	52.5	55.6	0	0	4.9
Similarity to your scientific interests	**54.2**	44.1	44.4	45.8	55.9	50.6	0	0	4.9

Table 4.56 Criteria for selecting a journal for publication

Table 4.57 shows that respondents' ability to present their work via Internet was demonstrated in the first and third phases, as 61.0% and 60.5% respectively stated that they had already made their research available online. In the second phase the percentage was lower, but it must be remembered that the confidence interval, estimated at over ten percent, is wide. This suggests that there have been few changes across phases. After all, somewhere between 45% and 65% of respondents believe they are making their research available via Internet (though the question did not explore the basis for this belief). However, the majority of respondents who answered "no" to this question claimed "limited free time" (Q17) as their main reason in all three phases.

Have you made your work accessible by the Internet? (Q13)	Phase 1	Phase 2	Phase 3
Yes	**61.0**	49.2	**60.5**
No	39.0	**50.8**	37.0
NV	0	0	2.5

Table 4.57 Ability of presenting the works via internet

As reflected in the following figure, doctors are more familiar with open access publishing idea across the three phases than any other category of respondents. As it is depicted in Fig. 4.8 in the first phase, 29.82% of doctors are familiar with open access publishing although the percentage is lower (22.03%) in phase two, this could be attributed to the fact that the sample size of doctors is smaller than that in phase one. In phase three (Fig.4.8), 30.0% of doctors, or the majority of participants, know about open access publishing. Among nurses, the overall percentages of those familiar with open access publishing are lower due to the small sample size (phase one = 10.53%; phase two = 13.56%). However, in phase one (Fig. 4.9), the majority of nurses are informed, while in phase two , the percentages of familiar (13.56%) and non-familiar nurses (13.56%) are equal. In phase three, the majority of nurses are aware as well and the percentage (27.50%) is much higher than in the previous phases.

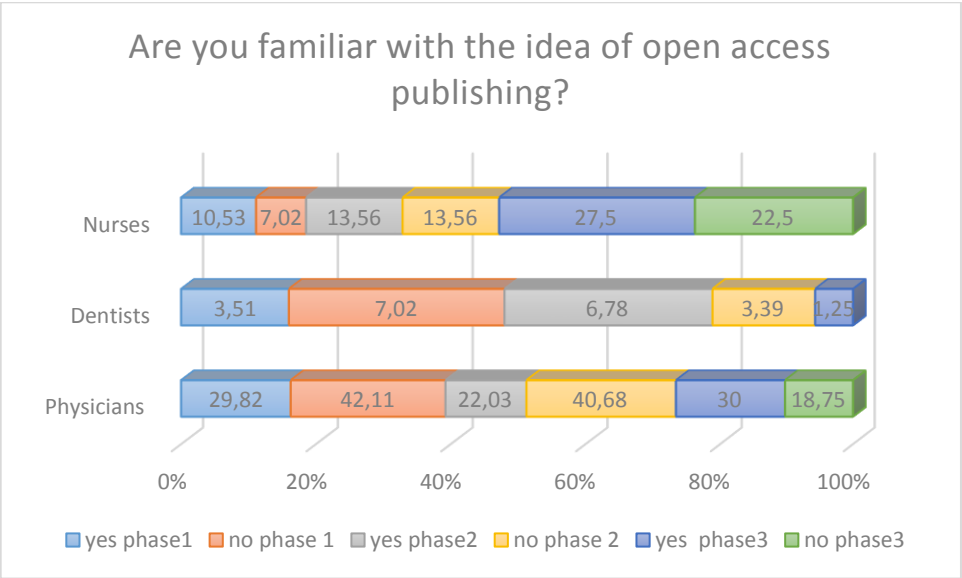

Figure 4.9 *Familiarity with open access publishing activity according to biomedical specialities*

In the first and the second phases, as illustrated in Table 4.58, only a minority of respondents (phase one=42.4%; phase two=42.4%) seem familiar with the topic of open access publishing. However, by phase three, the majority of respondents are familiar with open access publishing idea given that 56.8% of them answered "yes" to this question.

Are you familiar with the idea of open access publishing? (Q19)	Phase 1	Phase 2	Phase 3
Yes	42.4	42.4	**56.8**
No	**54.2**	**57.6**	42.0
NV	3.4	0	1.2

Table 4.58 Familiarity with the idea of open access publishing activity

Although the sample size means that the confidence intervals (appendices 4.4-4.6) do overlap, the trend that should be expected does seem to be occurring. Across all phases the majority of respondents seemed to be unaware of the option of publishing in an open access journal (Table 4.59), but the percentages were changing (phase one=64.4%; phase two=71.2%; phase three=55.6%). There is no smooth trend, and the results for phase two appear anomalous (but they are within the confidence interval of plus or minus ten per cent).

Are you aware of publishing in an open access journal? (Q21)	Phase 1	Phase 2	Phase 3
Yes	35.6	27.1	42.0
No	**64.4**	**71.2**	**55.6**
NV	0	1.7	2.5

Table 4.59 Awareness of publishing in open access journals

Table 4.60 (Q28 – Q36) illustrates respondents' attitudes towards open access journals across the phases.

Q28-Q36	YesP1	YesP2	YesP3	NoP1	NoP2	NoP3	Don't Know P1	Don't Know P2	Don't Know P3	NullV P1	NullVP2	NullVP3
Q28	**44.1**	**50.8**	**49.4**	35.6	25.4	28.4	18.6	13.6	17.3	1.7	10.2	4.9
Q29	23.7	27.1	28.4	28.8	23.7	22.2	**39.0**	27.1	**45.7**	8.5	22.0	3.7
Q30	27.1	32.2	28.4	**37.3**	30.5	**40.7**	27.1	18.6	25.9	8.5	18.6	4.9
Q31	16.9	13.6	23.5	35.6	42.6	**44.4**	35.6	23.7	29.6	11.9	20.3	2.5
Q32	11.9	15.3	24.7	13.6	10.2	6.2	**62.7**	**50.8**	**63.0**	11.9	23.7	6.2
Q33	15.3	22.0	34.6	33.9	20.3	24.7	**40.7**	33.9	37.0	10.2	23.7	3.7
Q34	13.6	28.8	43.2	22.0	15.3	12.3	**55.9**	32.2	39.5	8.5	23.7	4.9
Q35	18.6	27.1	32.1	18.6	15.3	9.9	**52.5**	37.3	**53.1**	10.2	20.3	4.9
Q36	16.9	32.2	34.6	30.5	11.9	23.5	**42.4**	33.9	40.7	10.2	22.0	1.2

Table 4.60 Statements on open access journals

The familiarity of respondents with open access journals showed no remarkable changes across the phases – within a confidence interval of plus or minus 10%, (Fig. 4.10) there is no difference.

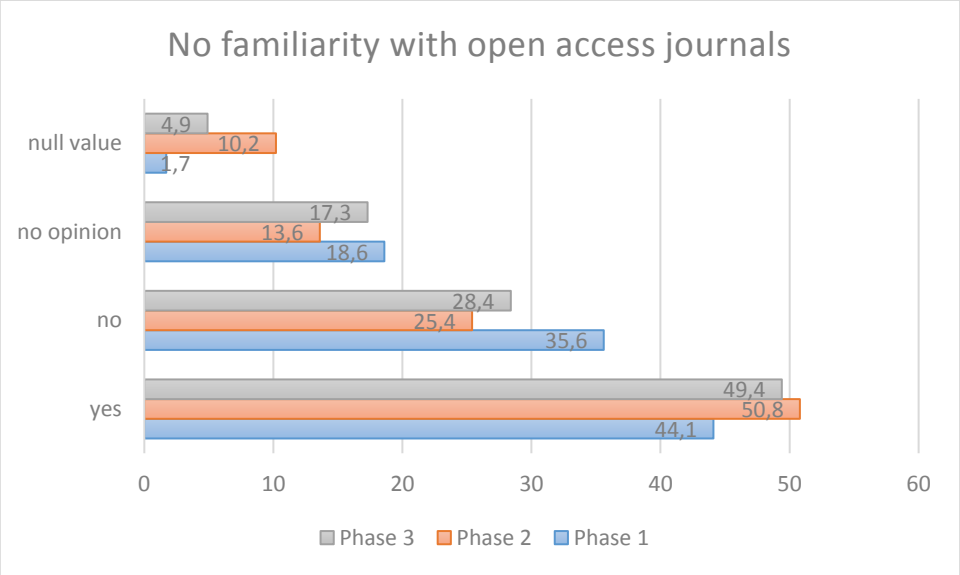

Figure 4.10 *No familiarity with OA journals*

Similarly, there was no change in participants' beliefs that the impact factor of open access journals is low **(**Q29, Fig. 4.11**)**, while in phases one and three the largest group of respondents had no opinion on the topic. By comparison, phase two had a lower percentage of "no opinion" responses as well as a larger number of null responses.

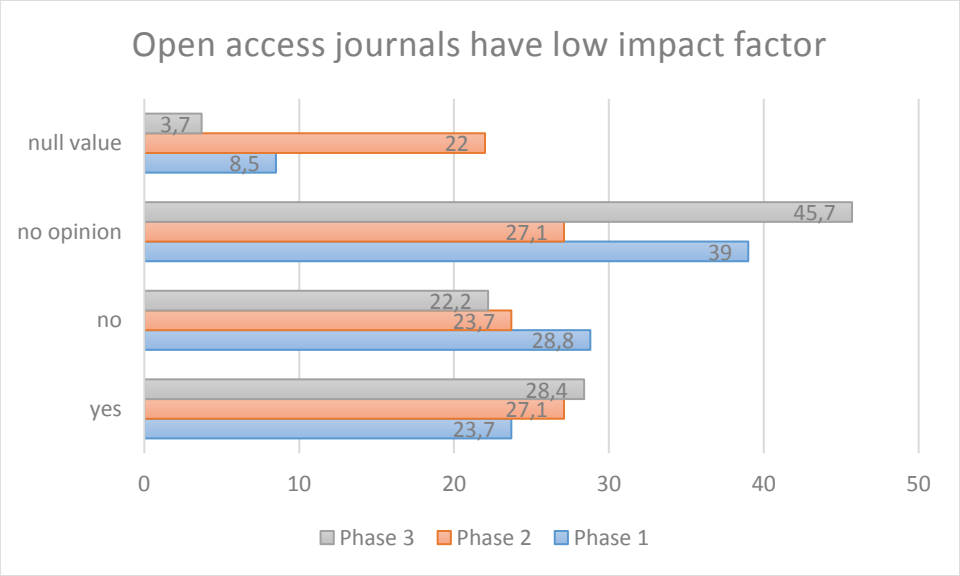

Figure 4.11 *Impact factor of OA journals*

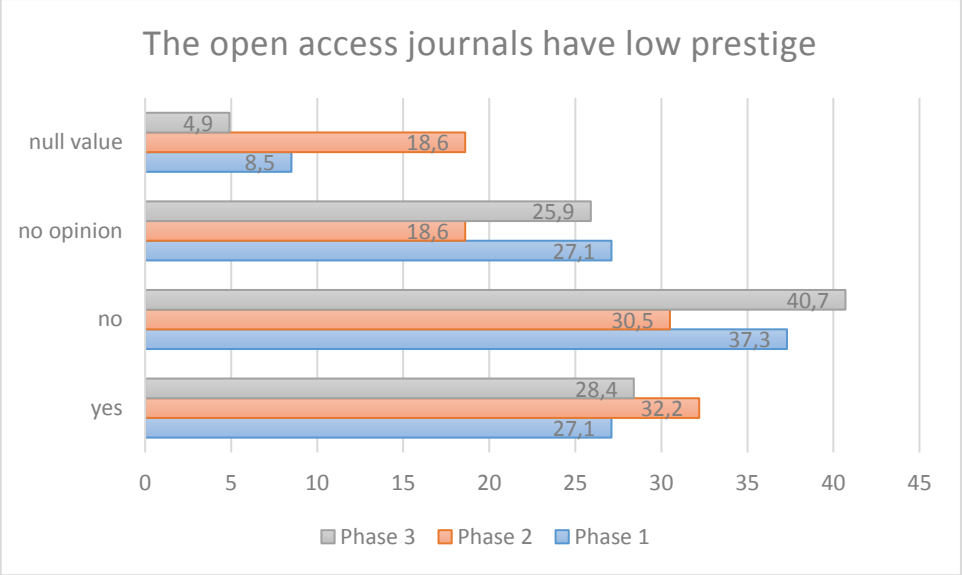

Figure 4.12*The prestige of OA journals*

For Q30 **(**Fig. 4.12**)** concerning whether open access journals were perceived to be of lower prestige, opinions were much the same across the phases, with the higher proportion of null values in phase two suggesting greater uncertainty. However, in all three phases, more respondents believed that open access journals were not of lower prestige than otherwise. What is more, the widest gap between "yes" and "no" views was in phase three, where 40.7% of respondents were not of the opinion that such journals were of low prestige compared to 28.4% who believed that they were.

Views on the readership of open access journals are slightly contradictory (Q31, Fig. 4.13). The gap between those with definite views one way or the other was 18.7% ("no"=35.6% - "yes"=16.9%) in phase one, 29% ("no"=42.4% – "yes"=13.6%) in phase two, and 20.9% ("no"=44.4% – "yes"=23.5) in phase three. This figure was unexpected as there should have been greater awareness of the fact that open access journals have a wide readership potential. Nonetheless, these differences are within the confidence interval of around ten percent.

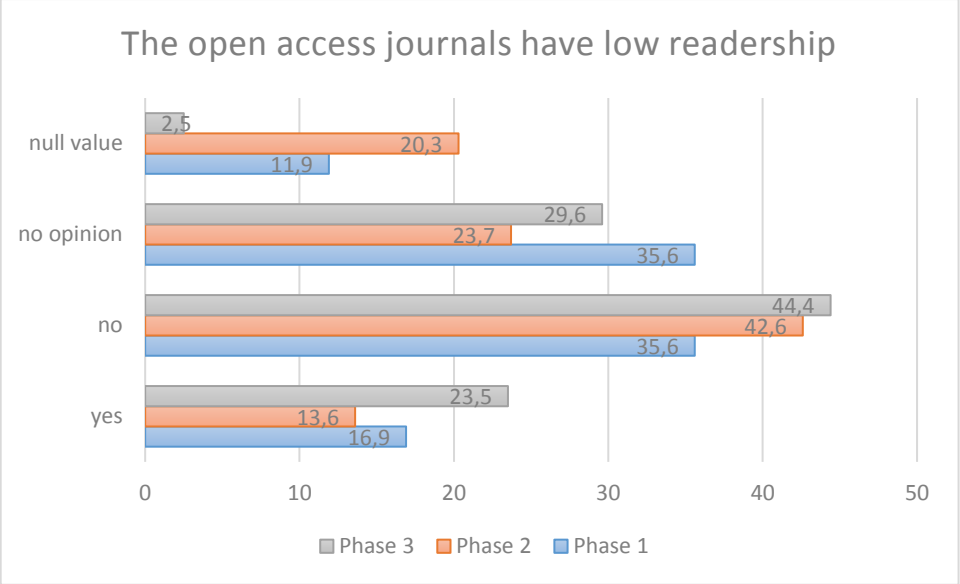

Figure 4.13 *Readership of OA journals*

There was no change on the subject of open access funding for authors (Q32, Fig. 4.14) across the phases. Most respondents (50% – 63%) had no opinion at all on the issue of funding, and this proportion hardly changed. By phase three, the difference between those who concurred regarding the lack of funding problem (24.7%) and those who did not (6.2%) was greater than in previous phases (18.5%). The direction changed from phase one, where fewer people (11.9%) thought lack of funding was a problem. However, this could also be a reflection of respondents' views concerning the impact of the Greek economic crisis.

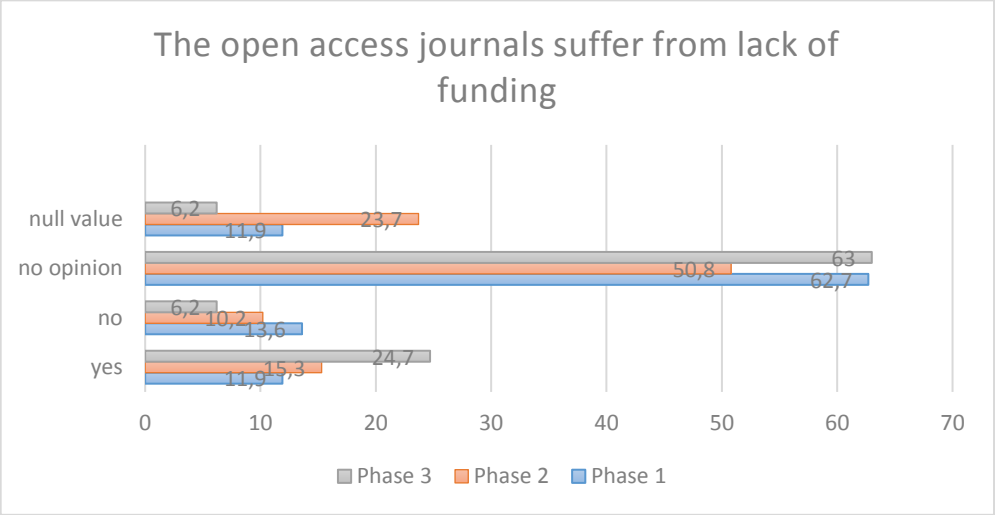

Figure 4.14-*Luck of funding of OA journals*

In fact, a higher percentage of respondents indicated that their respective institutions did not encourage them to publish in open access journals, as depicted in phase three (phase one = 15.3%, phase two = 22.0%, phase three = 34.6%), (Q33, Fig. 4.15).

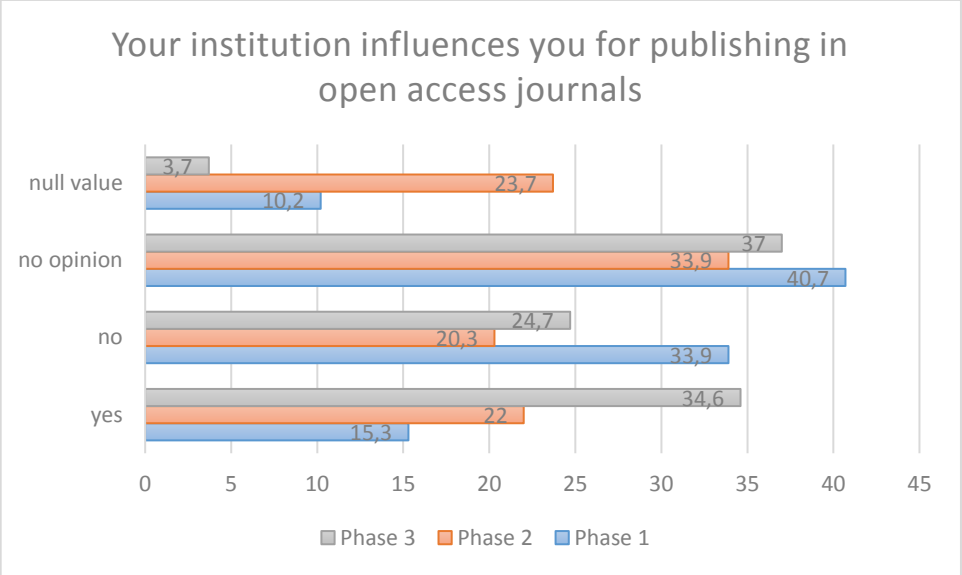

Figure 4.15 *Institution influence for publishing in OA journals*

Views on the impact of authors' publishing charges in open access journals (Q34, Fig. 4.16) changed in the third phase. Fig. 4.16 illustrates the dominance of the "don't know/no opinion" answer, with 55.9% of respondents responding as such in phase one. In phase two, this lack of opinion was still present but it was lower (32.2%), whereas in phase three, authors' charges are seen as a deterrent to publishing in open access journals, according to 43.2% of respondents.

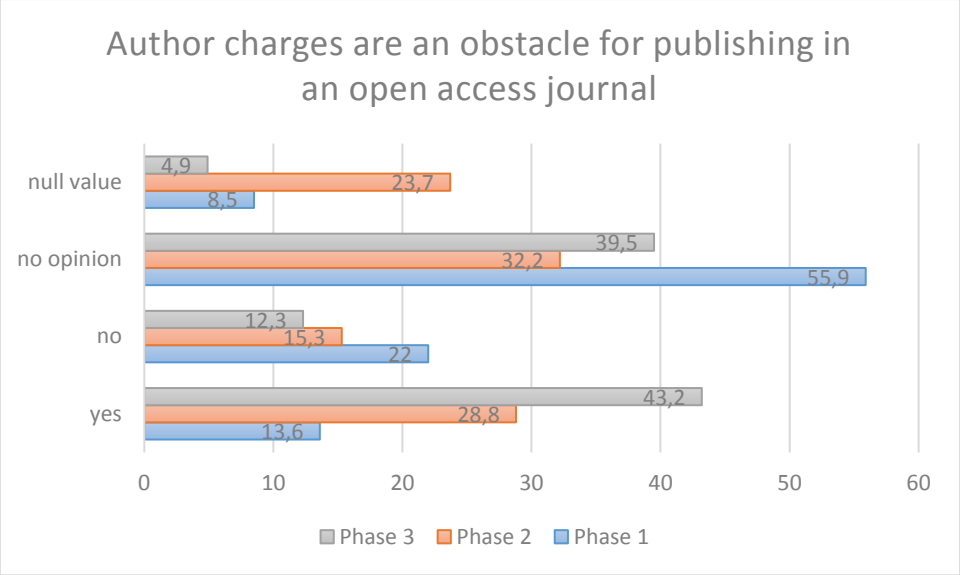

Figure 4.16 *Author charges for publishing in OA journals*

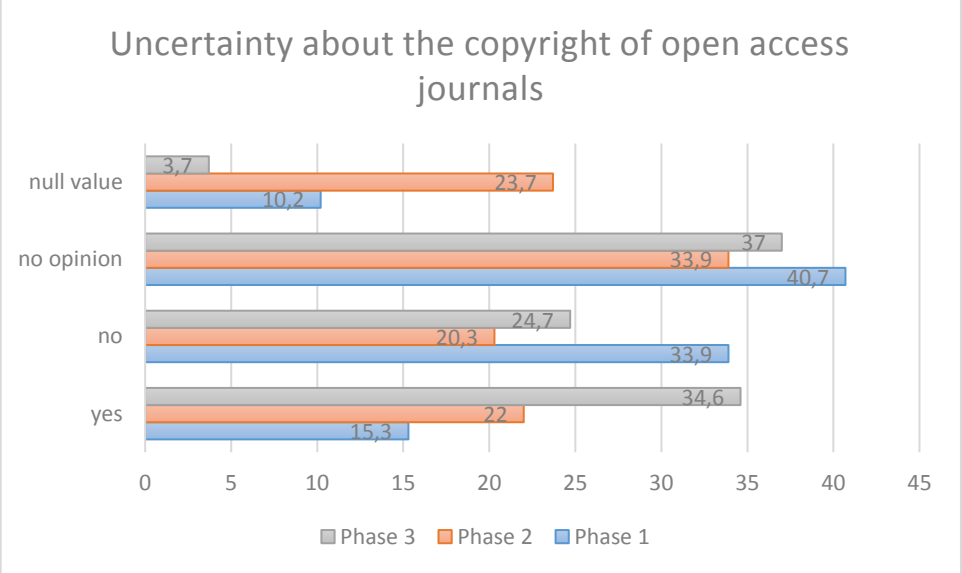

Figure 4.17 *Copyright issues of OA journals*

Participants were also uncertain with respect to copyright of open access journals (Q35, Fig. 4.17), where again, the "no opinion" group dominates across all phases. In fact, in phase three, only 9.9% claimed NOT to be uncertain about copyright, compared to 18.6% in phase one and 15.3% in phase two. Finally, respondents seem more uncertain in phase two (32.2%) and phase three (34.6%) with respect to the quality of the peer review process of open access journals (Q36, Fig. 4.18), although the high proportion of "no opinion" responses may also suggest an according lack of concern.

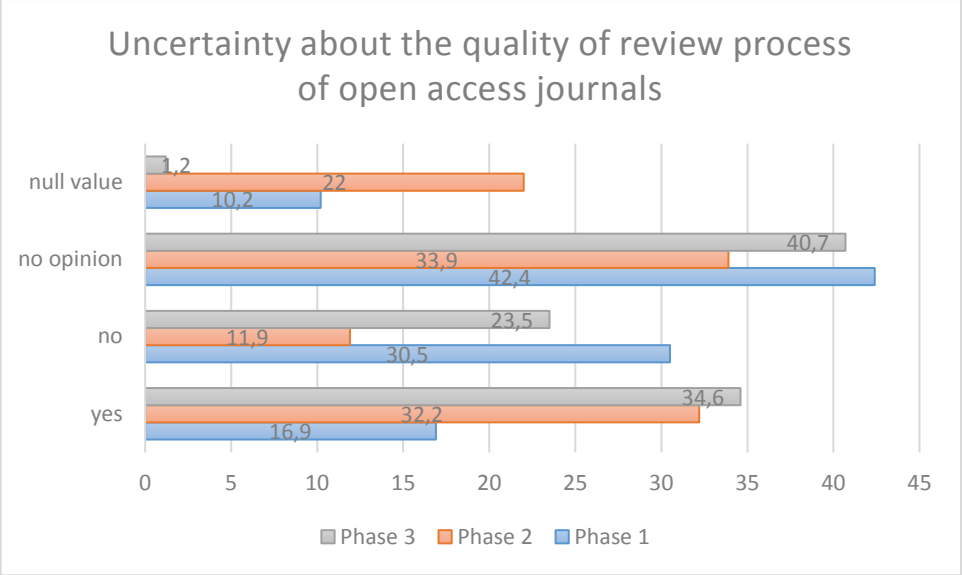

Figure 4.18 *Quality of OA peer review process*

The most striking fact about the findings for all phases is the high percentage of respondents who expressed no opinion or omitted responses on many of the questions. The sample size is relatively small proportionate to the population; nonetheless, the responses seem consistent. The estimated confidence intervals (appendices 4.4 -- 4.6) overlap on many of the answers so we cannot be sure that there is a difference between phase one, phase two and phase three. For example, Table 4.61 shows that between 20% -- 30% and 45% -- 55% of participants across all phases had no opinion regarding the quality of the review process. In phase three, 34.6% (95% CI 10.3% -- 44.9%) were uncertain, compared to 16.9% (95% CI 7.4% to 26.4%) in phase one. Despite the fact that the confidence intervals overlap (appendices 4.4-4.6), this is not the anticipated trend.

Uncertainty about the quality of review process (Q36)	**Yes**	CI	(+)	(-)	No	CI	(+)	(-)	No Opinion	CI	(+)	(-)
P1	**16,9**	9,5	26,4	7,4	**30,5**	11,7	42,2	18,8	42,4	12,5	54,9	29,9
P2	**32,2**	11,9	44,1	20,3	**11,9**	8,2	20,1	3,7	33,9	12	45,9	21,9
P3	**34,6**	10,3	44,9	24,3	**23,5**	9,2	32,7	14,3	40,7	10,6	51,3	30,1

Table 4.61 Uncertainty about the quality of review process (CI rates)

While there may be a trend in views concerning a lack of funding for publishing in OA journals, Table 4.62 still indicates that the 95% CI intervals overlap (i.e., for those answering affirmatively, indicating a lack of funding, the range is 3.7% - 20.1% in phase one and 15.4% -- 34% in phase three). The direction of the trend would be that which was predicted with respect to the economic crisis.

Lack of funding (Q32)	Yes	CI	(+)	(-)	No	CI	(+)	(-)	No Opinion	CI	(+)	(-)
P1	11,9	8,2	20,1	3,7	13,6	8,7	4,9	22,3	62,7	12,3	50,4	75
P2	15,3	9,1	24,4	6,2	10,2	7,7	17,9	2,5	50,8	12,7	63,5	38,1
P3	24,7	9,3	34	15,4	6,2	5,2	11,4	1	63	10,4	73,4	52,6

Table 4.62 Lack of funding for publishing in open access journals (CI rates)

However, the questionnaire surveys show that open access publishing awareness (Q19) had changed only by the third survey phase in 2011, even though still not high (i.e., change in awareness rose from 42.4% to 56.8%). There is still some lack of awareness concerning open access journals, given that even in the third phase, roughly half of the respondents were still unfamiliar with open access journals. There remains some lingering uncertainty about the prestige of open access journals (Q30), but this incertitude may possibly be changing **(**Fig. 4.12). Opinions on author charges (Q34) as a deterrent to publishing in certain open access journals show some change, but the "no opinion" category in this instance is perhaps as interesting as the "yes" and "no" ones **(**Fig. 4.16**)**.

Most respondents across all three phases either didn't know about the existence of an institutional repository or had no opinion on the matter (Table 4.63, Fig. 4.19). However, in the third phase, respondents seemed more informed. In phase one, neither Greek hospitals nor the Library of Health Sciences of the University of Athens had in fact established institutional repositories. This situation had changed by phase three. Consequently, we can see a decrease in the percentage of "do not know" participants (37.0%), while an increase in the percentage of those who knew there were no institutional repositories (once acquainted with the concept), as compared to phases one and two (46.9%).

Has your institution got an institutional repository? (Q37)	Phase 1	Phase 2	Phase 3
Yes	**30,5**	15,3	16,0
No	27,1	25,4	**46,9**
Do not know	**42,4**	**57,6**	**37,0**
NV	0	1,7	0

Table 4.63 Institutional repository existence

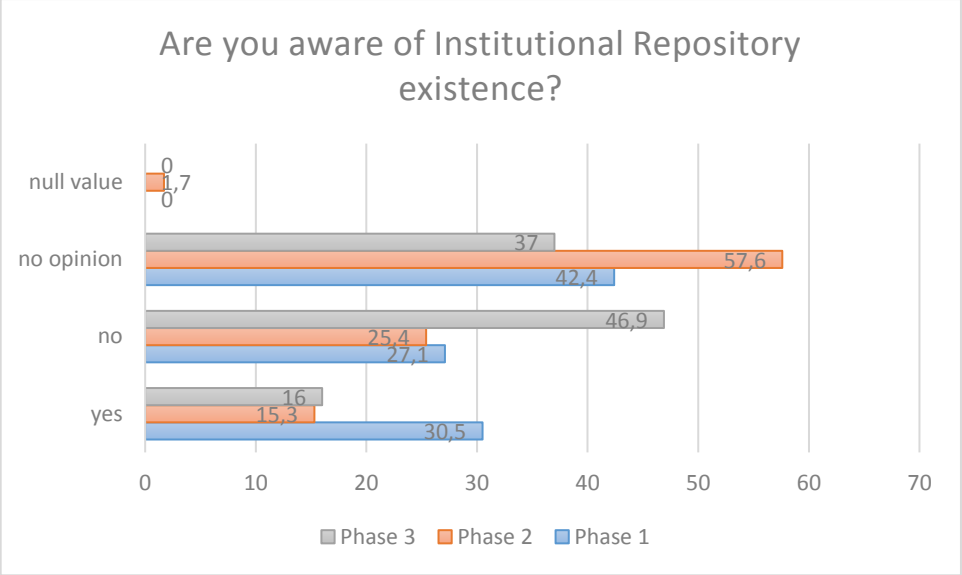

Figure 4.19 *Awareness of Institutional Repository existence*

There seems no change in the percentage of participants who believe open access publishing to be a means for wider information dissemination (see Table 4.64).

Do you consider Open Access Publishing as a means for wider information dissemination? (Q39)	Phase 1	Phase 2	Phase 3
Yes	**89.8**	**89.8**	**90.1**
No	5.1	8,5	8.6
NV	0	1.7	0

Table 4.64 Open access publishing as a mean for wider information dissemination

Similarly, there is no change on the percentages of biomedical scientists who are aware of using open access journals (see Table 4.65). Although in the second phase there was a slight reduction of the participants who knew, in the third phase it presented a rise.

Are you aware of using open access journals? (Q40)	Phase 1	Phase 2	Phase 3
Yes	**61.0**	**59.3**	**60.5**
No	39.0	40.7	38.3
NV	0	0	1.2

Table 4.65 Awareness of using (reading) of open access journals

As far as obtaining information about open access is concerned, Table 4.66 shows that across the three phases many respondents -- almost half -- have been informed about open access publishing through their colleagues.

Q42-Q44	**YesP1**	**Yes P2**	**Yes P3**	**No P1**	**No P2**	**NoP3**	**NullV P1**	**NullVP2**	**NullVP3**
Q42 Institution	30.5	25.4	22.2	66.1	69.5	77.8	3.4	5.1	0
Q43 Colleagues	**40.7**	**40.7**	**45.7**	55.9	54.2	54.3	3.4	5.1	0
Q44 Not aware until questionnaire received	33.9	27.1	25.9	62.7	67.8	74.1	3.4	5.1	0

Table 4.66 Means of awareness about OA

As we can see in Table 4.67, the majority of respondents find open access publication retrieval easy. Notably, in phase three, the decreased percentage of respondents who considered retrieval to be easy is accompanied by a corresponding increase among those who found the procedure very easy.

How easy is for you to detect open access information on your own? (Q46)	Phase 1	Phase 2	Phase 3
Very easy	20.3	11.9	17.3
Easy	**45.8**	**59.3**	**51.9**
Very difficult	3.4	5.1	6.2
Difficult	25.4	23.7	22.2
NV	5.1	0	2.5

Table 4.67 Detection of open access information

As Table 4.68 shows the detection of Greek open access biomedical sources is difficult.

How easy is for you to detect information on Greek biomedical research in open access journals? (Q47)	Phase 1	Phase 2	Phase 3
Very easy	13.6	5.1	6.2
Easy	35.6	33.9	33.3
Difficult	**35.6**	**47.5**	**46.9**
Very difficult	8.5	11.9	9.9
NV	6.8	1.7	0

Table 4.68 Detection of Greek biomedical information in open access journals

As can be seen in Table 4.69, many of the biomedical scientists are aware of the availability of open access journals though their libraries, though across the phases, while, a high proportion of respondent do not appear to know whether their libraries

in fact provide such resources or not. However, there are some indications of a change by phase three.

Does your library provide access to open access journals? (Q48)	Phase 1	Phase 2	Phase 3
Yes	**40.7**	**39.0**	**39.5**
No	6.8	1.7	9.9
Sometimes	11.9	11.9	16.0
Do not know	**39.0**	**45.8**	**32.1**
Other			2.5
NV	1.7	1.7	

Table 4.69 Availability of open access journals via library

The crosstabs calculations for the various phases provided the answers to the following questions that might be posed to the biomedical scientists

- Is a preference for publishing in high impact factor journals associated with familiarity with the idea of open access publishing?
- Is a preference for publishing in high impact factor journals associated with awareness of using open access journals?
- Is familiarity with open access journals associated with familiarity with open access publishing idea?
- Is awareness of using open access journals connected with familiarity with the idea of open access publishing?
- Is uncertainty around copyright issues of open access journals associated with familiarity with the idea of open access publishing?
- Is awareness of using open access journals associated with uncertainty around copyright issues with open access journals?

Three observations can be made from the following Tables. The **first** concerns changes that took place during the third phase of the questionnaire survey, as depicted in the Tables of hypotheses one and two. While in phases one and two there was no correlation between a preference for publishing in high-impact-factor journals and an awareness as to open access publishing idea (Table 4.70) or the use (reading) of open access journals, (Table 4.71), there was a distinct correlation in phase three. The most plausible interpretation of this correlation is that those who prefer publishing in high-impact-factor journals -- and who are therefore likely to be active researchers/publishers -- are also now aware of open access journals and open access publishing.

Hypothesis One	Phase 1	Phase 2	Phase 3
P value	0,557	0,720	0,104
Fisher Exact	0,278	0,361	**0,052**
OR	1,6	0, 7125	2.4074

Table 4.70 Association between familiarity with OA publishing idea (Q19) and preference for publishing in high impact journals (Q3)

Hypothesis Two	Phase 1	Phase 2	Phase 3
P value	0,989	0,349	**0,032**
Fisher Exact	0,495	0,174	**0,016**
OR	1.2	0.5217	3.2222

Table 4.71 Association between the impact factor criterion for journal publishing (Q3) and the awareness of using (reading) OA journals (Q40)

The **second** observation (Table 4.72) concerns the lack of significant changes or of no changes at all; unsurprisingly, across the phases, familiarity or unfamiliarity with the idea of open access publishing was associated with a familiarity with open access journals.

Hypothesis Three	Phase 1	Phase 2	Phase 3
P value	**0,000**	**0,000**	**0,001**
Fisher Exact	0,000	0,000	0,000

Table 4.72 Association between the familiarity with the idea of open access publishing activity (Q19) and the familiarity with open access journals (Q28)

Similarly, there is a strong correlation between familiarity with open access publishing and an awareness of the use (reading) of open access journals across all phases (Table 4.73).

Hypothesis Four	Phase 1	Phase 2	Phase 3
P value	**0,000**	**0,000**	**0,000**
Fisher Exact	0,000	0,000	0,000
OR	12.22	50.1818	9.6705

Table 4.73 Association between the familiarity with the idea of OA publishing (Q19) and the awareness of using (reading) OA journals (Q40)

The **third** observation concerns the variables that were not associated with each other across all the phases. Particularly, as far as hypothesis five is concerned, there was no significant correlation between the uncertainty over copyright issues of open access journals and familiarity with the idea of open access publishing in phase one; in phases two and three such a correlation is refuted as well. Awareness regarding copyright issues for open access journals is not correlated with familiarity concerning the idea of open access publishing (Table 4.74).

Hypothesis Five	Phase 1	Phase 2	Phase 3
P value	0,434	0,502	0,126
Fisher Exact	0,217	0,253	0,059

Table 4.74 Association between the familiarity with the idea of OA publishing (Q19) and the uncertainty about copyright (Q35)

As illustrated in Table 4.75, awareness regarding the reading of open access journals was not associated with any particular certainty or uncertainty concerning copyright issues, and this seems to bear across the three phases.

Hypothesis Six	Phase 1	Phase 2	Phase 3
P value	0,063	0,275	0,216
Fisher Exact	0,023	0,136	0,105

Table 4.75 Association between the awareness of using open access journals (Q40) and the uncertainty about copyright (Q35)

The data as analyzed in this chapter show a direct correlation between distribution rate and research results. The attitudes of biomedical scientists vary according to their professional category; physicians, for example, are more active researchers/publishers than the other categories. Thus, the imbalanced sample affected the facts and figures of all phases. If the analysis had been focused on the attitudes of each professional category, the research findings might have been different. As we can see from Fig. 4.20**,** percentages have changed, as physicians (32.76%) seemed less familiar with open access journals in phase one, while, in phase three nurses make up the difference, as the major percentage of them (29,87%) declare themselves "unfamiliar with open access journals". This may be a result of the impact of the convenience sample. Additionally, the dentists' sample size was very small, and thus did not affect findings. Consequently, physicians and nurses affected research results more than any other category.

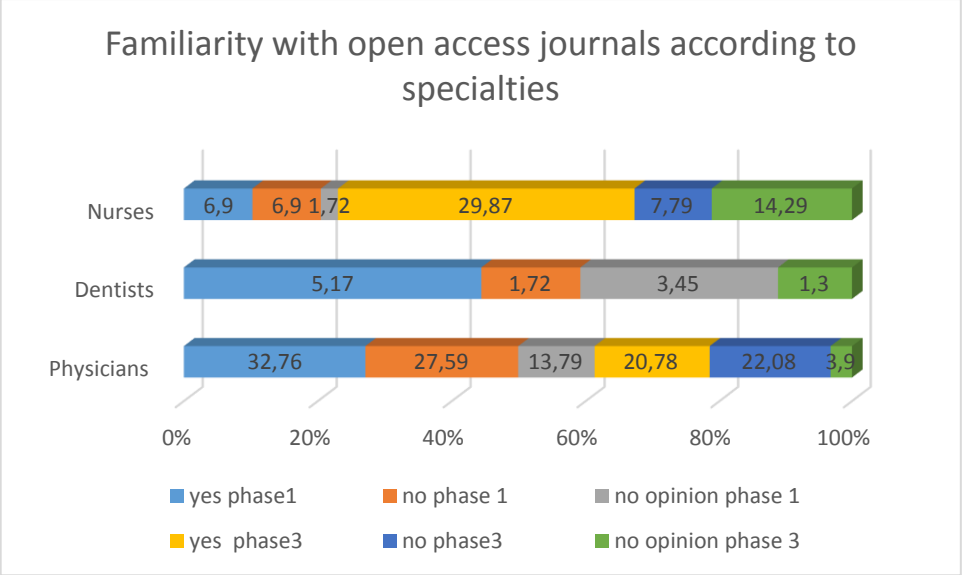

Figure 4.20 *Specialty associated with familiarity with OA journals (phase one and phase three)*

The increased presence of nurses in the sample of the second phase and their predominance in the third phase might have led to another conclusion. Although nurses across the phases have low publishing activity compared to physicians, some correlations -- such as that between familiarity with open access publishing idea and that with open access journals (see Table 4.72) -- probably still apply, and may even be stronger than predicted. Nonetheless, questions that might require a respondent having more experience in publishing (such as those on copyright) may have been affected.

4.7 Publishers' Interviews

All but one of the publishers permitted self-archiving but in interviews it was clear that the publishers wanted authors to apply for permission in order to monitor such activity.

Nine out of ten publishers allowed authors to self–archive the post print (journal) version to avoid duplicate publication, one publisher permitted self-archiving of the post-print (author version with corrections made after reviewing). One publisher commented that the existence of the paper in two websites would be confusing for the readers. Publishers were content for authors to self-archive on personal web pages (n=9), institutional repositories (n=8) or subject repositories (n=8). Self-archiving was mostly permitted immediately on publication of the journal version (n=8), one allowed self-archiving after acceptance of the manuscript. Most of the publishers (n=8) considered themselves in the blue Romeo – Sherpa category (self – archiving of the post-print version), one was in the white category (no self-archiving permitted) and one was in the green category (self-archiving of both the pre-print and post-print permitted). Five out of ten journals were open access and four of them are openly available upon the publication. No publisher provided details of Creative Commons Licences. Five out of ten journals were published only in print form, but one of them provided electronic access to the articles' abstracts only. The majority of publishers (n=8) provided copyright information in the section "instructions for authors". One publisher did not provide copyright information and another publisher offered information on copyright in the section "journal's rules".

4.7.1 Summary Conclusions

The Greek biomedical publishers seemed to be positive to the adoption of self-archiving policy. However, they wanted to be informed in advance and then provided to the authors the permission to do so. The self-archiving of post-print version of the paper was preferred as long as the bibliographic data would be included.

Additionally, biomedical publishers seemed to have no knowledge on the subject of Creative Commons Licences as they did not use them in order to protect their rights as copyright holders, and to protect authors' rights. As far as the open access character of the journals concerned, five out of ten can be characterized as open access journals. Additionally, nine out of ten publishers (both electronic and print journals) include copyright information in their journals.

4.8 Publishers' Websites Analysis

4.8.1 Introduction

This research study was conducted on nineteen Greek biomedical journals, to investigate what information was provided to authors. The majority of the journals belong to scholarly societies. These societies often rely on journal subscriptions as an important source of revenue for the society. The analysis was based on data found in the "instructions to authors" section.

4.8.2 Journal details

The titles which are published in both electronic and paper form were both checked for any variations. Some journal titles present some additional information in electronic form, for example, the journal "Pneumon" provides more information in the electronic form about "Conflict of Interests". The journal "Archives of Hellenic Medicine" provides data in electronic form about the "termination" and the "permitted use". However, the journal *Applied Clinical Microbiology and Laboratory Diagnosis* mentions the need for the originality of the submitted papers only in printed form. The following descriptions of each journal title give details of the frequency, history of the journal, publisher and other relevant details.

Acta Microbiologica Hellenica

It is a bimonthly journal of the Greek Society of Microbiology. It has been publishing from 1956. It is available free of charge via Society's homepage from 2005. No author fees.

Acta Orthopaedica et Traumatologica Hellenica

It is the journal of the Hellenic Association of Orthopaedic Surgery and Traumatology. It is published in four quarterly issues written in Greek language and the same original article in English language. It was first published in 1948 under the title Bulletin of the Hellenic Society of Orthopedic Surgery and Traumatology.

Applied Clinical Microbiology and Laboratory Diagnosis

It is the official journal of Society of Clinical Microbiology and Laboratory Diagnosis. It was first published in 1986. Since 2005 its issues are open access. It includes four issues per year. No information about author fees. There must be an embargo period because the issues of 2012 are not electronically available and the print form of the journal is under subscription.

Archives of Hellenic Medicine

It is a bimonthly refereed journal of the Athens Medical Society. It was first published with the title *Archives of the Hellenic Medical Societies* in 1975. While since 1984 it has been publishing under its current title. Since 1999 all the papers have been open access. No information about author fees. There is a charge only for the reprints.

Forum of Clinical Oncology

It is a journal published by the Hellenic Society of Medical Oncology which in 1997. It includes four issues per year. It has been made available as an open access journal via scholarly society webpage since 2002. No subscription or author costs are requested.

The first issue of the year 2010 is written in English language in order for the journal to be included in PubMed and the Web of Science. In this way, it will obtain an

Impact Factor. Additionally, in my opinion, it would very helpful the copyright notice of this journal to be included in other journals as well:

"*Authors who publish with this journal agree to the following terms*:

Authors retain copyright and grant the journal right of first publication with the work simultaneously licensed under a Creative Commons Attribution License that allows others to share the work with an acknowledgement of the work's authorship and initial publication in this journal.

Authors are able to enter into separate, additional contractual arrangements for the non-exclusive distribution of the journal's published version of the work (e.g., post it to an institutional repository or publish it in a book), with an acknowledgement of its initial publication in this journal.

Authors are permitted and encouraged to post their work online (e.g., in institutional repositories or on their website) prior to and during the submission process, as it can lead to productive exchanges, as well as earlier and greater citation of published work (See The Effect of Open Access)."

Galenus Journal : Panhellenic Bimonthly Medical Edition

It is a bi-monthly journal published by was first published in Thessaloniki in 1959 by Dr. H. ATHANASIADIS. In 1968 the owhership and management changes and continues under N. MIHALOPOULOS (non-doctor) and with a new subtitle "Bimonthly Greek Medical Journal", a new structure of contents (by category of paper) and new scientific committee and scientific partners. On April 1987, C.G.Stasinopoulos, Neurologist-Psychatrist, undertook the management of the Journal. C.G.Stasinopoulos continues the publication.

Greek Annals of Ophthalmology

It is the official journal of Hellenic Ophthalmological Society, is a peer-reviewed scientific publication, issued 4 times per year. It was founded in 1964.

Hellenic Radiology

Hellenic Radiology is published quarterly by the Hellenic Radiological Society. Its publication start year was 1968. Since 2000 it has been indexed in the Society's webpage and only the abstracts of papers can be accessed.

Hellenic Stomatological Review

It is a tri-monthly journal of Hellenic Dental Association. In July 2010 when this survey started this journal was published only in paper form, and it was first published around 1956. In March 2013 when it was explored again, it was discovered that the scholarly society changed its policy which announced in the first issue of 2011 the journal would be published only in electronic form. It would be a bi-lingual journal (Greek and English). Additionally, belongs to the category of open access journals as its issues from 2004 have been freely available. No information about author fees.

Hellenic Surgical Oncology

It is the journal of Hellenic Society of Surgical Oncology, published from 2001. It is a quarterly, and published only in paper format.

Hellenic Urology

Hellenic Urology is a quarterly publication of the Hellenic Urological Association. It has been publishing under the title *Hellenic Urological Review* since 1963. Its title changed in 1989. Since 2002 it has been publishing electronically and it is a freely available journal. Hellenic Urology is a nationally recognized journal it means that the works published in this journal are part of evaluation criteria for taking up a public position in a hospital as a doctor. No information about author fees.

Hippokratia

It is a journal of Hippokration General Hospital of Thessaloniki and first published in 1997. Its electronic form is based on Open Journals System software. It is an open access journal and since 2006 the journal has been included in PubMed Central. Only English language papers are submitted. In 2013 exploration of this journal it is mentioned that

"Due to economic reasons there are no free from charge pages in Hippokratia Journal any more."

Both authors must be registered for submitting their paper. The paper publication has a cost for the author and it depends on the type of paper and the number of the pages. Additional it is included in Web of Science by having an Impact Factor Indicator.

Hormones

Hormones is owned and published by the Hellenic Endocrine Society. It has been publishing since 2002. The full text of the published articles is available on the Internet free of charge. It is a tri-monthly journal which is included in PubMed, Science Citation Index Expanded, and Journal Citation Reports/Science Edition. No information about author fees.

Iatriki

It is the journal of the Society of Medical Studies. It was first published in 1962. It is a monthly journal.

In Vivo

In Vivo is published by the International Institute of Anticancer Research which is established in Greece. It follows NIH open Access Policy for the articles funded by NIH. It is a bimonthly journal and each annual volume includes six issues and index. It has been published since 1987. It is indexed in PubMed, BIOSIS etc. No information for author fees. But there is a cost for open access online reprints.

Nosileftiki

"Nosileftiki: Hellenic Journal of Nursing" is the official scientific journal of the Hellenic Nurses' Association (H.N.A.), which has been published since 1962. Its contents and full abstracts are available in the Greek Medical Data Base "Iatrotek" (2002) and in "CINAHL" (2008), the Cumulative Index to Nursing and Allied Health Literature International Database. The journal is under evaluation by SCOPUS and EBSCO. *Nosileftiki* is published quarterly and is addressed both to nurses of all specialties and to other health professionals. Its issues were freely available via

publisher's webpage until last year. It includes four issues per year. The author pays for the reprints.

Paediatriki of Northern Greece

It is the quarterly official journal of the Paediatric Society of Northern Greece. It has been publishing since 1989 and freely available via its homepage since 2001. No information about author fees.

Pneumon

It is a peer reviewed, bilingual (Greek and English) journal published quarterly as the official scientific journal of the Hellenic Thoracic Society and the Hellenic Broncholic Society from 1977. Its webpage provides open access to the full text type of papers from 1999. It is included in Scopus, embase.

Vima tou Asklipiou - (Rostrum of Asclepius)

It is a quarterly online scientific journal for nurses and other healthcare professionals published by the A' Nursing department, TEI of Athens. The majority of articles are in Greek language but an English abstract is always included. It is also included in DOAJ and HealLink. It is published in paper form in 2002 but since 2007 it has been publishing only in electronic form. No information on author fees are included.

4.8.3 Publishers Websites Analysis Findings

Publishers' websites analysis highlighted the common points among the author instructions of different publishers (appendix 4.10). However, the differences were more important because in this way we can see to what extent each publisher informed the authors about their rights concerning their works after publication. Indeed, all of them provided details about the types of articles accepted and the structure of papers.

The most popular clause of the agreements is "originality". So, 19 out of 19 publishers (100%) request the originality of the article. Meanwhile, the author must confirm that the article will be published for first time. Fourteen out of 19 publishers (73,7%) request "copyright transfer" and thirteen out of 19 mentioned

the term "permitted use" (68,4%). "Termination terms" are included in 10 documents. While, all the other variables are included in very low percentages or are unremarkable as we see in the following chart:

Fig. 4.21 shows that important matters such as proprietary rights, work for hire, further and fair use are absolutely ignored:

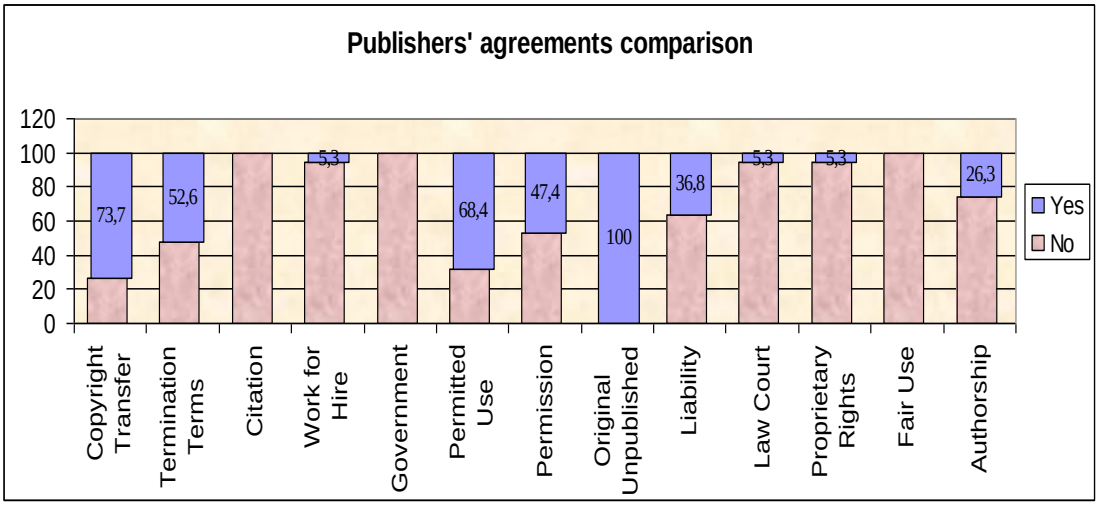

Figure 4.21 *Publishers' agreements comparison*

Some extracts of journals' terms would be useful in order to see the language they use. The following paragraphs are extracted from Greek journals published in the English language:

"….The author is responsible for obtaining written permission to reproduce previously published material (illustrations, tables) from the copyright holder. The consent of the senior author must also be acquired."

The submitted manuscript should be accompanied by a cover letter which should specify:

1. a statement that the submission is not under consideration by any other journal or published previously (apart from abstracts);

2. a statement by the responsible author certifying that all co-authors have seen and agree with the contents of the manuscript. These requirements are absolute…" (Hippokratia).

“A conflict of interest exists if authors or their institutions have financial or personal relationships with other people or organizations that might inappropriately affect, or might reasonably be thought by others to affect, the authors' judgment or actions. Examples of financial conflicts include employment, consultancies, stock ownership, honoraria, paid expert testimony, patents or patent applications, and travel grants, all within 3 years of beginning the work submitted. Conflicts of interest should be clearly stated in the Title page of the manuscript. If there are no conflicts of interest, authors should state that. For further information on how to report conflicts of interest, authors may refer to "the Lancet's policy on conflicts of interest" (James A, Horton R. Lancet 2003; 361**:** 8-9)” (Pneumon).

“ *Off prints and Extra Copies*

The correspondence author will receive an e-mail with the final article in PDF format (as the final publishing version). Additional papers off prints (maximum total number of 10 off prints for all the authors) are available after authors’ order. Costs for additional extra copies must be covered by the authors” (Nosileftiki).

“Manuscripts will become the permanent property of HORMONES and should not be published elsewhere without written permission from the authors and Journal” (Hormones).

4.8.4 Summary Conclusions

The findings of the survey showed that most publishers want to be the copyright holders of original works and have the control about the future usage of the papers. Additionally, almost half of the publishers (47, 4%) try to prevent any illegal action of the authors against copyright protected documents such as images, tables etc, and so, they request from the authors a usage license of the initial copyright holder for the type of material included in the new paper.

The absence of details about proprietary rights, law court, fair use, or work for hire may mean two things. On the one hand, the publisher is interested only about the discouragement of paper reproduction without his or her approval. On the other hand,

the absence of details may facilitate processes for the publishers to claim for more rights than they really have in the Court. However, as far as the libraries are concerned it is rare for a publisher to sue a library for illegal usage in Greece. The publishers mention only their own rights and their standards, which must be followed by the authors for their paper to be published.

As far as the language and the structure of the agreements concerned, it seems to be easy and similar in all publishers' documents. Consequently, the authors can understand the clauses of the agreements but they cannot be informed about their own rights. However, we must mention that in two cases, while, the papers are properties of the publishers (*Hormones* and *Hellenic Stomatological Review*), they can be reproduced only after the permission of author and editorial board. Another case is this one of the journal "Paediatriki of Northern Greece" at which the proprietary rights belongs to the author and the publisher, but only after the permission of the publisher can the article be reproduced.

A comparison *PNEUMON* as a bi-lingual journal with Greek biomedical journals showed that there are no important differences as papers' structure. The journal Pneumon has a National and an International Editorial Boards. The authors are obliged to submit the articles in the two languages. However, the structure of instructions for authors is the same as for the majority of Greek biomedical journals. As far as the copyright is concerned, all the authors must accept its transmission to the journal.

Finally, we should mention some signs of progress for the Greek biomedical journals, exemplified by the *Forum of Clinical Oncology*. It now operates under the principles of the Creative Commons licence and the copyright is not fully, transferred to the publisher only the right of first publication.

4.9 Cost Analysis

The purpose of cost analysis was the study of institutional subscription policy of the journal publishers and the changes which might have happened through the years. The indirect aim was to see the impact of publishers' policy to the budget and the effective function of the library. The main tool for the cost analysis was publishers' websites which were carefully explored. Apart from the subscription prices some information for each journal title is included as journal's characteristics may contribute to the structure of pricing policy. All prices are expressed in Euro and they concern the institutional subscriptions. While, it must be mentioned that the 2013 institutional subscription prices of foreign journals, apart from *Cell*, are derived from the subscription prices arranged for a specific institution the National and Kapodistrian University of Athens. This happened because the publishers do not provide general information as they offer a variety of subscription models adapted to the special characteristics of each Institute.

4.9.1 Journals' General Characteristics and Prices

British Medical Journal is published by British Medical Association. It had been available on line by 1994 and freely available from 1999 to 2006. Since 2006 subscription model was followed. All the restrictions were raised one year after publication. Institutional subscription prices depended on Full Time Equivalents. The prices for the year 2007 were:

	Print Only	Online Only			Print & Online		
		Small	Medium	Large	Small	Medium	**Large**
		FTE	FTE	FTE	FTE	FTE	**FTE**
BMJ International	**582**	**582**	**728**	**814**	**657**	**804**	**889**

Table 4.76 British Medical Journal subscription prices for the year 2007

In the second phase, in 2013, the ***British Medical Journal*** had already adjusted to an open access policy since 2008. It was freely available from time to time but it was not officially an open access journal until 2008. The cost of publication fees is £3000 per accepted research article. However, these expenses are pre–decided on the basis that will be covered by the funder. Otherwise, the publishing costs will be paid by the journal because the subscription for non-research articles secures the open access to all the research articles.

The ***British Medical Journal*** is a member of the Open Access Scholarly Publishers Association and uses the Creative Commons licences. In addition, as the journal refers in its site the *BMJ Open* is going to be launched in the Autumn of 2011.

The prices for 2013 are

	Print Only	Online Only
BMJ International	**1.173.23**	**2109.51**

Table 4.77 British Medical Journal subscription prices for the year 2013

New England Journal of Medicine is published by the Massachusetts Medical Society. It is a weekly journal and its issues were available in public six months after their publication. The prices for the year 2007 were:

	Print & Online	Online Only	Print & Workstation
New England Journal of Medicine	180.00	99.00	475.00

Table 4.78 New England Journal of Medicine subscription prices for the year 2007

In 2013 the website was searched again and no new details were found about an open access publishing policy. The research articles are freely available after the embargo period of 6 months and there is no information about author pay fees.

However, as it is observed in the following table the prices for the only print issues for 2013 are changed

	Print
New England Journal of Medicine	782.05

Table 4.79 New England Journal of Medicine subscription prices for the year 2013

Both the *British Medical Journal* and the *New England Journal of Medicine* are learned society publications in origin. Their impact factors were 9.245 (BMJ) and 51.296 (NEJM) in 2007. Their impact factors for 2011 were 14.093 and 53.298 respectively.

As we will see the data are different for the journals Lancet and Cell which are published by Elsevier, a commercial publisher in 2007 and 2013.

Lancet is published weekly both in London and New York. It started in 1823 and it is a very famous journal with high impact factor 25.800 in 2007 and 38.278 in 2011. Lancet was not an open access journal in 2007.

	Print
Lancet (European Countries and Iran)	**990.00**

Table 4.80 Lancet subscription prices for the year 2007

In 2013, the journal *Lancet* remains a non-open access journal but the Elsevier seems to have adopted an open access policy. The authors, who are funded in order to publish their research article as open access in *Lancet*, must pay a fee of £400 per page. The authors are encouraged to deposit the edited and peer reviewed form of their articles in institutional repositories and their websites but by adding journal's citation and the link of the published. They also need to fill in the Article Sponsorship form for the *Lancet* journals. While the institutional subscription for Greece is

	Print
Lancet	**1.954,19**

Table 4.81 Lancet subscription prices for the year 2013

Cell is another scientific journal of Elsevier. It has also a high impact factor 29.194 in 2007 and 32.403 in 2011. It was first published in 1974 and it is biweekly. An additional characteristic of this journal was the articles are open access 12 months after publication. Institutional Prices for 2007 were concerned only the print form:

	U.S. / Canada	all other Countries
Cell	635.32 ($ 997.00)	714.97 ($ 1122)

Table 4.82 Cell subscription prices for the year 2007

In 2013 the open access policy remains the same. Twelve months after article publication, all the articles are openly available to subscribers and non-subscribers. There is the cost of $5,000 per article. However, the fees are usually reimbursed by sponsors.

The subscription price of the print form for 2013 is

	U.S. / Canada	all other Countries
Cell	1053.77 ($1360)	1187.04 ($1532)

Table 4.83 Cell subscription prices for the year 2013

As far as Greek biomedical journals concerned the majority of them are published by scientific organizations. We shall examine four Greek biomedical journals; the Greek-language journals ***Iatriki*** and ***the Archives of Hellenic Medicine*** and two English-language biomedical journals; ***In Vivo*** and ***International Journal of Oncology***.

Iatriki is published monthly by the Society for Medical Studies. It is a Greek language journal in print form only. The prices in for 2007 subscription were:

	Greece	European Union	Other Countries
Iatriki	130.00 (Library edition)	90.00	120.00

Table 4.84 Iatriki subscription prices for the year 2007

***Iatriki* for 2013**

	Greece	European Union	Other Countries
Iatriki	130.00 (Library edition)	90.00	120.00

Table 4.85 Iatriki subscription prices for the year 2013

Archives of Hellenic Medicine is published by the Athens Medical Society since 1974. It is a bimonthly medical journal and the rates of annual subscription 2007 were:

	Greece	Cyprus	Rest of the World
Archives of Hellenic Medicine	47.00 (Library edition)	25.62 C £ 15.00	63.72 ($100.00)

Table 4.86 Archives of Hellenic Medicine subscription prices for the year 2007

The prices for 2013 are depicted in the following table

	Greece	Cyprus	Rest of the World	Balkan Medical Union
Archives of Hellenic Medicine	47.00 (Library edition)	24 €	63.72 ($100.00)	$50

Table 4.87 Archives of Hellenic Medicine subscription prices for the year 2013

Archives of Hellenic Medicine was recently included in Directory of Open Access Journals.

In Vivo is a bimonthly journal established in 1987 by Delinassios. It backs up the activities of International Institute of Anticancer Research and is included in international bibliographic databases such as MEDLINE, ISI, CANCER-LIT Database et al. Its impact factor was 1.273 in 2007 and 1.264 in 2011. The annual institutional subscription rate for 2007 were

In vivo	**875.00**

Table 4.88 In Vivo subscription prices for the year 2007

For 2013 the subscription rates are

	Price per volume Print/Online	Single Issue
In vivo	855.00	146.00

Table 4.89 In Vivo subscription prices for the year 2013

In Vivo supports the open access policy and it mentions that the cost of the online open access reprints fees depends on the length of the paper for example a paper from 1 to 4 pages costs 400 euros and the highest price for a paper of 17 – 20 pages is 800 euros. These prices reduce according to the number of copies.

International Journal of Oncology is published by the Professor D. A. Spandidos. It is included in many bibliographic databases such as Science Citation Index, MEDLINE, Research Alert as well. The impact factor was 2.556 in 2007 and 2.399 in 2011. It is monthly and its institutional price for 2007 was:

	Europe	all other Countries
International Journal of Oncology	**970.00**	**1020**

Table 4.90 International Journal of Oncology subscription prices for the year 2007

In 2013 the publisher announces in instruction for authors that the authors must pay for the publication of the accepted articles the following fees:

Basic charge (total amount for up to 5 pages): EUR 220
Each additional page : EUR 110
Reproduction in color : EUR 390 per page

Additional costs for immediate open access: EUR 450

Additionally it states that the paper will be automatically provided as an open access article twelve months after publication. But this policy concerns only the journals *International Journal of Oncology* and the *Oncology Reports*. For 2013 no information about prices are provided via journal's website.

4.9.2. Summary conclusions

Both the Elsevier publications are high impact journals, higher than the *British Medical Journal*, and seem to be able to charge a premium for that greater prestige – the *Lancet*, for example, cost a Greek biomedical library twice than the *New England Journal of Medicine* in 2007. In 2013, the price of Lancet is very high for the budget of an academic library. The interesting example was the different policy between the *British Medical Journal* and the *Lancet*, because although both of them had similar prices the much of the material of the first one was freely available after publication in 2007. But in 2013, Elsevier changed publishing policy and encourages the authors of research article to support open access policy. Moreover, the most impressive matter observed in the comparison of the above journal is that although the New England

Journal of Medicine remains the cheapest one, it has the highest impact factor of all and its articles are openly available six months after their publications. However, there is no information mentioned about author – pay fees.

The comparison between Greek language journals and English language Greek journals is difficult. As in 2007, the Greek language journals were very low priced but they covered only the needs of Greek scientific society and they did not enjoy the international prestige. However, in 2013, the journal *Archives of Hellenic Medicine* makes the difference because it is included in the Directory of Open Access Journals. The English language Greek journals might be very expensive but they have been internationally recognised since 2007. They have impact factor and are included in world –wide databases. Nevertheless, in 2007, the *International Journal of Oncology* could be estimated as too expensive as it cost more than the *British Medical Journal*! This might have happened for two reasons. Perhaps the *British Medical Journal* was published by a medical scholarly society, or perhaps the *International Journal of Oncology* was published by a commercial publisher and on the other hand the International Journal of Oncology as a smaller journal had a much harder job in covering their costs. A large number of subscriptions mean that the commercial publishers can sell more copies, and cover their fixed costs, and make a profit. Smaller publishers have to charge more per copy to cover their costs.

Another point to make is that personal/individual subscriptions are often a lot less than the institutional subscriptions. Different publishers (commercial and learned society) use different business models to balance up the income from personal subscriptions and from institutional subscriptions. Also, some publishers are offering access online to individual articles at a fee to non-subscribers.

The conclusion is that it is very difficult to work out what the financial motives are for many publishers! However, it is worth mentioning that some years later from 2007 the open access publishing as a model is included and followed by commercial and non commercial publishers. Certainly, it is happened in different ways but the fact is that an open access policy is generally adopted, at least partially.

4.10 Themes of Change

Summary conclusions	**Notes**
PubMed survey presented increase in currently indexed journals in spite of the changes in its inclusion policy	Section 4.1.3
Web of Science included a greater number of biomedical journals in English language published in Greece in phase two	Section 4.2.2
DOAJ is also enriched with 11 open access biomedical journals	Section 4.3.3
More Greek biomedical journals are currently indexed in **BioMedCentral** as well	Section 4.3.3
The number of electronic biomedical journals retrieved by **Google** remained almost the same across the two phases	Section 4.3.3
Increased the participation of Greek biomedical scientists in the social networking sources such as **LinkedIn, ResearchGate and Google Blogs**	Sections 4.4-4.4.1
Increased visibility of **publishing activity** of Greek scientists **via Web of Science**	Section 4.5.3
Keywords searching in **PubMed and BioMed Central** for information retrieval of papers about open access Greek biomedical journals remains inadequate	Section 4.5.3

The **three phases questionnaire surveys** showed that • the differences in the sample (professional representation and size) affect the results respectively • the physicians are the most active researchers • high impact factor" and and "high prestige" were important criteria for choosing journals for publication • researchers do make their works available via internet especially at the first and the third phase • the doctors seem to be more familiar with open access publishing idea across all the phases • by the third phase, the more active researchers are significantly more aware about open access publishing • the respondents seem to be unaware about the publishing in open access journals • the "no opinion/don't know" and missing values answers suggested that many biomedical scientists are not concerned about aspects of open access publishing (peer review, copyright etc.) • the respondents do not know about the existence of institutional repositories • they consider open access publishing as a means for wider knowledge dissemination • respondents read open access journals • they are informed about open access publishing from their colleagues • respondents can find open access information but Greek biomedical research information in open acess journals is more difficult to detect • by the third phase more respondents are informed about the availability of open access journals via library	Sections 4.6.1-4.6.4

Table 4.91 Changes through the years

Chapter 5
Discussion

5.0 Introduction

When the research started, open access had seemed to be one solution to the problem of journal subscription prices increasing faster than library budgets. During the period of the research, the financial crisis, and the ongoing technological changes, emphasized the need for understanding more about attitudes to open access and the most likely routes that open access might take. The evolution of this new publishing model and its role in libraries' daily practice were at the same time a challenge and a motive for a longitudinal study.

Chapter 5 discusses the main changes which have happened around the world (findings from the literature review) and relates these to the research findings on Greece. The organization of the chapter is as follows. The first sections discuss the developments of scholarly communication among biomedical scientists in Greece and the possible influence of open access, using the main trends identified from the bibliometric survey and the three phases of the questionnaire survey. The first theoretical framework used to examine the rate of change is Roger's diffusion of innovations theory, principally the five factors that govern adoption of an innovation. Later Lewin's theory of change (forces for and against change) is used, discussing how the forces for may be helped and the barriers to change reduced. In this way, it is possible to identify possible actions for library services.

5.1 Open access and scholarly communication in Greece

5.1.1. Developments in Greek biomedical scholarly communication

Scholarly communication in biomedicine in Greece is affected by international developments as such research activity has few physical borders. It was important to

assess what sort of impact open access developments were making in Greece. The relevant research question was:

- Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what are the main changes have been observed over the course of the last few years?

To answer this, a traditional bibliometric analysis (section 3.7) was done, followed up in 2013 with a study on professional social media, to be fully aware of recent changes in the way biomedical researchers make their research visible to peers.

The main quantitative changes observed from the bibliometric survey (sections 4.1 to 4.5) were:

- Increased number of open access Greek biomedical journal titles that could be retrieved from PubMed and PubMed Central
- Increased number of Greek journal titles covered by Science Citation Index Increased number of Greek open access and peer-reviewed biomedical journal are accessible via DOAJ
- Increased number of Greek open access biomedical journals are included in BioMed Central
- Steady number of open access biomedical journals were retrieved via Google
- Increased number of published works of Greek scientists were retrieved from Science Citation Index
- Increased number of papers concerned open access written by Greek scientists retrieved from PubMed and BioMed Central

If we can assume that increased visibility in the reputable databases such as Science Citation Index, Biomed Central and PubMed is an indicator of improvement in scholarly communication, then it seems that open access is certainly associated with the increased visibility, although correlation cannot be confused with causation. It is not possible to say that open access directly contributes to increased visibility, but it appears that Greek biomedical research is making increasing use of open access for scholarly communication, and the impact factor data for SCI (section 4.2) indicates

that the Greek open access biomedical journals can be of the same value and prestige as the traditional ones and they can enjoy the benefits which are derived from Impact Factor Indicator. Similarly, Greek biomedical researchers are using professional social media for exchanging ideas and make their works accessible. (section 4.4)
Although the number of open access/hybrid open access journal titles retrieved using Google remained about the same (section 4.3.2) this might be for two reasons: on the one hand the publishers may prefer their journals to be indexed and accessible via international databases such as PubMed and DOAJ, and on the other hand the Greek biomedical journals are not all indexed in a database and cannot be easily retrieved via Google.

The Greek scientists increasingly publish in the international scientific journals as the Web of Science survey indicated. This might be explained as an effort of Greek scientists to be more active in the international research context. (section 4.5)

In addition, the writing activity of Greek biomedical scientists on open access issues as it was depicted in BioMed Central and PubMed survey might be an indication of some greater awareness, among some scientists at least. **(**section 4.5.2**)**

The complementary questionnaire survey assessed the state of awareness about open access among Greek biomedical researchers, and attempted to assess what the main changes were. In fact, there is some change but this seems to be in an initial stage. Specifically, the major changes derived from the questionnaire survey (section 4.6) subject to some reservations about the confidence limits, were

- Increased number of participants chooses the high Impact Factor journals to publish in
- Increased number of participants demonstrate their research outcome via internet
- Greater percentage of participants are aware of open access publishing
- Greater percentage of participants are aware of open access publishing procedures

- Increased number of participants do not consider the open access journals as low prestige journals
- Increased number of participants consider the lack of funding as a problem
- More participants believe that their institution does not encourage them to publish in open access journals
- It is more obvious that the author charges are an obstacle
- Participants are more informed about the meaning and existence of institutional repository

If the "traditional" scientific journal could be considered as the most widespread scholarly communication channel, it would be interesting to see if the open access journal as a new form of scientific journal could contribute to the improvement of the scholarly communication as much as the traditional one has done. One could assume that the awareness could be characterized as an indicator of greater willingness to engage with open access journals. Nevertheless, awareness should not be evaluated as the key element for turning the open access journal into a substitute of traditional journal. During this three phases of the survey, change was mainly observed in the third phase. This fact suggests that awareness is growing slowly, but the more recent increase could be due to other external factors such as the greater push for open access by the NIH, in collaboration with National Library of Medicine, and the policies to promote open access to the biomedical literature. As we can see according to the findings (section 4.6.4) more active researchers (the physicians) are more aware of open access publishing activity than other categories of biomedical researchers such as nurses. However, more respondents consider that their institutions do not encourage them, perhaps, because they do not fund them to publish in open access journals that require page charges. Consequently, even if they want to publish they cannot because they know that they need to pay for this and they cannot afford to pay. So, the author charges are preventing them from publishing in some open access journals. However, the publishers' websites analysis showed that the majority of Greek biomedical journals which published by scholarly societies are open access without authors' fees (section 4.8). On the contrary, the journals cost analysis results could be characterized as an indication of the problem which the libraries cope with

because of the high subscription costs of the prestigious international journal especially of commercial publishers (section 4.9). It seems that this fact also concerns the Greek commercial biomedical publishers as someone can observe by analyzing the cost policy of Spandidos' biomedical publisher. Nevertheless, more Greek biomedical scientists who are active researchers and know the meaning and the advantages of Impact factor indicator, they also seem to be more informed about open access publishing idea and use of open access journals, as there is some correlation among those parameters.

More respondents might be more informed about the meaning of institutional repository because they know for sure that there is no institutional repository in their institution. However, the lack of more questions on institutional repositories did not offer us the opportunity to obtain in depth information on the knowledge of Greek biomedical respondents about deposition procedures or publishers' archiving policy. We cannot know if Greek biomedical scientists are informed that they can obtain the consent of Greek publishers to post their papers on their websites and institutional repositories after asking for permission and by including the bibliographic data of the journal. Additionally we do not know if the Greek respondents are aware about the major drawbacks of the institutional repositories derived from publishers' embargo periods or the forbiddance of archiving the final revised version. Both of the obstacles seem not to concern the majority of Greek biomedical publishers according to the interviews' results (section 4.7). Nevertheless, according to publishers websites analysis (section 4.8.3), publishers want to be the copyright holders and the authors are obliged to transfer the copyright in order their paper to be published.

This survey showed that there is lack of information about open access publishing and mainly the main characteristics of open access through all the phases because of the intense presence of "missing values" and "No opinion/Do not know answers" which were marked throughout all phases (appendices 4.1-4.3). However, it might have a logical explanation, because, as we see in section 5.2.2 an innovation needs time to be frozen in a condition, as it needs time to be accepted or rejected. Although, the lack of information or the insufficient knowledge might prevent a scientist from using this new communication means, the knowledge of this ignorance at least indicates where some of the stakeholders need to take action.

Additionally, the relatively small sample size and the overlap for many of the answers according to the estimated confidence intervals (appendices 4.4-4.6) indicate some uncertainty about the consistency of the responses and the difference among the findings of the three phases. Nevertheless, the literature review indicated that this apparent lack of awareness was not surprising, at least for phase one of the survey work. The Spanish survey conducted in 2004 (Hernández-Borges et al. 2006) showed that only 22% of respondents were aware of access publishing models and around one third of the Spanish respondents believed the author charges were a barrier. Swan and Brown's studies (Swan & Brown, 2004) found that awareness of open access remained at a low level. A survey conducted in 2007 in Cuba by Sánchez-Tarragó and Fernández-Molina (2009) emphasized the problem even more as they stated that over 50% of the Cuban biomedical researchers included in the study stated that they had never heard of open access journals, a surprising statistic given the greater access provided by open access journals to readers who cannot afford high journal subscriptions. Later, Swan mentioned in the 2008 study results (Swan, 2008) that researchers remain poorly informed about open access. Awareness was growing but still only slowly and there remain many misconceptions. Researchers are eager to maximise their own impact and reputation but do not understand what means and opportunities are available to them.

Open access has been promoted as a simpler, cheaper and effective way of disseminating research (Jain, 2012) – Harnad, some of the reports (Berlin/Bethesda etc) and the argument generally assumes that more open access journals could therefore improve scholarly communication. The difficulty is deciding how many more open access journals are desirable, whether the aim should be to make more of the existing journals open access (to some extent, and how) and what the role of institutional repositories might be, as sources of open access versions of journal articles. The bibliometric survey indicated that there was increased publishing activity for open access journals – and that Greek visibility for biomedical research appeared to be increasing. Many bibliometric studies of individual countries' biomedical research (or sections of that research) (Zainal and Zainab, 2011, Méndez-Vásquez et al., 2012, Aleixandre-Benavent et al.,2009) only examine the contribution to the high prestige databases (SCI, Medline) or the comparative contribution of a

particular country (e.g. Italy among EU countries, Gallo & Segnan, 2011). The working assumption is that it is the high prestige databases that matter in measurements of research productivity and scholarly communication, but these databases are, of course, much easier, and probably more reliable for such assessments.

The next sections of the discussion examine open access, particularly open access journals, as an innovation. This helps to understand the contribution of open access publishing to the possible improvement of work practices of biomedical researchers in Greece. To understand how things are changing helps to judge whether the changes signal improvements or not.

5.2 *The Theories for the Adoption of an Innovation*

Although open access to information has been the vision of many scientists throughout the years, open access publishing is more recent. The context for the innovation of open access publishing appear to be:

- People's request for open access to governmental archives was established by implementing the principle of Freedom of Information and enacting the relevant legislation (appendix 2.1)
- In the postWorld War II era the need for the production more specialized knowledge was intense (section 2.5.2)
- The weakness of learned societies to respond adequately to the demand for popular science (section 2.5.2)
- The participation of commercial publishers in the scholarly communication by publishing the scientific journals since 1945 (section 2.5.2)
- The increasing volume of scholarly journals because of cheaper publishing costs and increased volume of specialized information (section 2.5.2)
- The impact of commercial publishers' income on scholarly communication process (section 2.5.2)

- During 1960s period the electronic form of information facilitates the preprints' exchange via invisible college and creates the proper conditions for electronic journal preparation (section 2.5.4)
- In 1990, Paul Ginsparg was the inventor of well-constructed and successful preprints distribution system, the arXiv.org e-Print Archive (section 2.5.4)
- By the 1990s, it is observed increasing rate of electronic journals especially in USA (section 2.5.4)
- Development of metadata schemas for the description of electronic sources (section 2.6)
- Establishment of tools such as Open Archives Initiative and Resource Description Framework aimed at the detection of heterogeneous digital resources (Section 2.6.)
- Publishers' policy of increased subscription costs of print and electronic journals (2.5.2-2.5.5)

5.2.1 Open Access as an Innovation Analysed According to the Theory of Diffussion

The lack of awareness and the uncertainty about open access issues may arise from the situation, the transitional phases of the reformation of scholarly communication. As the survey results indicate **(**section 4.6**)**, there is still some uncertainty among the Greek biomedical researchers, but this is hardly surprising as the situation is complex (Campbell, Willinsky & Anderson, 2010). Additionally, uncertainty is a characteristic of "diffusion of innovation" procedure, so it is important to explore for the reasons which provoke uncertainty in the knowledge structures and their differences among the research communities (Fry & Thelwall ,2008).

As open access publishing is an innovation, it takes time to spread. The analysis of research results based on the Theory of Diffusion of Innovation and the Theory of Force Fields analysis could provide useful conclusions about the diffusion of open access publishing and the spread rate this process needs. The comparison of survey results with the following five change factors of Rogers Theory may explain the time that the social system needs to adopt the innovation (Section 2.13). These factors are

- Relative advantage
- Compatibility
- Complexity
- Trialability
- Observability

Relative advantage of open access

Open access publishing could be considered the evolution of electronic publishing and **the relative advantage** could be analysed by examining the comparative advantage of open access publishing against electronic publishing as a means of information dissemination.

The conception of open access publishing as a means for wider information dissemination could be considered as a strong **relative advantage** for adoption of this innovation. This fact is confirmed in all questionnaire survey phases as the majority of the respondents have formed this opinion (phase one=89.9%, phase two=89.8%, phase three=90.1%) (appendices 4.1-4.3). The advantage of wider information dissemination may be powerful because there is an intense need of the scholarly community for immediate access to knowledge in order that research results are evaluated and applied, especially in the biomedical sciences. At least in principle, the Greek biomedical researchers believe that open access should mean that a wider readership of research is possible, than through traditional subscription type resources. In practice, there is a disproportion between the percentages agreeing that open access publishing is a means for wider information dissemination (phase one=89.8%, phase two=89.8%, phase three=90.1%) and the percentages agreeing that they used (read) open access journals (phase one=61.0%, phase two=59.3%, phase three=60.5%). In addition, open access publishing sources includes subject repositories as well as open access journals. Consequently the above mentioned imbalance may happen because the scientists accept the principle, but have not had much experience in reading, or publishing in open access journals, or use of repositories.

The answers to the question about the detection of Greek biomedical research in open access journals show that Greek biomedical scientists have difficulty in finding Greek biomedical research in open access journals as shown from all the phases of the questionnaire survey (phase one=35.6%, phase two=47.5%, phase three=46.9%). On a practical level, it seems that their understanding of how to access such material is limited, beyond a Google type search that might produce relevant items from a range of resources. Libraries could inform Greek biomedical scientists about the detection of Greek open access sources but their role seems to be vague because a relatively high percentage of respondents stated they were ignorant about the availability of open access sources through the library (phase one=39.0%, phase two=45.8%, phase three=32.1%). Only in the third phase is the ignorance apparently decreasing. Nevertheless, consistently, the majority of the biomedical scientists read open access journals (phase one=61.0%, phase two=59.3%, phase three=60.5%) and there are Greek open access journals. It's worth mentioning that the detection of open access information generally considered to be an easy procedure for the respondents as depicted in the question 46 (phase one=45.8%, phase two= 59.3%, phase three=51.9%). By observing the respective percentages of the respondents who generally detect open access information we can conclude that although the detection of open access information is an easy process it is easier to detect the general open access sources than the Greek ones according to the percentages of the questions 46 and 47 (Section 4.6.4). This may reflect their usage of HealLink as HealLink offers the researchers the opportunity to find easily and quickly information which is open access from reader's point of view, although not really open access as the library has paid for the subscriptions. As far as access to the Greek biomedical journals is concerned, researchers need to look for these via search engines and the information retrieval takes more time. Greek biomedical researchers may in fact expect Greek open access journals to be available via HealLink.

The publishers' websites analysis, which took place in three different periods in July of 2010, November of 2010 and March of 2013, revealed thirteen to nineteen Greek biomedical journals that are open access. Indeed, the majority of the journals are open access as the publishers consider open access publishing as the best way of advertising their journals, although this is not always made clear to their authors. Additionally, the number of Hellenic journals which are bi–lingual (Greek and

English) or only in English language are increasing as publishers realize that the English language journals are more acceptable to world bibliographic databases**.**

There is further confirmation from the bibliometric survey that illustrates the participation of Greek biomedical journals and Greek biomedical scientists in open access sources. Meanwhile, in PubMed Central, *Hippokratia* and articles of *Cancer Therapy* are included. In BioMedCentral, Greek biomedical scientists participate in open access journals as editors (from two in 2006 to three in 2011). In DOAJ there is an increase in Greek biomedical journal titles included, from six in 2006 to eleven in 2011. (section 4.3.3) All these facts indicate that Greek biomedical scientists are getting more and more familiar with open access sources. The relative advantage of greater dissemination seems to be getting clearer to the biomedical scientists.

Another **relative advantage** of open access is the ease of publication as each researcher may easily be a publisher as well. Sometime ago, the announcement of research results was a privilege of the publishers. Nowadays, Web 2.0 technology turns the readers into publishers in easy and quick procedures. The increasing number of personal webpages, blogs, use of social media and the listserves make personal publishing easier. Greek biomedical scientists seem to participate in networks for presenting their works (see sections 3.3, 4.4-4.4.1) as a survey in ResearchGate showed that among the 1.804 Greek members connected to the University of Athens there were 754 biomedical scientists who had announced 2.897 papers out of the total of 4.114. However the impact points of biomedical works was 8.196,96 out of the total impact points of 10.748,59. As far as the participation of the National and Kapodistrian University of Athens in LinkedIn concerned, there were 3.222 followers. The survey in the Greek edition of Google blog search makes obvious the increased usage of blogs and announcements via blogs as informal communication means (National and Kapodistrian University of Athens = 21.300, National and Kapodistrian University of Athens Medical School=4.290). (section 4.4)

The questionnaire survey confirms this as the majority of the respondents (phase one=60.5%, phase two=49.4%, phase three=60.5%) claim to have announced their work via the Internet. A large number, although not the majority stated that they have posted their works via institutional webpage, or subject repository such as PubMed

Central (Q38, phase one=47.5%, phase two=37.3%, phase three=45.7%). Unfortunately the questionnaire did not ask for further details about the reasons for their belief, but it seems that the respondents are aware that online databases, and journal websites offer some publicity for their research, at least through dissemination of the abstract, and full text if it is possible. The questionnaire did not ask further details about any personal dissemination related to research reports or articles via the Internet, which could be by email, through an online research collaborative, blog or microblog (Twitter).

Also **relative advantage** is that with open access publishing, there is no formal charge for access to knowledge. The libraries and the readers do not need to pay for access to information. However, the author charges may alter the character of this benefit. Some publishers who have adopted open access policies aim to overcome this problem by making contracts with scholarly societies and institutions for funding authors. However, Swan and Brown (2004) state that the authors do not often worry about the author charges because they know that charges shall be paid by institution funds or grant awarded agencies and they refer to the examples of Howard Hughes Medical Institute and Wellcome Foundation which are both willing to pay for open access publishing. Laakso et al. (2011) mention the policy of large publishers to launch open access journals funded by author charges but the role of funders is stressed again. NIH of USA (Carroll, 2008) promotes open access by making obligatory the deposit of publications concerning research funded by the State into PubMed Central, in order to make publishers comply with the NIH Public Access Policy. The Federal Government of USA has taken the lead in open access again by promoting via a directive of U. S. White House Office of Science and Technology Policy a form of cooperation among the Association of American Universities, the Association of Public and Land-Grant Universities and the Association of Research Libraries in order to expand public research by launching a "Federate System of University Repositories" (Howard, 2013). The implementation of this federated repository entitled as SHared Access Research Ecosystem-SHARE could be characterized as the academic response to the CHORUS (Clearinghouse for the Open Research of the United States) proposal of the publishers. In CHORUS, the publishers propose open access to peer reviewed articles facilitated by federal funding which have been published, whether or not the publication has been in open access

journals. This means that for the first time, articles to which access was a privilege of subscribers shall be made openly available. Additionally, the CHORUS mechanism as it is described by Sporkin (2013) is based on the software, CrossRef, FundRef and ORCID. It means that CrossRef will provide the metadata and the FundRef will cross reference this to the federally funded research. ORCID helps researchers to identify their works by recognizing digital identifiers. There will be a link which references to the full text articles in publishers' websites. Additionally, the whole procedure seems to be very easy for grantees as well. They need also to choose the funder and everything is arranged by publishers in collaboration with funding agencies. However, as Eisen (2013a) demonstrates PubMed Central could be used instead of CHORUS. Because both systems have similarities, so the expansion of PubMed Central would be easier and almost costless. But the publishers also claim that the infrastructures' costs will be minimized because of the usage of existing structures.

However, CHORUS seems to be in doubt because publishers' targets also are in doubt as it is revealed in the dialogue between Stevan Harnad (2013) with David Wojick on "CHORUS". First of all, because there are suspicions that publishers shall "exploit" some memorandum's principles which can be elastically interpreted. Specifically, the fact that agencies are obliged to make publicly available within an embargo period of twelve months but this period will be adjusted to the discipline's requests, and this makes the scholarly community believe that the publishers shall manage to provide publicly the articles at the end of twelve months period (but no earlier) in order to benefit from the subscription revenue. Should open access mean immediate open access as Harnad (2013) states? Furthermore, the control of open access publishing will be taken away from the hands of scholarly society and publishers shall manipulate the results of public results as they want. Publishers have always fought for this, and if their proposal is accepted they may succeed in their target. Moreover, it is dubious whether open access articles can be found if they shall be accessible only via publishers' websites and the funding agency' website. Finally, although the CHORUS mechanism is presented as cost savings mechanism, the cost of its preservation may be at expanse of libraries because of the increase of subscription prices (Eisen, 2013**).**

As far as SHARE concerned Wojick (2013d) mentions some problems which may be derived from the SHARE implementation which are the following

> "First it takes readers away from the publishers' version of the article, reducing traffic and revenues, which will likely result in increased subscription and author charge rates. Second it imposes significant new burdens on the authors. Third it requires the government to assert a new set of rights".

Nevertheless the actions for consolidating of open access are a reality, however, the implementation of memorandum's principles provokes discussions because nobody really knows how open access will work in the future.

Additionally, it is assumed that the author's fees can be funded so the problems derived from authors' burden may be overcome in this way. However, the matter is "is this true?" Solomon and Bjork (2012) research showed that the funding depends on the scientific area and the original country of the scientist. The most common disciplines funded are biomedicine and physics, the social sciences and humanities are different. It may mean that a social scientist may not have at his or her disposal the proper amount of money in order to pay for open access publishing. Additionally authors originated from developing countries usually use personal funds, although Biomed Central has mechanisms to support authors from developing countries by offering them an automatic fund waiver, as described on their website (http://www.biomedcentral.com/authors/oawaiverfund-25.08.13). Article Processing Charges of some open access journals may be too high for some authors. Solomon and Bjork (2012) cite the high Article Processing Charges (due to the high Impact Factor of the journals such as PLoS Biology(with IF=12.9) as APCs=$2.900.

Very poor countries seem to be better served because of waived charges. But, Papin-Ramcharan (2006) mentions that the University of West Indies researchers feel embarrassed to ask for fee waivers because of financial hardship and they prefer to publish in subscription journals, where there is no need to plead for fee waiver.

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Another **relative advantage** of open access publishing is the possibility of greater and faster citation impact. Many surveys have been conducted in order to explore if the

increased visibility of open access articles leads to increased citation rates or otherwise the open access citation advantage. As Swan (2010) analysed the findings of 31 related surveys which took place from 2004 to 2010 and presented a rise of articles citations because of the open access advantage as the 27 to 31 researches showed association between open access and increased citation rates. However the impact rate differs from discipline to discipline. The increased rates of citations concern medicine (from 300 to 450%), agricultural sciences (from 200 to 600%) and physics/astronomy (from 170 to 580%). Additional factors which may affect the open access citation impact are the quality advantage and early publication advantage. The high quality articles seem to attract more citations when they are open access than the poorer quality ones. While, the open access to preprint form of the paper via an institutional repository such as arXiv may positively affect the citation counts.

Another large scale survey conducted by Norris (2008) depicted the positive impact of open access advantage on journal articles. However, the reasons which contribute to the open access citation advantage are unclear. Davis et al. (2008) support that the downloads as a measure of readership cannot be connected to open access citation advantage. Because, although the visibility was higher, the citation percentage of open access articles (59%, no= 146 of 247) in the first year after publication was not much different from the percentage of toll access articles (63%, no= 859 of 1372). Certainly, it is worth highlighting two points that this research was conducted in Science Citation Index and the number of observed articles is unequal. As Moed (2012) mentions the citation index is an improper mean to evaluate the impact of open access because it is difficult to be detected as particularly the high rank journals are assessed and the people who use them can pay for access. Consequently it is obvious that the percentage of citation advantage will be higher to toll access articles. Additionally, the sample size may not mean to objective results. Another factor which is not mentioned is the embargo period. Meanwhile, it is not clear if some of the open access articles were closed for a period of time for example during the first six months of the year. Gargouri et al. (2010) observed that the quality of open access articles defines the open access citation advantage because the users have their own criteria based on which they choose the appropriate open access articles. Xia and Nakanishi (2012) explored the open access citation advantage by comparing between high impact factor and low impact factor journals included in Science Citation Index.

Although, it is another survey which resulted in the increased citation counts of open access articles, the novelty is that the low impact factor papers seem to have higher open access citation advantage. It may be justified by the fact that the low impact factor journals can publish high quality articles as well or as the authors explain this situation the low impact factor journals are not easily detected. Consequently, the open access offers the readers the opportunity to have access to these journals also. However, there are some limits in this research because of the small sample size especially for bottom – ranked journals.

In concluding, we could say that the open access promotes the knowledge transmission not only by contributing to the increased readership but also boosting the citation impact of open access articles. Nevertheless, the surveys which present neutral or negative open access citation advantage show that the real impact of open access has not already been confirmed yet.

Compatibility of open access

This factor considers whether open access is compatible with the research work environment, whether open access fits with publishing habits and preferences. The journal's prestige is an important criterion for choosing a journal for publication. As Falagas (2007) suggests, open access to journal content will be a great contribution to the scientific progress. Encouragingly, as there is a percentage of respondents (phase one=37.3%, phase two=30.5%, phase three=40.7%) who believe that open access sources are not of low prestige they could be comparative to non-open access journals. However, the percentage of the "don't know/no opinion" answers remains high (phase one=27.1%, phase two=18.6%, phase three=25.9%) but at least is lower in phase three than it was in phase one. It seems that there may be an increase in the proportion of biomedical researchers who agree that open access journals are not necessarily low prestige journals. In the earlier Spanish survey, only 19% of participants did not consider open access journals as low prestige journals (Hernández-Borges et al., 2006). Therefore, open access journals may be increasingly compatible with the desire of the majority of the respondents who have as a selection criterion for publishing in a journal, high prestige. However, the prestige of a journal is interrelated with the Impact Factor indicator and this fact was perceived in third

phase as the Impact Factor was the most important criterion for selecting a journal for publication (Section 4.6.3). The high Impact Factor indicator turns the journal into a high prestige journal and makes it more attractive to the scholarly community. In all three phases, the opinions about prestige and high impact, as publishing outlet criteria, were quite similar. With the growth of open access journals, several have now had time to establish an impact factor. There are open access journals which have a high Impact Factor indicator, e.g. Genome Biology from Biomed Central has an impact factor of 6.63. The importance of Journal Impact Factor as evaluation marker seems to be known to the biomedical scientists. But they may not be informed about the Impact Factor of open access journals. So it is important for the librarians to be able to inform the academic community on impact factor issues of open access journals and in order to urge them to use this new journal publishing model. By doing a search in the search engine Google by using the string "(librarian) and (impact factor) (search done on 30.08.2013) it was discovered that several academic libraries such as Health Sciences Libraries of the University of Washington, Michigan State University Libraries, University Library of University of Illinois at Urbana–Champaigne in USA provide outline or detailed information about the importance and the evaluation of impact factor indicators.

Greek open access journals and Greek journals which have steadily adopted open access policies are included in international databases such as PubMed, BioMedCentral, Web of Science and Directory of Open Access Journals, and in this way they obtain prestige and impact factor markers. This fact demonstrates on the one hand publishers' needs for increased visibility at the international level and on the other hand their awareness about how to succeed in achieving such visibility. The journals included in the above mentioned databases are in English language. Consequently, not only is the strong obstacle of non-English language articles overcome but also the journals are increasingly aligned to the inclusion policies of databases (see sections 4.1 – 4.3).

Nevertheless, there is an inconsistency at this point, as the percentage of respondents who have never published an article in an open access journals seems to be increasing throughout the phases (phase one=69.5%, phase two=81.4%, phase three=88.9%). Granted, there is the overlap of confidence intervals (appendices 4.4-4.6) to be

considered, but nevertheless there could be other reasons which prevent researchers from publishing in open access journals such as author charges.

Publishers of some open access journals have made strenuous efforts to become respectable, and commercial publishers are developing new policies adjusted to the open access publishing model. Specifically, Springer absorbed the BioMed Central and adopted the Open Choice policy which allows the authors to pay publishing fees in order for their article to be made open access. Similarly, other biomedical publishers make contracts with scholarly societies in order to secure publishing in open access journals and the extra payment of the publishing costs. In this way publishers managed to broaden their market but also provide the opportunity to the readers to obtain free access to the articles. However, if the author fees are too high, the payment will be hard as well.

Furthermore, the National Institute of Health in USA seriously affected progress on open access issues by implementing the NIH public access policy 2008. It means that researchers funded by NIH are obliged to deposit the final peer–reviewed journal manuscript to PubMed Central after its acceptance for publication. The paper must be publicly accessible, at the latest, twelve months after its publication in the journal. But, as announced in NIH website (February and April 2013), the publications of those awarded research grants must now comply with the public access policy otherwise the award procedures will be delayed. This mandate has made open access obligatory for a large number of biomedical researchers.

Moreover, NIH public policy seems to have affected Greek biomedical publishers because they implement corresponding policies as well. Additionally, the need for open access outlets would seem to have provided opportunities for some publishers. An example is the International Institute of Anticancer Research which publishes English language biomedical journals in Greece (Anticancer Research, In Vivo and Cancer Genomics and Proteomics). The Institute's website informs researchers funded by NIH that they are able as authors to deposit the final copy of their manuscript, four months after publication in the journal, in PubMed Central. As far as Institute's open access policy concerned, *Anticancer Research* and *In Vivo* are freely provided from 2004 to 2010. *Cancer Genomics and Proteomics* are online–only open

access journals in cooperation with the Stanford University HighWire Press. Additionally, the journals are included in many abstracted and indexing databases.

Another Greek biomedical publisher Spandidos (*International Journal of Molecular Medicine, International Journal of Oncology, Molecular Medicine Reports, Oncology Reports, Experimental and Therapeutic Medicine, Oncology Letters, Biomedical Reports, Molecular* and *Clinical Oncology*) adopted an open access policy but using a different business model. The authors who desire to publish in Spandidos journals need to pay for page charges after the paper's acceptance for publication. Open access is optional and charges for immediate open access per article cost 450 euros.

Otherwise, the articles are automatically made freely available 12 months after publication. In addition Spandidos uses the Creative Commons Attribution-Non Commercial 3.0 Unported License and refers to this in the related webpage about users' rights. It is worth mentioning that the majority of his journals now have an Impact Factor indicator. Moreover, the manuscripts which are agency – funded and paid as open access are available via PubMed Central and Europe PubMed Central by the publisher. For example a manuscript for research which is funded by NIH will be automatically deposited in the above mentioned subject repositories but only the manuscript will be fully accessible and there will be also a link to the publisher's websites. Additionally, author-self archiving in institutional repositories and funding agencies' website is encouraged six months after publication. But this happened via a link to the publishers' website by providing all the bibliographical data and the acknowledgement of the journal as the original source. It is worth mentioning that the authors who turned their articles into open access articles can archive the final publisher's PDF in their institutional repository and funding agency's archive immediately. A link to the published version on the Spandidos Publications website must be included with full citation details and acknowledgement of the journal as the original source. Authors that have purchased open access can add the final publisher's PDF to their institutional repository and funding body's archive immediately. Additionally, the journals are included in many abstracted and indexing databases.

Complexity of open access

The factor of complexity refers to the difficulty of implementing an innovation. Innovations which are simpler should be faster to implement. The meaning of complexity here seems to relate to the lack of information, and likely confusion, which appear to make open access difficult and complex. The apparent lack of information on significant issues which concern open access journals such as funding, copyright issues, impact factor and peer review process makes the biomedical scientists feel confused and uninformed as the questionnaire survey depicts.

Author charges seem to pose a barrier for open access publishing because of the lack of funds and unawareness of reputation and prestige of open access journals, as Hernández-Borges (2006) indicates. The current survey findings suggest that as awareness has been increased, the proportion of researchers who believe author charges are a deterrent has also increased, although a high proportion of researchers also have no opinion on the subject. The lack of biomedical scientists' information on business model is proved by the high percentages of "no opinion / do not know" to the question 32 which concerns "the lack of funding for publishing in open access journals" (sections 4.6.1 – 4.6.3). The majority of respondents in all questionnaire phases did not have any opinion on funding issues (phase one=62.7%, phase two=50.8%, phase three= 63%). While, in the third phase the survey participants show that more realised that the problem is author charges, as the majority of them (43.2%) state so and a high percentage of respondents have no opinion (39.5%).
A survey of Research Councils of United Kingdom (2008) about academic institution policies related to open access publishing showed that the 48% of the respondents (1013/2122 researchers) answered to the question "How is to pay–to–publish open access funded at your Institution?" that that they did not know.

However, the matter is important if the author fees are a real problem. As Doyle, Gass, and Kennison (2004) mention, the publication fees are not derived from the open access movement but usually they are connected to publishers' policy restrictions. Authors may need to pay for the publication of their works even they publish in subscription - paid journals if there is a page number restriction or if they need reprints, and so the authors are obliged to cover the extra expenses.

Additionally, the author charges may not be charges paid by the author. Usually, scholarly associations, universities or other research funders pay for the publication fees. There are alternative funding models (see section 2.1.3) which contribute to the promotion of open access. As it has already mentioned, the publishers may make contracts with scholarly societies in order their authors can be funded for publishing in open access journals as Elsevier does. As far as Elsevier's funding agreement is concerned, details about the funding of open access publishing costs depend on the open access policy of the funding agency. For example, Arthritis Research UK allows authors to choose between gold and green open access but it pays for the publication costs only if author's institution is unable to do so. However, the collaboration between this funding agency and Elsevier offers the researcher the right to publish in Elsevier journals according to the journal's author instructions after his or her identification as an Arthritis Research UK author. In addition, Elsevier will automatically deposit the final published article to Europe PubMed Central (established by Wellcome Trust in collaboration with European Bioinformatics Institute (EBI), the University of Manchester (Mimas and NacTeM) and the British Library and this will be available from PubMed Central as well. As far as self-archiving is concerned, the author can deposit only the accepted manuscript. When the article is published authors are obliged to add at the top of the accepted author manuscript a notice which includes the bibliographic data of the published paper and the DOI (Elsevier, 2013c). Moreover, the academic institutions may make special agreements with open access publishers such as Biomed Central, so that they shall have a better arrangement to fund a certain number of publications and authors.

Pinfield (2010) emphasises the importance of posing clear directions about all the processes which concern the funding of open access publishing. Additionally, he highlights two significant points which could be traps for open access publishing funding. On the one hand, the funding of publishing in open access journals as a direct cost can mean less funding after the end of grant. On the other hand, if the funding of open access publishing burdened the library, the further budget cuts may seriously harm library's function. So, if the publishing costs were included in indirect research costs, the certain amount would be co-calculated in the general funding and the paper publishing would burden only the research grant, although this has implications for the number of research projects that can be funded out of limited

research funds. The role of librarians may be very important at this point. Librarians need to explain how author charges work for open access journals and some of the variations in business model used for open access publishing. Additionally they may inform the researchers about the administrative procedures followed in order that the application for grants including the open access publishing fees to be approved.

Another solution suggested by Harnad (2003) is the deposit of preprint form of the paper in institutional repositories or author webpages and with a complementary account of the changes made because of the peer review process and paper's publication. However, this procedure may be difficult to implement because it may be time-consuming for authors and difficult for detection by readers. Additionally, the majority of Greek biomedical journals which are open access do not charge the authors. The interviews with Greek publishers indicated that the majority of publishers allow authors to include the post print form of the paper via their personal webpage, institutional or subject repository (see Section 4.7), although such information did not appear on the websites of the total of the journals. All the above mentioned policies should normally encourage the Greek biomedical scientists to support open access journals but they did not seem know about these developments judging by the questionnaire results (appendices 4.1-4.3).

The lack of information on copyright issues is another aspect that could relate to complexity. Research on copyright information to authors supplied by Greek biomedical publishers suggests that the information provided is usually very limited (section 4.8.3, Vlachaki and Urquhart, 2011). As we can see in section 2.10.3, in daily practice the author's rights are altered. Publishers are the manipulators and the owners of authors' intellectual property. This happens because in essence the authors exchange their rights for publicity and the recognition. Political philosophers examined the meaning of property rights and to some extent intellectual property rights (see also section 2.10.2). Specifically, according to Lockean theory the creator is the only owner of the product and has the right to enjoy the fruits of their labour. However, Locke's theory creates questions which request an answer. It characterizes the property as a result of some hard work but how we identify the efforts of a writer, which are the criteria? According to Fisher

> "There are at least four plausible candidates: (1) time and effort (hours spent in front of the computer or in the lab); (2) activity in which one would rather not engage (hours spent in the studio when one would rather be sailing); (3) activity that results in social benefits (work on socially valuable inventions); (4) creative activity (the production of new ideas)" (Fisher, 2001).

In my opinion the first and the fourth candidates apply to the modern "copyright" principles because of two reasons. On the one hand the physical object is a product of creative ideas and on the other hand the production needs time and effort to be spent. As it has already mentioned, the copyright transfer results in the weakening of moral rights, on behalf of publishers. However, there are publishers who allow authors to retain moral rights. Emerald is an example as this publisher provides the opportunity to the authors to manipulate some of their rights but under the terms of the publisher. Specifically, the authors can deposit their work to their websites or the repositories but a link to the publisher page and a statement about publisher shall be included. Emerald's website details authors' rights and obligations. Additionally, it highlights the publisher's aim to protect authors' rights against any illegal action. Creative Commons Licences may be a solution to this problem. In this way, both of the publishing stakeholders may be satisfied because the authors retain and manipulate their moral rights and the publishers may produce and reproduce the document by protecting authors' rights and their own profits. As Seadle (2005) mentions Creative Commons Licences were mainly created for protecting authors' moral and retained rights in 2001. Publishers use these Licenses as well. According to Seadle (2005) SPARC offers authors two options. On the one hand an agreement between SPARC and author is based on Creative Commons Licence 1.0 and publisher's rights and on the other hand the agreement does not include the Creative Commons Licence. In the first case, the author can reuse their own work but for non- commercial reasons and the journal and article metadata must be included as well. As far as the Greek biomedical publishers who were interviewed concerned, they did not know anything about the licenses and especially the Creative Commons (section 4.7). However, as Spandidos mentions in his website, the articles may be redistributed, reproduced, and reused for non-commercial purposes, provided the original source of publication is properly cited by using

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Hegel provided a new approach of the property rights by highlighting their role to the bearer of rights' personality growth (Hegel, 1952).

Marx demonstrates, as it has already mentioned, that intellectual products of a country belong to the world society (Marx, K and Engels, F, 1848).

However, nowadays, the philosophers' theories tend to pale in relevance because of the actual copyright transfer to publishers, and the creators seem not to enjoy the fruits of their intellectual labour and their product does not belong to them but to publishers. But the question is why and how does it happen? According to literature review information since commercial publishers have taken on scientific journal publication the following academic publishing model has been formed

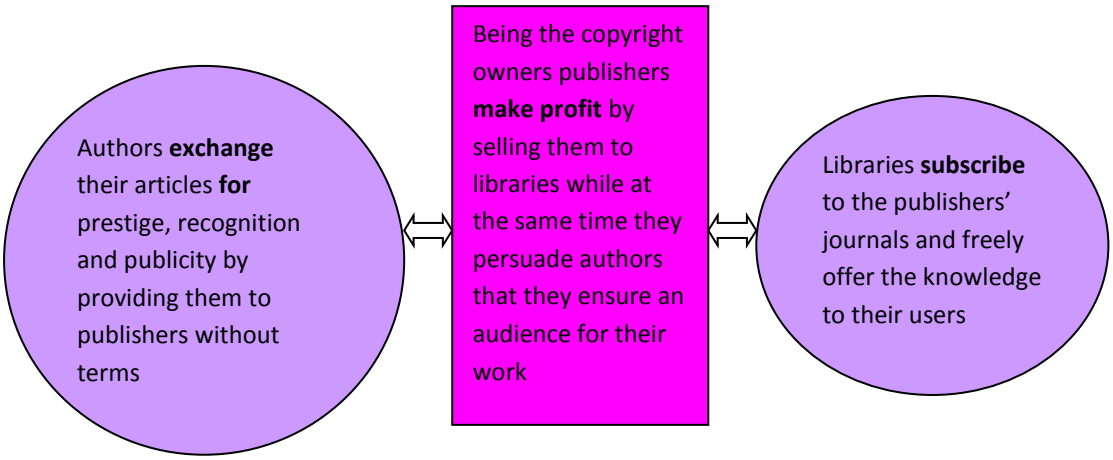

Figure 5.1 *Academic publishing model*

However, in Fig. 5.1 there is a clue which is not noticeable at first sight. Normally, the libraries ensure the audience for authors' work because they provide the journals to a wide audience. So libraries make the publishers richer because not only do they spend a great amount of their budget to subscribe to commercial publishers' journals

but also they provide a certain audience. Libraries provide the best advertisement for the publishers but at the same time they increase authors' prestige and recognition, rather than the publishers. But to the extent that publishers continue to be powerful by owning the main means of knowledge transmission, meanwhile the scientific journal, copyright issues may provoke confusion, as publishers "cultivate" the view that authors do not need to know more as the most important issue for authors is publication of their article in prestigious publishers' journals. This has an impact, as the questionnaire survey depicts, on copyright of open access journals as well. The situation over copyright in open access journals seems complicated because the "no opinion" dominates across all phases while in phase three, things are getting worse as the percentage of respondents who state they are "not uncertain", i.e. certain about copyright is lower than the second and first phase as we can see in section 4.6.4 (phase one=18. 6%, phase two= 15. 3%, phase three=9. 9%). Biomedical researchers seem to ignore the matter of open access journals' copyright, and as Swan (2008) identified, authors often do not understand copyright regulations in general. The ignorance of open access journals' copyright in this survey, and the large percentage of respondents in all phases of the survey who could provide no opinion on their state of certainty (or not) about copyright confirms this. (Sections 4.6.1 – 4.6.3).

However, the survey participants have mostly "no opinion" about copyright issues, and even in the third phase, the percentage of the uninformed biomedical scientists is the highest (53.1%). This was not really surprising as the analysis of the Greek biomedical publishers' websites (section 4.8, appendix 4.10) demonstrated that there was no information on proprietary rights, fair use, law court and generally terms which enable authors claim their rights. In addition the publishers' interviews showed that the copyright holders are the publishers and their permission is pre-required even for self-archiving of the papers. Consequently, the authors seem to know what they need to know according to the extent of their rights. However, generally, the continual changes on copyright policies and the lack of information seem to make the scientists feel uncomfortable to the extent that they do not try to care about copyright.

The biomedical scientists emphasized journal impact factors because they may give a boost to their career. Publication in a high impact factor journal may also be a cause for increased number of citations and creative collaborations. Perhaps under these conditions the lack of information on Impact Factor of open access journals could be a

cautionary factor for the publication in them. As it seemed especially in the third phase of the survey the ignorance about Impact Factor of open access journals is at its peak with 45.7% of participants stating that they have no opinion about it. But, in the third phase the number of participants who consider Impact Factor as the most important criterion for selecting a journal for publishing is 46.9%. In conclusion we could say that it is not possible for the biomedical scientists who choose a journal according to Impact Factor to publish preferentially in an open access journal. But as depicted in Fig. 4.5, more and more Greek biomedical open access journals are included in Journal Citation Reports and obtain an Impact Factor indication (from four to ten journals). Change is happening, but slowly, perhaps because of the complexities involved.

Another factor that hampers open access publishing activity is **authors' uncertainty about the peer review process**. Researchers are very concerned about the quality and the use of the publication output and peer review process makes them feel more confident not only about the quality of work but also the ownership of ideas (Fry 2006, Fry et al. 2009). However, this survey found that the researchers are indeed very uncertain about the peer review process in open access journals. The uncertainty seems to have a rising direction through three phases as the results depict because in phase one the percentage of uncertain respondents was 16.9%, in phase two 32.2% and in phase three the percentage was the highest one 34.6%. But the most significant remark concerns the "don't know/ no opinion" answers where the frequencies were modal, the highest of all possible responses (phase one=42.4%, phase two=33.9%, phase three=40.7%) (see Section 4.6.4).

However, Falagas (2007) highlights that the differentiation of traditional peer review process with open peer evaluation of manuscripts (e.g., by signing peer reviews and publishing reviews online) may be a good motive for the re-evaluation and re-examination of the traditional peer review process. However as Eisen (2013b) highlight the peer review process is not flawless even in subscription based journals. In particular, he did an experiment. He sent a badly written and paper with errors to different journals including *PLoS ONE* and *Science*. In both cases, the article was evaluated under peer review process. In the first case, the peer reviewers rejected the article because they recognized its problematic character, while, the journal *Science*

accepted it for publication. So, it is becoming obvious that an open access journal can apply an effective and qualitative peer review process. Nevertheless, new methods have already been tested in order that the quality of peer – review process in open access journals may be secured. Web 2.0 applications contribute to this direction by creating new metric methods such as altmetrics in order to reinforce the peer review process (House of Commons Science and Technology Committee, 2011, p. Ev w156). According to Altmetrics manifesto (Priem et al., 2010) altmetrics will supplement the traditional peer review process by doing a quick peer evaluation in journals such as *PLoS ONE, BMC Research Notes. Consequently, before the time-consuming procedure of peer review process another review process will be taking place in order for the article to be evaluated according to the volume of its usage.* Additionally, as Swan (2012) stresses, the importance of these new types of metrics for open access journals is clear because the Impact Factor poses an obstacle to their acceptance in traditional or other dissemination channels. But she also considers that they need time to work effectively.

Trialability of open access

The experimentation of open access sources may be proved to be the most effective way for this innovation to be absorbed or rejected because the researcher has the chance to know and assess the innovation. The development of institutional repositories could possibly contribute to the promotion of open access sources because normally institutional repositories would be an open access information source enriched with a mixture of documents such as journal papers, dissertations and other types of documents. The institutional repository represents the intellectual "capital" of the academic institution, so the institution may oblige staff to contribute to the repository. The self-archiving mandatory policy in repositories may be an effective way of repository enrichment. It is generally observed that institutional repositories suffer from low deposit rates (Ferreira et al., 2008). The scientific impact of an institutional repository is determined by the amount and the quality of its content. Xia (2012) mentions that the most useable repositories have a long history and management in the West. Although, the majority of Greek universities preserve an institutional repository, Chantavaridou (2008) states that they mostly include electronic dissertations and theses. This finding indicates that the Greek academic

libraries need to try new ways to approach faculty and researchers. By coping with the same problem of the low rate of members' contributions in University of Minho, Ferreira et al. (2008) implemented some measures in order to increase the depositing rate. Apart from the advertising activities of the institutional repositories and open access benefits in internal community, they also participated in internationally related events. Additionally, the Dean's decision drove the mandatory deposit of the intellectual outputs of faculty and researchers. However, the financial incentive could also be considered a strong motive of self-archiving. The academic community with the highest percentages of deposit was rewarded with a certain amount of money. The statistics showed an increase from 3.363 deposits at the end of 2003 to 915.341 by the end of 2007. Greek institutional repositories seem to apply mandatory self–archiving policy but especially for dissertations and theses, such as Panteion University and Harokopio University. However, there are academic institutions which apply obligatory deposit and Chantavaridou (2008) mentions that TEI of Thessaloniki does so. A national policy on mandatory self-archiving in repositories would help their proper function. An important event about open access in Greece happened in November of 2012, when the Deans' Senate (EKT, 2012) decided to sign the Berlin Initiative and urge the universities to promote open access by launching institutional repositories and deposit works in them, to participate in activities providing information to university members about open access publishing, and advising them to publish in open access journals.

However, the participants (46.9%) of the survey state that there are no institutional repositories and the 37.0% of respondents do not know anything about repositories in the third phase. The development of institutional repositories started, as it has already mentioned, in 2008 in Greece. As the questionnaire survey was conducted in three phases and the first one was in early 2007 the second early in 2010 and the third phase from September 2010 to May 2011, it could be expected that the respondents would have a more complete opinion on this topic in the third phase because a period of trialability would have taken place. The questionnaire surveys showed that while in the first phase, the "don't know answers" respondents were 42.4%, in second phase the same answer was chosen by 57.6% of the participants and in the third phase the percentage is lower to 37,0%. Additionally, in the third phase the respondents seemed to be more informed about the meaning of the institutional repository as they know

(46,9%) that the Institutions, where they work, do not have an institutional repository. It is possible in the first phase there could be a misunderstanding of the meaning of institutional repository because the percentage of 30,5% answered "yes". A similar survey conducted by TEI of Athens in June of 2012 (Koulouris et al., 2012) showed that although the majority of faculty was not familiar with the repository, they were willing to deposit their works in it.

The effectiveness of an institutional repository, however, depends on its contents. If the active researchers of an Institution do not publish in proper open access journals the role of institutional repository is limited because of the copyright transfer to the publisher which means that only an abstract can be deposited, at least initially. In this case the inclusion of authors' works in institutional repository must firstly be approved by the publishers and this is the difficult point. Consequently an institution, on the one hand, may provide the financial sources to authors in order to publish in an open access journals which will enable them to deposit their output to the institutional repository under open access terms, on the other hand, it must be certain about the prestige of the open access journals which the authors choose to publish in. Nevertheless, Koumoutsos, Mitrelis, and Tsakonas (2010) mentioned that their research about digital repositories showed that the high percentage of 15.1% respondents answered "Don't know/Don't answer" about copyright issues.

As far as the Greek biomedical publishers are concerned, the website analysis showed that the majority of journals are open access. The publishers' interviews confirmed their approval to the inclusion of papers in an institutional repository under two terms the bibliographic data of the journal article are included and their permission will be asked for in advance. The publishers appear to be happy with increased recognition for their journal.

Observability of open access

The visibility of open access and its impact on scholarly communication may allow to the scholars to observe in order to comment positively or negatively on this innovation. The role of peers as opinion leaders and early adopters may be very important at this stage. Their institution may positively affect the visibility of open

access by supporting the publication in open access journals. In phase three, the percentage of participants whose institutions appear to influence them to publish in open access journals is higher (phase one= 15.3%, phase two=22.0%, phase three=34.6%) and a reduced percentage of the respondents have no opinion (37.0%).

In addition a University can fund its researchers or find external financial sources to back up them in order to publish in an open access journals but the choice may also depend on colleagues' opinions. As the questionnaire surveys (Q. 43) evidenced, the percentage of participants who were informed about open access from their colleagues was steady at the beginning and slightly increased in the third phase (phase one=40.7%, phase two=40.7%, phase three=45.7%). (section 4.6.4) This change in percentage may mean that the colleagues are becoming more informed through the support of their colleagues. The opinion leaders may be very effective supporters of open access and digital repositories. However, the diffusion rates of open access may depend on the disciplines. As Moon, Jarvenpaa and Kuk (2007) mention, the physical sciences, technology and medical sciences have higher rates of open access implementation than humanities and social sciences. It may not be co-incidental that the innovators of open access practices have mainly arisen from the open access-centred disciplines as it is depicted in the timeline of open access practices history as appeared in Albert's paper (2006) (appendix 5.4).

Early adopters of open access could be characterized as all the scientists of scholarly community who contributed to the implementation and function of open access advances. For example all the members of School of Medicine in National and Kapodistrian of Athens who published their research results in BioMed Central or the Greek biomedical scientists who participate in editorial boards of open access journals, can be deemed early adopters. Among them there were also the opinion leaders who could urge their peers to support open access publishing and in this way the open access to be advanced via greater **Observability**. Consequently, opinion leaders inform their peers about the advantages and characteristics of open access sources, showing through example how to use open access as the active authors may be readers as well. The percentages of awareness of using (reading) open access journals (phase one=61.0, phase two=59.3, phase three=60.05) seems to be higher than the percentages of familiarity with open access publishing idea (phase one

"no"=54.2%, phase two "no"= 57.6%, phase three "yes"= 56.8%) . It may be a sign that the respondents are more aware of the benefits of tracking the open access information than publishing in open access journals. But also it may show that opinion leaders can function more efficiently in order to persuade their peers to read the open access information which can be freely available via Web than advising them to publish in open access journals by exposing the terms and the advantages of publishing in open access journals. In addition, it may be that the early adopters have not been convinced yet that the values and the structures of open access publishing are compatible with the traditional publishing models as Moon, Jarvenpaa and Kuk (2007) suggest. Faculty as depicted by Warlick and Vaughan (2007) are interested more in publishing in high Impact Factor journals even if these journals are subscription journals. However, more recent studies such as Björk and Solomon (2012) show that gold open access journals indexed in Web of Science and Scopus are of the same quality as the subscription based journals.

This discontinuity of the roles between authors and readers especially in biomedical sciences, as Creaser et al. (2010) (see Section 2.4.7) demonstrates, is not focused on posting and using a subject repository such as PubMed Central but it also extends to the gap between open access publishing activity and reading of open access journals. In other words, the authors are more aware about the advantages of using open access journals than the possible benefits from publishing in open access journals. In concluding, the association between the familiarity with open access publishing idea and awareness of using/reading open access journals is not doubted.

Other stakeholders such as publishers could contribute a lot to the awareness of biomedical scientists but it seems that they provide inadequate information on copyright issues and open access generally (as far as the Greek biomedical publishers were concerned). However, the awareness of biomedical scientists may be a result of opinion leaders and early adopters' work. First of all, Greek biomedical scientists feel familiar with the idea of open access publishing activity (Q19) because the majority of them answered "yes" to this question in third phase (phase one "no"=54.2%, phase two "no"= 57.6%, phase three "yes"= 56.8%). In addition they may now be more aware about publishing in open access journals (Q21, phase one "yes"=35. 6%, phase two "yes"=27.1% and phase three "yes" = 42.0%). As far as the characteristics of

open access journals concerned the percentages in third phase changed with 40,7% of the participants who do not consider the open access journals as low prestige journals (Q30). Moreover, they do not believe that they are of low readership as in the phase three the 44. 4% of the respondents answered "no" (Q31). The knowledge of the colleagues on open access issues may be the key to the "absorption of innovation".

Attributes	**Open Access Innovation**
Relative advantage	• Open access publishing can be a means for wider information dissemination • Ease of publication
Compatibility	• The majority of respondents believe that open access sources are not of low prestige. • Publishers' new policies make them more compatible to the traditional information sources • Institutional Repositories
Complexity	Lack of information on • Payment arrangements • Copyright Issues • Peer-review process
Trialability	Institutional repositories are tested as open access information sources
Observability	Colleagues inform others about open access publishing benefits

Table 5.1 Open Access Innovation

Table 5.1 summarizes the main points from the above analysis of the five factors in Roger's theory on diffusion of innovations. As indicated, there are some major barriers as well as some levers for change. For example, experience with institutional repositories may be limited, partly due to the complexities around copyright and possible availability of full text, and which full text version is permissible. Although

the biomedical scientists are theoretically in favour, the practice is much less assured, and probably limited at this stage to the early adopters.

5.2.2 Lewin's Force Field Analysis

A useful way to see the forces (driving and restraining) which promote and hinder open access and the stages of this change is the force field analysis of Lewin. First of all, we shall analyze the reasons which led to the change and the first "unfreezing" stage. Next the reasons for the success or the failure of change will be discussed in "moving" stage and at the end the new reality will be form in "refreezing" stage. Specifically, the Force Field Analysis will help to answer the following research questions

- What are the reasons that led to the establishment of open access publishing?
- Who are the stakeholders of this publishing mechanism?
- In what ways do the stakeholders influence the new publishing models?
- Are Greek biomedical scientists informed about the characteristics of open access journals?
- Does English language pose a problem for the Greek biomedical scientists to publish in foreign language journals?
- How easy is it for the researchers to find digital information on their own?
- In what ways do stakeholders influence the new publishing models?
- What means do the Greek biomedical scientists use to inform themselves about open access journals?
- Which models of open access publishing are used?
- How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods?
- How might the expectations of library users change as a consequence of the open access publishing?

- Does open access publishing contribute to the improvement of scholarly communication among biomedical scientists in Greece, and what are the main changes have been observed over the course of the last few years?
- What are the advantages of Greek researchers' participation in open access publishing?

Reasons for change

Since 1945, many of the scientific journals, the most important channel of scholarly communication, have been published by commercial publishers. To increase profits, and to increase market share with more new journals, publishers increased journal subscription prices, as there were often no competitors for particular journals. The weakness of scientists to pay for journals' subscriptions in combination with the weakness of libraries to pay for the access to knowledge resulted in scholarly communication crisis. The resulting need for libraries to find solutions to scholarly communication has been intense for Greek libraries too. In Greece, libraries have to cope with two problems, the over-priced journals and the budget cuts as a consequence of economic crisis. The diagnosis of need for change mainly because of financial factors was complemented by web advancements, and changes to methods of publishing options. The traditional scholarly communication channels were therefore ripe for change.

Unfreezing stage

As the diagnosis of the problem is completed, the next step is the identification of the context affected by the change, the development of possible solutions and the actions of information. The stakeholders of scholarly communication environment are libraries, scientists (authors and readers), publishers, universities, informatics groups (e.g. JISC in the UK) and research funding agencies. By studying the related literature one can conclude that the proposed alternative option is open access publishing compatible with different business models. The role of key leaders is very important in order to help all the stakeholders to identify the need for change and establish the credibility of open access publishing as an alternative channel of scholarly communication. However, we cannot omit to mention that for the change to

function well, the stakeholders need to be adequately informed. In Greece, the National Documentation Centre seems to be the most important leader on open access issues as it provides multi-level and current related information since approximately 2008, although much of the information has not yet trickled down to the biomedical scientists that responded to the questionnaire. The publishers were more aware of the principles and how they might work with open access initiatives such as the NIH mandate in the USA.

Moving stage

The moving step depicts a confusing period according to Lewin. This seems to fit some of the observations in the empirical research. Because the scholars are aware of the traditional ways of communication, they feel confused about the new means of communication. At this stage, the adequate information will be critical to the success or failure of novelty. At European level, the open access movement was officially announced in 2002 with the Budapest Open Access Initiative. The open access journals (Gold road) and institutional and subject repositories (Green road) were advertised as the main routes of open access publishing. However, during the implementation of open access publishing, different types of business models were developed. By identifying the same problems in Greece, it was interesting to see nationally to what extent the open access publishing has affecting publishing practice and scholarly communication and the attitudes and needs of Greek biomedical scientists to open access journals and publishing. The literature review offered a general overview about the open access developments in foreign countries and in Greece. Bibliometrics evaluated the visibility and the impact of Greek research to the global scholarship. Questionnaire surveys measured the rate of Greek biomedical scientists' publishing activity, their awareness of open access publishing and open access journals and their readership of open access journals. The results of these different types of research contributed to the visibility of driving forces for changes and restraining forces against the change as depicted in the following table

Driving forces	Restraining forces
Creative Commons Licenses secure the legal use of open access sources (Sections 2.11.1, 5.2.1)	Uncertainty about copyright issues (Sections 4.6.4, 5.2.1)
Increase of Greek open access journals included in Journal Citation Reports and Web of Science and international databases (Sections 4.5.2, 5.2.1)	Ignorance about Impact Factor of open access journals (Sections 4.6.4, 5.2.1)
Collaboration between Greek biomedical publishers with funding agencies (Section 5.2.1)	Ignorance about funding of publication in open access journals (Sections 4.6.4, 5.2.1)
Increasing number of Greek open access journals included in international databases (Sections 4.1 – 4.3.3, 5.4.1)	Uncertainty of quality of peer review process (Sections 4.6.4, 5.2.1)
National Documentation Centre informs about the benefits of open access and open access publishing (Sections 1.3, 3.4,2.3, 5.2.2, 6.2-6.4)	Unfamiliarity with publishing in open access journals (Sections 4.6.4,5.2.1)
Universities develop institutional repositories and are urged by Deans Senate to promote the open access movement in any way (Section 5.2.1)	Ignorance about institution influence (Sections 4.6.4, 5.2.1)
Author charges' paid by funding agencies in most cases (Sections 5.2.1,5.2,6.2)	Author charges' obstacle (Sections 4.6.4, 5.2.1, 5.2, 5.1)
Negotiations between institutions (faculty/librarians) and publishers in order the authors to have the right of deposing their works in institutional repositories and websites (Section 5.2)	Copyright transfer to the publishers (Sections 3.12.1, 4.8.3, 5.2.1, 5.1.1,6.2)
Increase of visibility of Greek biomedical research via English language journal included in international databases (Sections 4.1 – 4.3.3, 5.2.1)	Difficulty in detection Greek open access biomedical information (Sections 4.6.4, 5.2.1)
Ease detection of open access information (Sections 4.6.4, 5.2.1)	Publishers' profits (Sections 2.5.3, 4.8, 5.4)
Publishers' contribute to the open access publishing because they have income (Section 5.4.1)	
Web 2.0 technologies promotes open access communication (Sections 2.1.1, 2.8, 2.14,3.3, 4.4 -4.4.1, 5.3, 5.2.1, 6.2, 6.4)	The content of social networks may be unreliable because of the lack of peer review process (Sectionn 2.7, 5.2.1)

Table 5.2 Driving and Restraining Forces

Refreeze stage

This is the last stage of this theoretical framework. The efficient preparation of the two previous stages will determine the end of this model. The acceptance or the rejection of the open access publishing model will be dependent on the work done in previous phases. As depicted in table 5.2 most restraining factors are derived from the lack of awareness and the lack of collaboration among stakeholders. For example, authors (biomedical researchers) are not aware about developments at the level of the institution, and publishers are not providing all the information they could. Extensive information campaigns may be an effective means of promoting open access in Greece but other ways are needed as well. Libraries may dramatically affect the establishment of open access movement in biomedical sciences. But first of all, librarians must be self-confident about their knowledge on open access issues. The development of collaboration, internally and externally, could be a powerful tool for the accomplishment of the change. In internal context, within the academic community, libraries may develop or reinforce the role of faculty liaison librarian. In this way the librarian will help faculty to improve information retrieval skills in detecting and using open access sources. In addition, professors as the educational leaders may urge students to enjoy the advantages of open access publishing. Additionally, faculty will be informed about publishing in open access journals. The librarian can help professors to choose an appropriate open access journal (gold road) for publishing. Consequently, professors will be enabled to overcome the obstacles which are based on ignorance, and benefits of open access publishing are developed. Additionally, faculty must be informed about the institutional repositories and the procedures which must be followed in order that their works can be deposited. In this way, the faculty may be changed from possessing a small group of early innovators, into a majority of adopters of the innovation. If they urge student to use high quality open access sources, students will accept that use of such resources is the norm. If open access is seen as the norm, faculty is better able to persuade the administration to fund the publication in open access sources.

In the external context, Greek biomedical librarians must cooperate with publishers; the majority of these are scholarly societies in Greece. There are Greek biomedical journals which are freely available via Internet but authors of articles are not protected

by copyright licenses. So, first of all, publishers must be informed about creative commons as a means of protection means for publishers and preservation of authors' rights. The usage of licenses may make the authors feel safer. For example, an extensive reference to copyright and moral and retained rights could be included in publishers' websites. Additionally, providing information to the publishers about the inclusion criteria of PubMed database and the terms of other databases such as DOAJ, BioMed Central, Science Citation Index may encourage them to improve their journals' quality sufficient for inclusion in the databases. The increased participation of Greek biomedical journals in international databases not only entails the upgrade of Greek biomedical journals, but also Greek journals need to attract more and more Greek biomedical scientists. As far as the Greek biomedical journals which implement the author–pays policy are concerned, they could develop collaboration with funding agencies in order to help the authors to publish open access articles even if the journals are not completely open access. All this information should be presented in publishers' websites for the journals. Additionally, the negotiations between the faculty/librarians and publishers about the enrichment of institutional repository could lead to better understanding of the open access policy and its benefits of the publishers.

Librarians' activities and agreements may have supporters and the best thing would be that the faculty and the university administration are aware and, approve activities and workflows for open access publishing and repository deposit.

The academic Libraries of Health Sciences in cooperation with the National Documentation Center could launch a Greek subject repository of biomedical sciences inspired by PubMed Central. PCMI is intending to create a digital archive network (U.S. National Library of Medicine. National Institutes of Health, 2003b). So the cooperation of academic libraries of health sciences with the National Centre for Documentation should lead to an agreement similar in purpose to the UK agreement.
The National Documentation Center could cooperate with academic libraries for this target because biomedical research mainly takes place in the laboratories of Medical Schools. So, as far as the Greek biomedical information produced by the Greek Universities, it would be easier for the Greek research results to be included in the subject repository if cooperation could be accomplished.

The dynamic role of librarians in combination with the faculty's support should lead to the weakening of restraining forces. The development of new services offered to the academic community may be more effective than merely information campaigns. The faculty liaison librarian may be the title of a special department in the library interlinked with the daily practice. This department could be in charge to identify the proper journals which correspond to the criteria the authors have posed. The librarians would choose the most prestigious journals (high impact factor and peer reviewed journals) for publishing outlets, and they could also collaborate with the publishers in order to assure authors' rights. Librarians of this special department could also be in touch with the funding agencies in order to be certain for the funding of research results in open access form. Additionally, the department would help in the writing of grant proposals because library has the information sources and the experience to support such a proposal. It would be another way for the library on the one hand to justify its existence and the budget and on the other hand to promote actively the open access movement by securing the publication of funding research results in open access journals and the deposit of works in the institutional repository. Initially, the faculty liaison librarian department might be limited in the service of professors but the effectiveness of its function could lead to the offered services to the rest of the academic staff. Some examples of faculty liaison librarian activity include by Rodwell and Fairbairn (2007) and Malenfant (2010). According to Rowell and Fairbairn the role of faculty liaison librarian is very important but its effectiveness depends on the personality and knowledge of the related staff. In the same article it is mentioned the different sides of faculty liaison librarian activity. They point out that although the role of faculty liaison librarian is not a new one, now this role is considered to be especially important. A very good example of faculty liaison librarian's role in the changing scholarly communication environment is described by Malenfant (2010). It concerns a case study which took place in the University of Minnesota Libraries. Librarians' duties were reformed in order for the faculty liaison librarians' targets to be reinforced. At a first level, liaisons should collect data about faculty without interviewing such as the existence of disciplinary repository about a specific subject area and professional society's/societies' attitude related to open access and at the second level the identification of faculty leaders could help to the acceptance of the innovation. In concluding, the changes of scholarly communication system offer to the librarians the opportunity to collaborate with the faculty at an

equal level by aiming at the accomplishment of University's goals and effectively affecting their implementation. Greek librarians are well qualified and able to cooperate with the faculty.

Another activity which could be helpful to the detection of Greek biomedical information is the creation of a platform which will launch the Greek open access journals published by the University of Athens generally such as the journal *Kinesiologia* included the biomedical ones such as *Annales of Clinical Paediatrics*. The creation of this platform may be the motive for the publication of new open access journals by the University of Athens. The collaboration between editorial boards and librarians could contribute to the increased visibility of Greek research by helping the editors to promote the journals in international databases. Creative Commons could be implemented and there would be detailed information about the copyright and authors' rights. In addition, these journals are peer-reviewed and they shall have the opportunity to obtain an Impact Factor indicator. Consequently, the journals shall be competitive and the author–pays charges for the faculty and the rest of academic staff shall be covered by the University. Afterwards, the experience and the existence of the proper infrastructure can lead to the creation of the Directory of Greek Biomedical Journals (in Greek or English language or both of them).

However, all the above mentioned activities, which could indeed strengthen the driving forces and weaken the restraining forces, could be successful only if the library staff are self-confident and know the ways and means to persuade and have a constructive and steady collaboration with all stakeholders who are involved in open access publishing process, such as the faculty administration, the biomedical researchers, the publishers, the funding agencies, the editorial boards and the National Documentation Center. Additionally, when it is requested, the cooperation among libraries must be possible.

5.3 Summary Conclusions

Open access publishing considered to be an innovation. Consequently the observation of the changes in bibliographic and research level, nationally and internationally, is requested. In Greece, as it has already presented, either the Universities or the National Documentation Centre have hardly tried to adopt open access models especially by launching institutional repositories and free access digital collections in particular since 2008. Additionally, the visibility of Greek research is increasing as depicted by bibliographic research. More Greek but in English language journals (open access journals as well) are included in international databases such as DOAJ and PubMed Central, PubMed and Science Citation Index.

However, the research findings show that the changes take place at a slow pace. Just in the third phase (September 2010 – May 2011) the awareness of biomedical scientists about open access is slightly higher (phase one=42.2%, phase 2=42.4%, phase three=56.8%) than the previous phases. Nevertheless, the lack of opinion related to the uncertainty about copyright of open access reflects to the reality according to the literature review. Because, the authors seem to be generally unaware about journals' copyright issues. In addition, they have no opinion about peer review process. New bibliometric methods, altmetrics are in trial as an alternative option of peer review process. Journal Impact Factor, especially in the third phase, considered to be the most important criterion for choosing a journal for publishing in. The open access journals (Gold route) may have an Impact Factor indicator but the researchers must receive the proper information from the libraries.

Greek biomedical scientists need more information about open access issues because they seem to be more informed about the foreign open access sources than the Greek ones. However, the awareness of Greek biomedical scientists as a means of the promotion of the open access innovation is assessed by the implementation of the Roger's diffusion of innovations theory and Lewin's theory of change. The innovation seems to be acceptable in Greece but the academic libraries could work more on that. Scientists would have to be persuaded about the benefits of open access publishing and the usage of open access sources generally. Additionally, the need for opinion leaders seems to be intense. The

adoption of the liaison librarian role could help the faculty to be aware of the open access issues and persuade them to promote open access publishing in the academic community too. But firstly librarians would be well informed about open access and self-confident about their knowledge.

Chapter 6

Conclusions

6.0 Introduction

The study set out to explore whether open access publishing can result in effective scholarly communication channels particularly among the biomedical scientists in Greece. For this reason, the research considered the concept of open access publishing and has identified the reasons and the motivation for the development of open access publishing, the variety of open access publishing models and their functions, and the interactions among the international and national contexts.

As a health librarian working with biomedical researchers who desire instant access to research information, and visibility for their own research, I was interested in the impact of the open access movement on biomedical researchers, and biomedical publishing in Greece. It was important to explore what the biomedical researchers understood about open access, and how their views might change. One of the aims of the study was to illuminate whether, and how, librarians should support open access. The conclusion chapter considers the research strategy, the methodology, the findings and the extent to which the research objectives were met.

6.1 Research strategy

The main research question was "Does open access publishing contribute to the improvement of scholarly communication among the biomedical scientists in Greece, and what are the main changes have been observed over the course of the last few years?(Question 1)". The following sub-questions were posed according to the objectives' categories (see also Section 1.5).

- What are the reasons that led to the establishment of open access publishing? (sub-question 1)

- What means facilitated its proliferation? Its cost? (sub-question 2)
- Which models of open access publishing are used? (sub-question 3)
- In what ways do the different models work? (sub-question 4)
- Does open access publishing influence knowledge dissemination? Is it possible to assess this? (sub-question 5)
- Who are the stakeholders of this publishing mechanism? (sub-question 6)
- In what ways do the stakeholders influence the new publishing models? (sub-question 7)
- Does English language of journals pose a problem for the Greek biomedical scientists to publish in foreign language journals? (sub-question 8)
- What are the advantages of Greek researchers' participation in open access publishing? (sub-question 9)
- How easy is it for researchers to find digital information on their own? (sub-question 10)
- How might the expectations of library users change as a consequence of the open access publishing? (sub-question 11)
- Are Greek biomedical scientists informed about the characteristics of the open access journals? (sub-question 12)
- What means do Greek biomedical scientists use to inform themselves about open access journals? (sub-question 13)
- What is meaning of 'Free at the point of access': do open access and similar initiatives assist Greek clinicians in locating information about biomedical research in Greece more quickly and more effectively? (sub-question 14)
- What are the attitudes of Greek biomedical scientists towards open access publishing and how are these changing? (sub-question 15)
- Are there open access biomedical journals in Greece? (sub-question 16)
- What do Greek biomedical publishers think of open access journals? (sub-question 17)
- How can the changes in scholarly communication among biomedical scientists in Greece be measured through bibliometric methods? (sub-question 18)

- What is the writing activity of Greek biomedical scientists in open access journals? (sub-question 19)
- Do institutions and libraries promote the open access journals? (sub-question 20)
- How could libraries contribute to the development and usage of open access journals? (sub-question 21)

The research strategy had to be appropriate for the aims of the research, which were to identify whether open access could improve scholarly communication among biomedical scientists in Greece. The other main aim was to identify how librarians could or should help. Therefore the research strategy had to acknowledge my own standpoint as a health librarian, wishing to improve the current situation. The appropriate choice, therefore, of Critical Realism as a research philosophy contributed to the way the research questions were structured and the selection of the research tools, as open access is, essentially, the result of social systems interacting. Open access is a phenomenon that is, partly, measurable, but not quite in the same way as a laboratory experiment. The aim of this research, was two-fold, on the one hand, the study of the open access publishing as a social phenomenon (a more constructivist approach) and, on the other hand, the exploration of development and usage of open access biomedical journals in Greece (which examined how the reality of open access is constructed by the biomedical scientists and the Greek biomedical publishers).

6.2 Reflections on Methodology

As far as the methodology is concerned, the study adopted a mixed methods research for accomplishing the aims and the objectives (see Chapter 3). The results of qualitative and quantitative research methods are analyzed in chapter 4 and additional data analyses provided in Appendices 4.1-5.3. Additionally, the findings were analyzed in the context of relevant theories for the adoption of open access publishing as an innovation: "Theory of Diffusion of Innovations" and the "Theory of Force Fields Analysis". Both theories provided a proper theoretical framework in order for the barriers and enablers to be recognized. The implementation of both theories was

possible because the research is a longitudinal case study. The identification of the changes in open access publishing, and changes in attitudes, through the years can be identified. As the lack of awareness and the increased percentage of uncertainty on important open access issues appeared to be the major barriers, the actions and the collaborations of the stakeholders were analyzed in order to assess which the best enablers might be (see also sections 5.2.1-5.2.2).

The explanatory case study methodology contributed to the assessment of the impact of open access publishing on scholarly communication by implementing the three - phase questionnaire surveys in different time periods. The questionnaire is the proper tool for the requests of the specific research as analysed in sections 3.2 and 3.9 , because, even with some limitations, we reached to conclusions which can be helpful to the refreezing of open access in biomedical sciences in Greece.

If I were asked to conduct a survey about the progress on open access in biomedical sciences in Greece now, I would choose the questionnaire as a research tool and the sample would be chosen according to the principles of the convenience sample because it fits the needs of biomedical scientists as a research sample. Perhaps more efforts to obtain quota samples of doctors, dentists and nurses would avoid an unbalanced distribution of health professionals. In addition, I would have a discussion with a small panel consisted of the biomedical scientists who, ideally, could have participated in questionnaire survey beforehand, just asking their views and identifying other possible influences. Finally, I would repeat the bibliometric survey in order that the impact of Greek research on global research activity might be assessed. It would be useful to widen the scope, a more altmetrics approach, as professional social media are now important. However, the bibliometric surveys that the NDC now conduct concerning the visibility of Greek research should also contribute.

6.3 Reflections on Findings

The themes that emerged in the discussion chapter are summarized below, together with the relevant research sub-questions.

Increased representation of Greek biomedical research publications in international databases and the usage of social networking as indicators of improvement of scholarly communication (Question 1, sub-question 8, sub-question 18) (see sections 4.1-4.5.3, 5.1.1)

The changes were small, but generally towards greater visibility for Greek biomedical research publications – and mostly these publications were in English.

The importance of the impact factor criterion for selecting a journal for publishing (sub-question 12- see sections 4.6.1-4.6.4, 5.1.1, 5.2.1)

> The majority of Greek biomedical scientists are not informed about the impact factor of open access journals as the questionnaire survey shows as they state that they have no opinion on this characteristic of open access journals.

Author charges appear an obstacle for publishing in open access journals (sub-question 4, sub-question 12, sub-question 20- see sections 4.6.1-4.6.4, 5.1.1, 5.2.1)

> It was unclear where the lack of encouragement for publishing in open access journals occurred. The problem could involve the lack of proper information or the lack of funding for publishing in open access journals, or a mixture of the two.
>
> Biomedical scientists should be informed by the librarians that Greek biomedical journals that are mainly published by scientific societies are free of charge for the writers, and **some of them** are included in international databases as well, as the website analysis reveals such as *Hippokratia* (included the full text form of the journal in PubMed Central) and Archives of

Hellenic Medicine (included the bibliographic data and a link to the journal's home page in DOAJ). Consequently, all, even junior Greek biomedical researchers can enjoy the open access citation advantage too.

Changes in awareness of Greek biomedical scientists on open access publishing (sub-question 15, sub-question 18 – see sections 4.6.1-4.6.4, 5.1.1, 5.2.1-5.2.2)

Although, the bibliometric survey and social media follow-up survey found that Greek biomedical scientists use social networking for their scholarly communication, the questionnaire survey indicated some uncertainties about open access publishing in general and open access journals in particular. The third phase observed a slight change in the awareness of the Greek biomedical scientists on different aspects of open access publishing although the percentages of "don't know/no opinion" answers remain high throughout the phases. However, it is interesting to note that **before** the time point for the third phase (from September 2010 to May 2011), the first Greek open access developments **had already** been tested and two Conferences on open access had been organised by the NDC.

Changes in the attitude towards the prestige of open access publishing Journals (sub-question 15,-see sections 4.6.1-4.6.4, 5.1.1, 5.2.1)

The percentage of Greek biomedical scientists who stated that open access journals tend to have low impact factors is the same percentage of participants who considered the open access journals as of low prestige. But, there are open access journals which now have a high impact factor indicator, and even low impact factor open access journals can include high quality articles, that are more easily detected because of the open access character.

Changes in the understanding of the meaning and the existence of the institutional repository (sub-question 11, sub-question 15, see sections 4.6.1-4.6.4, 5.2.1)

The institutional repository is the Green road for establishing the open access scholarly communication. In Greece the institutional repositories were mainly established in 2008, a short time after the first phase of the survey. Consequently, the lack of awareness of the Greek biomedical scientists about the institutional repositories as communication channel at the first and second phase of the survey is justified. At the third phase the academic community seems more informed and the Greek biomedical scientists are aware of the non-existence of institutional repository in their workplace. Additionally, the institutional repository as a communication channel is accepted by Greek biomedical publishers too. As the publishers' interviews showed the Greek biomedical publishers are agreeable to the archiving of the post-print version of the article under special terms. However, a collaboration among publishers, authors and libraries can increase the importance of institutional repository. Libraries can inform Greek biomedical scientists about the existence of institutional repository and the advantages of archiving their articles in this platform. Additionally, libraries can inform Greek biomedical scientists about publishers' archiving policy. Greek biomedical scientists must be encouraged to archive their papers after asking publishers for permission to do so.

The weakness of the scientific societies to respond to the need for more specialized knowledge after the World War II and the increased subscription costs of commercial scientific journals contributed to the establishment of open access publishing (sub-question 1-see sections 2.5.2-2.5.3,5.2)

Expensive access to scientific information contributed to the scholarly communication crisis as the scientists and the libraries cannot afford to pay for having access to all these specialized journals. Consequently, the access to the research outcomes became more and more difficult and the need for the establishment of new cheaper and effective communication channels more urgent.

People's requests for open access to governmental archives provided support for open access to knowledge (sub-question 1, see sections 2.11, 5.2)

The Internet facilitated open access to government information (supporting democracy) and thus gave a motive for the implementation of open access to scientific information, particularly research results from government funded projects.

The electronic form of information and the creation of proper tools for its common description and detection facilitated the implementation of open access publishing (sub-question 1- see sections 2.5.4, 2.6., 2.7, 5.2-5.2.1)

During 1960s the exchange of electronic preprints via invisible colleges prepared the context for the establishment of electronic scientific journals and inspired preprint archiving. Information retrieval for electronic resources became more effective using the metadata schemes and detection tools such as Open Archives Initiative and Resource Description Framework.

Reasons for adopting open access for scholarly communication transformation (sub-question 9, sub-question 14, sub-question 20, sub-question 10- see sections 4.6.1-4.6.4, 5.2.1)

An important factor in assessing the adoption rate of an innovation is the benefit that it provides. Nevertheless, one needs to perceive the values of the open access journals and embrace them. The main reasons for valuing open access were the belief that open access would provide better dissemination. However Greek biomedical scientists surveyed believed that it is easier to detect general open access information than Greek biomedical information. Additionally, the libraries' role is a bit vague for the Greek biomedical scientists. At the same time, Greek biomedical scientists are embracing social media, which indicates that librarians need to catch up with the activities of the researchers. There is still considerable debate about the citation advantage of open access journals, and more surveys must take place on this.

Open access publishing can be integrated into normal research publication practice (sub-question 3, sub-question 7, sub-question 8, sub-question 16, sub-question 17, sub-question 19-see sections, 4.6.1-4.6.4, 5.2.1)

Greek biomedical publishers are making some efforts to adjust their journals to international standards. As the questionnaire survey reveals there is an increasing percentage of the participants who do not consider open access journals as low prestige journals. However, there is a high percentage of participants who do not have an opinion about this. It would be very useful for the academic community to be informed by the library's webpage about the value of impact factor indicator for journals**.**

In addition, the institutional / subject repositories as a new business model for open access are boosted mainly by the mandatory self-archiving policy implemented by the National Institute of Health of USA. Consequently, all the researchers, of all nationalities, that are funded by this funding agency are obliged to archive their articles in the subject repository PubMed Central. Greek biomedical publishers such as Spandidos and the International Institute of Anticancer Research inform their authors about the implementation of this policy on their webpage, and make such deposition easy.

The lack of awareness about the main characteristics of open access journals makes the implementation of open access innovation more complex (sub-question 12, sub-question 21-see sections 4.6.1-4.6.4, 5.2.1)

The Greek biomedical scientists, especially at the third phase, are more informed about open access publishing. However, the lack of awareness observed about the main characteristics of open access journals such as author charges, copyright and peer-review process indicates a role for libraries in providing easy access to such information to allow authors to compare information and select appropriate journals.

The trialability period for institutional repositories provide information about the acceptance or the rejection this form of open access publishing (sub-question 4, sub-question 21-see section 5.2.1)

As the institutional repositories have started since 2008, they were in a "trialability" period for most of the research period. In general, the Greek biomedical stakeholders react positively towards self-archiving in institutional repositories. Universities promote the deposit to the institutional repositories even in many ways such as applying a mandatory policy, providing financial awards to the academic community with the highest percentage of deposit and advertising the benefits of archiving. Deans' Senate encourages the establishment and deposit in institutional repositories and publishing in open access journals and the Greek biomedical publishers permit the archiving of the articles under some terms. The Greek biomedical scientists seem to be more informed about the institutional repositories especially by the third phase but they need to be informed about the copyright issues by librarians.

The visibility of open access sources (observability) affects the adoption and spread of the innovation (sub-question 13, sub-question 11, sub-question 20, see sections 4.6.1-4.6.4, 5.2.1)

The observability of open access sources can affect the adoption and spread rate of the open access publishing innovation. However, the factor of colleagues' communication is an important factor as the questionnaire survey shows. The early adopters may not be fully motivated to persuade their colleagues to publish in open access journals and the institutions do not provide funding for author fees. Greek biomedical publishers do not provide information about the copyright issues concerned with open access publishing. Libraries do not provide adequate information on these characteristics of open access sources. Consequently, libraries need to work with all the stakeholders to deal with the information and awareness gaps.

There are identified driving and restraining forces for open access according to Lewin's Force Field Analysis (sub-question 2, sub-question 6, sub-question 7, see section 5.2.2)

The scholarly communication crisis and the technological advancements led to the appearance of open access publishing as a new channel of scholarly communication. The identification of the need for change led to the unfreezing stage. Two models of open access publishing, the open access journals (Gold road) and institutional repositories (Green road) predominate for Greek biomedical researchers. The role of key leader, in our case the National Documentation Center, is very important for the adoption of the innovation. At the moving stage there is some confusion because of the realization of the new reality which is being formed among the scholarly community (as shown during the three questionnaire surveys). Drivers or barriers contribute to the adoption, or the rejection, of this innovation. The most important obstacles are ignorance and uncertainty. Collaboration and advocacy are the two practices which must be developed by the libraries to reduce restraining forces and reinforce the driving forces in order to accomplish the adoption of open access publishing during the refreeze stage of diffusion. The libraries must be the connecting link of all stakeholders by forming internal and external relations.

6.4 Open Access Publishing: Connections and Interactions

At the start point of this thesis the open access publishing context seemed quite easy to analyse. The stakeholders could be defined and the actions and reactions presented as known because of the needs and the requests of each stakeholder. However, closer inspection showed that the reality was more complex and has become more complex. Open access publishing developments need to be viewed against the background of changes in scholarly communication, and changing relationships among research funders, researchers, universities, institutions, commercial publishers and learned societies. Although, at the beginning the comprehension of the connections and the interactions was difficult, the multi-method approach helped interpretation.

First of all, a series of questions were posed because of the general definition of open access publication initially mentioned in Budapest Open Access Initiative (2002). The combination of technological progress via internet and the need for 'free at the point' of access led to the suggestion of two means of open access for biomedical researchers: *Self-Archiving* and *Open Access Journals,* without forgetting the target which was open access to peer-reviewed journals for the public good**.** Nevertheless, there are some questions about which the theoretical framework can provide the answers but the future will confirm them. So, the above mentioned questions are the following

- Are self-archiving and open access journals the only vehicles for open access establishment?
- Could the 'free at the point of access' be the feature of all open access publishing models?
- And if so, how do they work? How are they implemented in the biomedical sciences?

However, by implementing Aristotle's principles of deductivism, we could answer to all the questions. If we consider that all the publishing models which were 'free at the point of access' are open access publishing models, in the category of open access publishing models could be integrated the hybrid open access journals, the institutional repositories and all the models which are analyzed in this thesis. The literature review examined each model, the etiology about their creation and also, the mechanism that supported each of them. The borders between the formal and the informal scholarly communication channels are altering. The peer-reviewed scientific journals which used to be formal can now be informal as well. Articles may appear (in any version: preprint, post-print etc.) and be disseminated via informal communication channels such as blogs, and listserves. However, as a result of changes in information and communications technology the informal character of the scholarly communication is changing. So, by observing the literature review and research results of the thesis are the following questions were formed

- To what extent could an eponymous exchange of ideas visible to other scientists be characterized as informal?
- Could we say that we are experiencing a transition stage to Open Science?
- Could the combination of open access publishing and technological advancements lead to this new social and scientific reality?

Technological advances and scientific community requests seem to lead to a new social and scientific reality inspired by the ideal of Open Science and accomplishing this by promoting the open access publishing. The experiencing of this transition stage indicated from the following trends

- The mandatory character of open access principles. The mandatory archiving of public research findings in institutional and subject repositories presents the desire of the knowledge creators and funders to re-obtain and distribute openly the published information. However, even Open Science must have rules which will be derived from the respect to the intellectual property even when the creator is unknown. This barrier may be overcome by the usage of licenses such as Creative Commons. At another level but equally important in expressing the need for open access is the Freedom of Information legislation (see appendix 2.1) which allows open access to government information which may concern the public as well but not without taking into consideration the minimum legislation for data protection (see appendix 2.2).
- The web 2.0 technologies which promote the eponymous and visible intradisciplinary and interdisciplinary communication express the need for wider dissemination of published information by overcoming the copyright and charges obstacles that publishers pose. Consequently, the informal scholarly communication pauses to be informal because on the one hand it contains published information and on the other hand the unpublished ideas are turning into published because they are written, eponymous and can be judged in an open procedure by the scientific community.
- Metadata schemes facilitate the federated search from heterogeneous information sources, search engines and open access databases. This

collaboration between information scientists and informatics can be another sign that the scientists promote the Open Science by creating the proper tools to detect the published information easier and faster.

All the above issues which are analyzed in the thesis must be the motives for further action. The tools which lead to Open Science are continually improved. The non peer-reviewed information sources and the other types of documents such as books which have not been included in evaluation tools such as Web of Science (including Journal Citation Reports) must be evaluated as well. Scopus (included SCImago Journal & Country Rank) has already started to function as complementary tool. Google Scholar may be a valuable evaluation tool too because it tracks citations from a greater variety of information sources, as long as a better organized structure and consistent appearance of results can be implemented. Moreover, the open access models can be evaluating because new assessment methods as open peer-review process, altmetrics, collaborative filtering tools are being tested and criticized by the scholarly community. However, the scientists' opinions conflict so far, and perhaps the whole picture remains confusing. At this point, we could see the role of individuals in the evolution of the social phenomenon. The human actors as stakeholders of the open access publishing context are connected to each other, but each of them, having different roles, react in different ways and are affected to different degrees by the new reality. Although, libraries, institutions, scientists, publishers and informatics seem to be the most important stakeholders of the open access publishing in national and international level, their connections and interactions depend on the progress which has taken place. So, the Greek open access publishing framework seems to be constructed on a different basis to the international one. Consequently, the observation of both contexts was meaningful and for their better understanding the following tables represent stakeholders' roles, connections and interactions as they are depicted and analysed in this thesis.

Stakeholders	Roles	Connections	Interactions
US White House Office of Science and Technology Policy (OSTP)	**Enforces** policy for the mandatory open access to the federally funded research	Association of American Universities the Association of Public and Land-Grant Universities the Association of Research Libraries Publishers	**Provoked** the **collaboration of Universities and ARL** for the writing of SHARE proposal **and publishers collaboration** for writing CHORUS proposal U.S.A. Government will affect the future of open access publishing by **selecting the proper proposal**
US National Institute of Health	**Funds** biomedical research **Supports** open access policy	Europe PubMed Central PubMed Central (U. S. National Library of Medicine in USA) Publishers Researchers	**Supports** PubMed Central and Europe PubMed Central by implementing the policy of the mandatory deposit of research findings **Collaborates** with publishers for the implement of the policy **Informs** researchers for its policy and **funding** them
U. S. National Library of Medicine in USA	**Hosted and supports** the subject repository PubMed Central	Europe PubMed Central National Institute of Health Publishers Institutions (learned societies) Scientists	**Enriches** Europe PubMed Central with its citations via PubMed and PubMed Central and the reverse **Implements** the policy of NIH for mandatory deposit of peer-review articles funded by public budget and in this way the PubMed Central is enriched as well. **Cooperates with institutions and publishers** for the selection of the open access journals which fulfill the inclusion criteria. **Collaborates** with publishers for the implementation of NIH open access policy **and** offers to the scientific community free access to the related articles **Provides to scientists** the information for further research by openly accessing to research findings

U.K. Wellcome Trust	As a research funding agency **adopts** and **implements** the open access policy for all its funded research on biomedical sciences **Conducts** surveys on open access topics	European Bioinformatics Institute (EBI) the University of Manchester (Mimas and NacTeM) the British Library Publishers Scientists	**Set up** the Europe PubMed Central in collaboration with EBI, Mimas and NacTeM and British Library **Mandates** the deposit of the research papers to PubMed Central and Europe PubMed Central via the publishers As funder of biomedical research **communicates with scientists and invest in their knowledge**
Joint Information Systems Committee (UK)	**Intends** to create a national network of higher education repositories **Funds** projects related to the launching digital repositories and support the development of information use services, data and text mining procedures, workflows, preservation process and tools **Created** JISC model license for journals **Conducts** surveys for the benefit of libraries and does proposals such LOCKSS	Universities Informatics groups Publishers Libraries	**Developing** the national network of higher education repositories, the access to information will be quicker and more effective for the public While, Universities will integrate the intellectual production **Cooperates** with Informatics groups and **provides** to the Universities the knowledge for competent infrastructures **Makes** negotiations with the publishers for the acceptance of JISC model license for libraries' benefit **Provides** to the libraries the tools for better management of their digital journal collections
SHERPA/ROMEO and JULIET	**Informs** for publishers and research councils archiving policies	Publishers Research councils Libraries Authors	**Helps** libraries and authors to be informed about self-archiving policies after the **collaboration of SHERPA with Publishers and Research Councils**

Table 6.1 Public and private institutions in U.S.A and UK promote open access

Table 6.1 notes how in the USA the National Institute of Health and US National Library of Medicine collaborate intensively to implement the open access to public funded biomedical research, through the deposit of the related papers in the subject repositories PubMed Central and Europe PubMed Central. The question is under which terms the mandatory open access policy will be finally implemented. The choice of SHARE or CHORUS or a third option unknown at the moment may actively contribute to the establishment of Open Science or provoke its delay. Nevertheless, this initiative of US White House Office of Science and Technology Policy will have an important impact on the open access movement.

In UK mechanisms for promoting and "refreezing" or stabilising open access publishing have been developed as well. The UK Wellcome Trust seem to have a similar role to the US National Institute of Health and, additionally, it contributes to the creation of Europe PubMed Central. The funding of open access infrastructures are funding by JISC and the need for information on open access publishing topics are highlighted by the funding of SHERPA/ROMEO and JULIET.

Stakeholders	Roles	Connections	Interactions
DOAJ	**Hosts 10000** open access peer reviewed journals	Lund University Library Infrastructure Services for Open Access Publishers	**Established and supported** by Lund University Library since 2003 In 2013 **belongs to** Infrastructure Services of Open Access Services **Collaborates** with publishers whose the open access journals hosts or are going to host
BIOMED CENTRAL	**Hosts 250** open access peer reviewed journals on STM scientific areas **Launching** institutional repositories named as Open Repository	Current Science Group National Institute of Health in the USA Springer Web of Science Scopus Google Scholar Libraries	**Established by** Vitek Tracz former chair of the Current Science Group inspired from the discussions Harold Varmus from National Institute of Health in the USA **Bought** by Springer **The journals are indexed** by Web of Science, Scopus and Google Scholar **Collaborates** with libraries for the creation and preservation of an Institutional Repository

SPARC	**Changes** of scholarly communication status quo by supporting open access by creating new open access models, facilitating open archiving, overcoming copyright barriers, offering access to the knowledge for all readers **Publishes** alternative low – priced journals	Association of Research Libraries (ARL) Libraries Publishers	**Established** by Association of Research Libraries (ARL) **Collaborates** with libraries and publishers for the promotion of open access to research findings
PLoS	**Launches** open access peer review journals **Promotes** interdisciplinary collaboration by launching PLoS network which addresses to the scientists of different disciplines **Provides** freely PLoS Article-Level Metrics **Is** a founding member of "International Open Access Week" **Is** one of the directors of Open Access Scholarly Publishers Association (OASPA)	Universities Organizations Foundations Web of Science Open Access Scholarly Publishers Association	**Is funded** by Universities, Organizations and other Foundations **Its journals are included in Web of Science and have Impact Factor** **Is director of** Open Access Scholarly Publishers Association

Table 6.2 Open access publishers

The table 6.2 depicts the initiatives of open access publishing which were mainly initiated by Universities and Libraries. However, the situation has changed for DOAJ and BioMed Central, as DOAJ is not supported by Lund University Library anymore and BioMed Central is directed by Springer. Nevertheless none of them lost the open character.

Stakeholders	Roles	Connections	Interactions
Springer	**Adopts** Open Choice policy (hybrid open access journals) **Participates** in HINARI program **Publishes** open access journals and books **Launches** BioMedCentral	BioMedCentral Authors Funding agencies PubMed Central Europe PubMed Central Researchers	**Informs** researchers about open access policy and they provide their articles for publishing in Springer's journals **Collaborates** with funding agencies for funded researchers **Sends** the research – funded articles to PubMed Central and Europe PubMed Central **Implements** an open access publishing model in developing countries for promoting research
Elsevier	**Launches** open access journals **Supports** Scopus and SCImago	Funding agencies Researchers Statisticians PubMed Central Europe PubMed Central	**Makes** agreement with funding agencies for funding researchers **Collaborates** with authors funded by the cooperated funding agencies **Cooperates** with statisticians for citations tracking and the journals' evaluation **Sends** the funded articles to PubMed Central and Europe PubMed Central
Taylor and Francis and Routledge	**Adopts** Taylor and Francis Open and Routledge Open Select policy **Launches** open access journals (Gold road) **Allows** the self-archiving after an embargo period for the Author's Accepted Manuscript **Supports** the open access to articles of subscribed based journals (hybrid open access journals)	Funding agencies Researchers	**Informs** researchers about the compliance with funding agencies open access policy **Promotes** open access by informing the researchers for Taylor and Francis Open and Routledge Open Select policy and the alternative open access publishing models

Table 6.3 Commercial publishers promote open access

Table 6.3 depicts the actions of commercial publishers for promoting open access publishing. In addition, it presents the impact of commercial publishers on the establishment and the support of new open access publishing models such as hybrid open access journals.

Stakeholders	Roles	Connections	Interactions
Web of Science-Journal Citation Reports (Thomson Reuters Institution) **Scopus (Elsevier)** **Google Scholar (Google)**	**Provide** the evaluation tools of open access journals	Open access publishers Authors	**Collaborate** with publishers in order the journals to be indexed **Provides** the tools to authors to see the evaluation of their research finding
The Ranking Web of World repositories (the Consejo Superior de Investigaciones Científicas -CSIC)	**Evaluates** institutional repositories via the Ranking Web of World Repositories	Institutions Researchers	**Collaborates** with Institutions to which belong repositories **Concerns** the researchers who deposit their works in repositories

Table 6.4 Evaluation tools of open access sources developed by public and commercial institutions

The table 6.4 illustrates the stakeholders who contribute to the evaluation of open access sources by developing open access initiatives and evaluation tools. These metrics contribute to the refreezing of the open access publishing by offering the tools for the assessment of the open access sources. Moreover, they provide the opportunity to compare the impact of the traditional scholarly communication channels and the new open access publishing models on the scholarly communication procedure for example the Web of Science helps to the estimation of citation advantage of open access journals compared to the citation rates of subscribed journals.

The Greek open access publishing context is different. Although the stakeholders are fewer there is some action on open access issues. First of all, the Greek Universities develop cooperation and establish the Institutional consortia – open access in appearance model. The Greek Academic libraries create the institutional repositories. National Documentation Centre seems to be the leader in the open access publishing context by providing a support framework for interaction with many stakeholders.

Stakeholders	Roles	Connections	Interactions
Greek Consortium of Academic Institutions	**Implements** the Institutional Consortia open access model via HealLink	Ministry of Education, Culture, Religious Affairs and Sports Academic Libraries Publishers Academic community Portico	**Ministry pays for** Heallink **Academic Libraries** via **Consortium support** the continual function of HealLink **Negotiates** with Publishers for lower prices **Offers,** free at the point of access, the included information sources to academic community **Preservation** of the backfiles by Portico
Greek Academic Libraries	Host institutional repositories and open access digital collects especially of rare collection	Academic Institutions Informatics groups Academic community Publishers	**Collaborates** with the administration of the Institutions they belong for the planning and implementation of self-archiving policy **Cooperate** with informatics groups for the creation and preservation of the infrastructures **Inform** the Academic community for the new services and the need of its participation **Help** faculty to overcome the copyright problems with publishers **Supervise** for the implementation of the policies
National Documentation Centre	**Organizes** the International Conference on open access issues **Informs** about open access news via the related portal **Launches** digital repositories **Being** the e-publisher of open access information sources **Hosting, managing and developing** the aggregator openarchives.gr **Coordinated** the European Project MedOAnet	Universities Scholarly societies Researchers Public Libraries European open access supporters	**Collaborates** with Universities which provide it with their intellectual production such as PhD theses **Collaborates** with scholarly societies for which it publishes the e-journals **Cooperates** with researchers who deposit in its repositories **Collaborated** with some public libraries for the implementation of their digital libraries **Cooperated** with other European open access supporters for the harmonization of open access policies and practices in Mediterranean countries

Public Libraries	**Promotes** open access by hosting open access digital libraries	National Documentation Centre **Academic Libraries**	**Provide** the documents and for some of them the implementation of their digital libraries took place by National Documentation Centre **Cooperated with Academic Libraries in order digital libraries to be developed**
Scientific societies	**Host** open access journals	National Documentation Center Researchers	**Publish** open access journals in collaboration with researchers who accept the open access policy **Some of them are supported** by National Documentation Centre
International Institute of Anticancer Research	**Publishes** impact factor subscription- based journals but it implements the NIH open access policy **Implements** the open access policy **Complies with** NIH open access policy	the Stanford University HighWire Press NIH Researchers PubMed Central Many abstracting and indexing organizations	**Cooperates** with the Stanford University HighWire Press for the implementation of open access policy **Informs** the researchers about their obligation to deposit to NIH a copy of the final manuscript funded articles to be archived PubMed Central Its **journals included** in many **abstracting and indexing databases** in order the researchers to be currently informed about the new research findings
Spandidos Publications	**Publishes** impact factor subscription- based journals **Implements** the open access policy **Cooperates** with funding agencies **Encourages** authors to support self-archiving policy	Funding agencies Researchers PubMed Central Europe PubMed Central Many abstracting and indexing organizations	**Informs** researchers about the funding agencies with which it cooperates **Implements** the mandatory deposit of funded research to PubMed Central and Europe PubMed Central **Obliges** researchers to comply with its open access policy by paying author charges even if open access only happens after the embargo period of 12 months Its **journals included** in many abstracting and indexing databases and the researchers are informed for the new research findings
Biomedical learned societies	**Host** open access biomedical journals and most of them without authors' charges	Researchers Abstracting and indexing organizations	**Accept** authors manuscripts and upon publication of the issues make them available via their websites Some of them are included in abstracting and indexing databases

Table 6.5 Greek open access publishing context

By observing the above–mentioned tables, some missing links, stronger collaborations and duplicated (or replicated) efforts in national and international level are highlighted as depicted in the following tables.

Missing Collaborations Between
Libraries and funding agencies
OSTP and scholarly community (the individual researchers)
Greek academic libraries and biomedical publishers (commercial or learned societies)
Greek academic libraries and NDC

Table 6.6 Lack of collaborations table

Collaborations **Between**
PubMed Central and funding agencies
Publishers and funding agencies
Publishers and indexing and abstracting services
Publishers and PubMed Central
SHERPA/ROMEO and JULIET and publishers, libraries, research councils and authors
NDC and public libraries
Academic libraries and public libraries
NDC and scientific societies
NDC and researchers
Greek biomedical publishers and researchers
Among academic libraries
Biomedical publishers and researchers

Table 6.7 Collaborations developed among stakeholders

Duplicated Efforts
Development of Europe PubMed Central based on the standards of USA PubMed Central
Creation of licenses
Deposit of two separate proposals SHARE and CHORUS
Scopus-Web of Science

Table 6.8 Efforts for the creation new tools

Table 6.6, the missing collaborations present the gaps which are developing for open access publishing. Libraries do not seem to cooperate with funding agencies, although they could collaborate with funding agencies and provide very useful information for the scientific areas which need investment for further research and suggest better open access journals for publication. Additionally, US White House Office of Science and Technology Policy (OSTP) studies proposals for the best implementation of open access publishing to federal funded research output. But it does not seem to collaborate with the scholars as individuals. The OSTP will apply a new policy which may radically change the current structure of scholarly communication so the US White House Office must find a way to communicate with wider scholarly community, perhaps something like a scholarly referendum.

As far as the national missing collaborations, Greek academic libraries may not at present cooperate with Greek biomedical publishers but the collaboration could be beneficial for the whole of open access publishing stakeholders because they could inform publishers about Creative Common licenses, authors' rights details, and the inclusion criteria of PubMed Central. All the information would be helpful for the authors as well. Moreover, there is no collaboration of National Documentation Center with Academic libraries on open access issues. Perhaps, it happens because common points for collaboration have not presented yet.

As far as the collaborations concerned (see Table 6.7), publishers seem to have a more definite role in open access publishing because they cooperate with the majority of stakeholders such as funding agencies, researchers, PubMed Central, indexing and

abstracting services in national and international level. NDC collaborates with the majority of stakeholders too, the public libraries, the scientific societies and researchers. While, the academic libraries have a strong collaboration with each other, perhaps more than with organisations external to the libraries. Finally, the technical knowledge and experience of University libraries on the development of repositories could be transmitted to the public libraries. An example of such a collaboration is the creation of digital library Daniilida of the Municipal Library of Patras in cooperation with the Library & Information Center of the University of Patras. So in the future a more intense cooperation among academic and public libraries can be very beneficial for the whole society.

According to table 6.8 the duplicated or replicated efforts may be characterized as "double" efforts because they cover needs for which the tools have already been created. It does not mean that the development of new instruments is needless. Because, some competition, can lead to the improvement of the current tools. In addition, the duplicated efforts can be a sample of the scientific evolution or different interests. In particular, the creation of the European PubMed Central may be a need for hosting of the vast published information in Europe which cannot be included in the US PubMed Central. Moreover, copyright is established within legislation but the open access sources must be protected with respect to principles of the European and US Initiatives for users' rights. Licenses not only protect the documents but also inform the user for usage rights. The deposit of CHORUS and SHARE just for the implementation of the same aim illustrates the lack of collaboration between of the Libraries and Commercial Publishers on open access issues. Additionally, the differentiation of implementation vehicles may be an indication of different interests. As far as the Scopus and Web of Science concerned, both databases are bibliometric tools which provide citation counts and impact factor indicator. But Scopus additionally includes citations from book series.

By studying the tables 6.1 - 6.5 perhaps it is easier to detect the similarities and the differences between the national and the international open access publishing context. As far as the international context is concerned, the open access models seem to have become the contemporary means of scholarly communication.

In Greece, the picture is not the same. There is progress on open access but it is slow. Greek academic libraries have not launched a Directory of Greek Open Access Journals yet. But they have managed to implement the Institutional Consortia open access model in order to obtain lower prices in subscription–based journals and databases, and as a result, a great number of scientific journals and important databases are made 'free at the point of access' for the scholarly community via HealLink.

The majority of higher education institutions have launched institutional repositories and made open access digital collections available to the public. In November of 2012, the Deans' Senate decided to promote open access publishing, either by self-archiving or publication in open access journals. The National Documentation Centre has a very active role on open access issues. It supports open access publishing in several way, from being e-publishers of scientific societies journals to launching subject repositories and it cooperates with public libraries for the development of their own digital libraries. However, the establishment of a national open access policy probably would help in the promotion of open access publishing, especially as far as mandatory self-archiving is concerned.

Biomedical learned societies' journals such as those from the International Institute of Anticancer Research are openly available via their websites, while commercial publishers such as Spandidos publications adopt an open access policy but under specific terms. However, fast peer review and publication processes, as it is mentioned in his website (Spandidos, 2013), could create some doubts about the quality of procedures and the ability of Greek biomedical scientists to directly respond to the publisher's requests. Nevertheless the inclusion of Spandidos journals in high standard international databases could be an indication of the papers' quality. Further research on the quantity of Greek articles in the total of articles included in Spandidos journals on the one hand could answer the second point about the readiness of the Greek biomedical scientists, and on the other hand would illustrate the visibility of Greek biomedical research via Spandidos journals.

According to the principles of Theory of Diffusion and Force Fields Analysis, the innovation seems to be acceptable in Greece but the hard work has not finished yet.

In general level, we may be at the "moving" stage where the benefits of open access publishing and the usage of open access sources have already been recognized. The driving forces seem to be in place, but not put into gear. The findings of the phases of the questionnaire survey, especially at the first and the second phase, showed that the biomedical scientists are not well informed and their ignorance and the lack of cooperation may be the obstacles to the acceptance of the innovation. Therefore, we need more opinion leaders in order to cooperate and promote the open access to the scholarly community members. Biomedical librarians have many serious reasons to promote open access and the most important is libraries' survival as they are in danger because of the financial crisis. Consequently, the active liaison role of a librarian may be the best advertisement for open access models to the scholarly community. There are several means which could be used such as personal discussions, meetings and seminars. The role of National Documentation Centre is very important as well. It has the infrastructure and the proper staff for developing the infrastructure of Greek PubMed Central but it needs to cooperate with the biomedical librarians who have the knowledge and the experience to persuade the biomedical researchers.

6.5 Limitations

From the beginning of this research I had to cope with two problems that affected the research methods used – and the results obtained:

- the lack of free time of biomedical scientists and publishers
- the research topic was not directly relevant to the biomedical scientists

The research was conducted on a subject out of the scope of the biomedical scientists' scientific interests. This fact made me more cautious about the selection of the survey tools because this "non-relevance" could be a discouraging factor for their participation. Moreover, the longitudinal character of the case study and the need for replication of the questionnaire survey in different time periods constrained some choices on sampling. For all these reasons the selection of a convenience sample was the feasible choice. As the results showed, the difficulty was identifying for sure any changes as the confidence intervals (appendices 4.4-4.6) overlap was a consequence

of the small sample size. Moreover, the unbalanced sample size and synthesis in the three phases affected the analysis of the research results. However these consequences are expected because of the choice of non-random sampling. In hindsight, it might have been better to focus on obtaining a larger sample of physicians for all three phases, but the findings also indicated that librarians will need to work with nursing researchers.

The problem of free time was faced in the interviews with biomedical publishers as well. The questions which could be answered by journals' websites, they were answered by advising the websites from the researcher and the answers were confirmed by the biomedical publishers. In this way, interview duration was reduced and the communication with biomedical publishers was easier.

Finally, the effect of external factors, such as the change in PubMed inclusion policy made the bibliometric research more difficult but this type of change may be inevitable in a longitudinal study.

6.6 Contribution to Knowledge

The research findings depict and explain the transition from limited scholarly communication to the start of Open Science in Greece. In spites of the constraints, the research findings are probably generalizable to other small countries that have active biomedical societies that may publish at least some articles in English. In addition, the increasing number of open access publishing models, the creation of new metrics tools for the evaluation of the content of the open access sources are some indications of this change.

The longitudinal case study benefited the research because, on the one hand, it emphasizes the complexity of researching social systems because some of the effects of the economic crisis - and the impact of the NIH mandate on the different ways the journals are reacting and on the other hand, at the same time, it identifies some of the constant, and rather concealed problems around copyright and licenses. However

many conferences and awareness raising sessions the NDC hold - unless some of these uncertainties are resolved, authors are likely to be uncertain how to deal with open access. And that is where health librarians should help.

The tables (see section 6.4) which are concerned the actions and interactions of the stakeholders present the changes which are happening on open access context in national and international level. The collaborations, and the duplicate efforts present the progress on open access publishing and the methods used practically for its promotion. The missing collaborations are important and may affect the rate of adoption of open access among Greek biomedical scientists, but also they provide a motive for further action in order the problems to be resolved. In spites of the constraints, the research findings are probably generalizable to other small countries that have active biomedical societies that may publish at least some articles in English.

6.7 Implications for Practice

By knowing the real barriers to open access, the information professionals who work in health libraries need to cooperate and communicate with the scholarly community. They need to inform the biomedical scientists on the following topics:

- The open access biomedical journals may have a high Impact Factor as well
- The author does not always pay because the institution or the funding agency may pay instead
- Author's rights can be absolutely protected via licences such as Creative Commons
- Their benefits from publishing in an open access journal may be more than publishing in a subscription–based one because of the possible open access citation advantage.

Additionally, this thesis demonstrates that nurses are the least active researchers in publishing their work. The information scientists must work harder with nurses in order to persuade them on the one hand to publish their works and on the other hand

to publish them in open access journals. Health librarians must present them the motives so the obstacles to be overcome. The journals *Archives of Hellenic Medicine* and *Vima tou Asklipiou - (Rostrum of Asclepius)* are Greek language journals which are included in international databases. So they do not need to write in English language and their works may enjoy increased visibility via the international databases.

All the indications show that the refreezing stage for open access is close, according to Lewins' Force Fields Analysis. While, according to the Theory of Diffusion, the open access publishing, as an innovation, has many attributes which make it accepted but more actions must take place. In Greece, the collaboration between the information professionals who work in health libraries and the scholarly community (opinion leaders, faculty, and researchers) may be the key to the transition not only to the open access publishing but to Open Science as well.

6.8 Suggestions for Further Research

As the progress to the open access publishing issues in Greece is slow in comparison with the international level, the need for the repetition of the present research is increased. The same research tools could be used for the same research samples and the research findings tested according to the same theories (Diffusion of Innovations and Force Fields Analysis) in order to see if the complexities of the open access publishing have been overcome and the refreezing stage is approached. The distribution of the same questionnaire to other scientists would help on the one hand to understand the progress of the innovation according to the disciplines and on the other hand to detect the problems.

Certainly, the ideal situation would be a stratified random sample and a larger sample size to be used by aiming at the reduction of the problem of confidence interval overlap and help clarify where the trends are. Moreover, a survey conducted by using the focus group method would help to see how the group can affect the behavior of the unit (individual) for or against open access publishing. However, knowing the

limitations of the present study, the conduct of surveys by using these research tools may be unsuccessful. The limitations can be overcome by Greek biomedical scientists' awareness and their interest in open access publishing issues.

Another research study could be also conducted on the Greek biomedical publishers in order to see the changes on copyright issues and their awareness of open access publishing. The above mentioned surveys could be conducted possibly at the end of 2017, because, by then, the institutional repositories infrastructures and the NDC repository may be completed as well. Additionally, the usage of current infrastructures will provide more information on the awareness of open access publishing. Finally, the impact of international events may be more obvious after four years**.**

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Appendices

Appendix 2.1 Freedom of Information

The central focus of Democracy is each citizen of a country. The appropriate and right function of this regime is based on citizen's right not only to be aware about Government's actions but also to be able to criticize them. The principle of Freedom of Information is to enable people to have a total view about the work of public authorities and Government's deeds as the public archives should be at citizens' disposal. Normally, a democratic authority must work under a feedback framework, in the sense that it is accountable to its citizens and should respond to their concerns. Meanwhile, the Government's members as citizens' representatives must provide information to the public and the public can freely express their opinions to the representatives. Unfortunately, this process is usually forgotten when the representatives govern and this may be characterized as the weak point of the Democracy. Freedom of Information aspires to the "restoration" of democratic procedure as via this legislation the people can request data not only from their personal archives kept by the public authorities but also for the acts of government. Certainly, the degree to which a Government is open to the public depends on the governmental tradition. An example is given by Blackstock and Oppenheim who contend that:

> "The first person to draw attention to the idea of FoI in the UK appears to be the political activist and exile, Guiseppi Mazzini, in 1844. He stated:
>
> *This anxiety for secrecy on the part of public officers is a growing evil. Who are these men who treat as enemies their fellow subjects of the realm? Let diplomacy have its secrets for public servants, we want responsibility; and responsibility cannot be obtained without publicity. Secrecy is but another word for fear"* (Blackstone and Oppenheim, 1999).

During the 20th Century the Freedom of Information was established. The UK White Paper was published in 1997 and its purpose was to provide access to official records and information as an indication of democratic government (Blackstone and Oppenheim, 1999). Certainly, there were some exceptions such as national security and international relations; law enforcement; personal privacy; commercial

confidentiality, the public and the environment etc. Although White Paper was seen as an act of good will on Government's behalf (Labour Government, UK) and managed to accumulate good criticisms, nevertheless, the negative comments cannot be omitted as acknowledge in Blackstone and Oppenheim's article (1999).

USA has had Freedom of Information legislation, in place for over 40 years. Specifically Muir and Oppenheim (2002) mentioned that Freedom of Information Act of 1966 authorizes citizens to claim and have access to government's documents. However, terrorism is a repressive factor for the dissemination of government information. The most common exemptions of national Freedom of Information legislation concern the defence and the security of the State.

Nowadays, technology facilitates the dissemination of government information via e-Government as Muir and Oppenheim (2002, p. 173-186) maintain. Indeed, e-Government concerns the delivery of information and more specifically the delivery of government information. Freedom of Information concerns government information as well. But there is a slight difference between the two terms. Government uses e-Government sources because it desires to make its actions known to the public, while, Freedom of Information expresses the public's request for access to governmental information, in my opinion, these could be two sides of the same coin. In other words e-Government could become the medium for government – public communication as it is the easiest and quickest way.

The correct implementation of this idea presupposes citizens' knowledge about the manipulation of electronic sources. Public libraries can have the role of educator for the people who are not familiar with e- Government and all the digital sources and the services they offer. A survey of library and information science (LIS) staff in public libraries and the private sector on understanding of, and attitudes towards Freedom of Information legislation was conducted in UK by Blackstock and Oppenheim in 1998. It is a study which may give us useful background information on librarians' awareness of legal aspects of information provision. In fact, this research showed that librarians were not completely aware or they did not understand the way in which FoI worked at the time of the survey (Blackstock and Oppenheim, 1999).

Although the above results concerned research conducted some time ago, it offers us a motive for more research in order to see the differences and similarities between the past and the present or the evolution of FoI related to e-Government. Research conducted by Muir and Oppenheim (2002, p. 173-186) showed that although governments have promoted the computerization of information, they have not faced the problem of digital literacy. There are people who cannot manipulate a computer and so they are not able to have access to digital government information.

Appendix 2.2 Data protection

Data protection legislation could be reasonably characterized as the field of intense and opposing views among many countries. Data protection is a sector of exceptional sensitivity as it concerns the collection and dissemination and use of personal data.

Individuals must be protected against the misuse of data about their health, their financial status. The most enthusiastic supporter among developed countries seems to be the European Union. It passed the analogous Directive in 1995 and it was implemented by its Member States in the years after 1998. The Directive includes private and public sectors and imposes the minimum legislation about data protection from each Member State. Its policy is stricter for non-European countries with inadequate data protection legislation. It means that protected personal data cannot be disseminated or accessed by non-European countries which do not implement an efficient level of data protection, for example USA. The European Union's discretion on this subject inspired other places to follow its example (such as Hong Kong).

It is impressive the lack of consideration with which New Zealand and USA cope with this special area. New Zealand is not actually as protective as ought to be for the sake of its citizens in the opinion of Muir and Oppenheim. Two very serious omissions in New Zealand Act are the lack of restrictions about dissemination of private information from country to country and the weakness of the New Zealander, because of the Act, to claim for information privacy (Muir and Oppenheim, 2002, p. 173-186).

As far as USA concerned, to some extent there is protection of data and privacy but it depends on agencies. The only guarantee of data protection is TRUSTe which functions as described

> "Member companies submit a formal privacy policy to TRUSTe and pay a fee. They can then use the TRUSTe logo on their web site. However TRUSTe does not set minimum standards of privacy policy" (Muir and Oppenheim, 2002, p. 173-186).

Consequently member companies are in charge of not only bring the TRUSTe logo but also really protect citizens' privacy. However, the advantages of private sectors may be above individuals' interests and this case the logo may be forgotten.

Plato	***Aristotle***
Connection of knowledge with the "substances"	Connection of knowledge with the "substances"
But "substances" are the permanent and unchangeable – Plato believed that there was a reality behind the material world – the world of ideas that contains the eternal and immutable patterns behind the various phenomena we see in nature.	Substances are continually changing until the individual substance to be created. Aristotle believed that the "form" or "idea" was made up of what we observed, the characteristics of the things
Plato's theory of ideas defines the hypostatization of all concepts as an objective entity outside of any mind	Aristotle talked about the "one" which is continuous, the whole, the individual and the universal. The "one" which is indivisible in number and form – a unity of form and substance
"Man is the measure of all things…means that individual things are for me such as they appear to me, and for you in turn such as they appear to you – you and I being "man" " (Fowler, 1967, p. 41).	All men naturally desire knowledge

Knowledge is sensible perception and true opinion with reasoned explanation – reality has two regions – the world of the senses where our knowledge is incomplete – nothing is really permanent in this world. The other region is the world of ideas, about which we can have true knowledge using our reason (e.g. 2+2=4). And the highest degree of reality was that the world of ideas. General knowledge defines the knowledge of particulars "…he doesn't understand the knowledge of shoes if he does not know knowledge" (Fowler, 1967, p. 23).	Knowledge is our esteem for the sense…and most of all the sense of sight. Things that are the highest degree of reality are what we perceive with our senses. Experience is the knowledge of particulars
Lovers of wisdom are lovers of reality and truth	The wisdom is the knowledge of the experience and the knowledge of cause of the things
Memory creates images which last but whatever is rubbed out or cannot be imprinted, it is forgotten and unknown	Experience is the output of memory
Plato defined two causes 1. The essence 2. The material cause	There are four kinds of causes about the particular things: 1. Formal 2. Material

	3. Efficient 4. Final
Art is interrelated with the improvement of the soul as "…until the soul is able to endure the contemplation of essence and the brightest region of being…there might be an art, an art of the speediest and most effective shifting or conversion of the soul" (Plato, the Republic, 1970, p. 135).	Art is the knowledge of universal
Only ideas really exist.	The completed form of knowledge is the knowledge of the "universal" and the "particular"

Appendix 3.1: Plato and Aristotle epistemological and ontological theories viewpoints

Appendix 3.2: Ερωτηματολόγιο-Questionnaire (adapted version of the Spanish questionnaire included in the article of Hernández-Borges, AA, Cabrera-Rodríguez, R, Montesdeoca-Melián, A, Martínez-Pineda, B, Torres-Álvarez de Arcaya ML & Jiménez-Sosa A, 2006)

Ποια είναι η ιδιότητα σας;

[ ] Ιατρός [ ] Οδοντίατρος [ ] Νοσηλευτής

Which is your specialty?

[ ] Physician [ ] Dentist [ ] Nurse

<u>Α. Εκδοτική Δραστηριότητα – A. Publishing Activity</u>

Α1. Έχετε δημοσιεύσει ένα άρθρο σε κλινικό περιοδικό τους τελευταίους 18 μήνες;

[ ] Ναι [ ] Όχι

A1. Have you published an article in clinical journal within the last 18 months?

[ ] Yes [ ] No

Α2. Ποια από τα παρακάτω κριτήρια χρησιμοποιείτε όταν επιλέγετε ένα περιοδικό για δημοσίευση;

[ ] Υψηλό Impact Factor

[ ] Αυξημένο κύρος (πολύ γνωστό περιοδικό, υψηλή κυκλοφορία)

[ ] Αυξημένη σχέση με τα επιστημονικά σας ενδιαφέροντα

[ ] Γρήγορη δημοσίευση

[ ] Συχνότητα δημοσίευσης

[ ] Ποιοτική διαδικασία αξιολόγησης (review process)

[ ] Πρόσκληση συγγραφής άρθρου από τον εκδότη

[ ] Γενική πρόσκληση για δημοσίευση άρθρων

[ ] Όλα τα παραπάνω

[ ] Άλλο (Παρακαλώ διευκρινίστε)……

A2. Which of the following criteria do you use when selecting a journal for publication?

[ ] High Impact Factor

[ ] High Prestige (journal well known, high circulation)

[ ] Great similarity to your scientific interests

[ ] Quick publication

[ ] Frequency of publication

[ ] Quality of the review process

[ ] Invitation for writing a paper by editor

[ ] General call for papers

[ ] All of them

[ ] Other (Please specify):……

Α3. Έχετε κάνει τη δουλειά σας προσβάσιμη μέσω του Internet;

[ ] Ναι

[ ] Όχι

A3. Have you made your work accessible by the Internet?

[ ] Yes

[ ] No

Β. Εκδοτική Δραστηριότητα Ανοιχτής Πρόσβασης – B. Open Access Publishing

Β1. Είστε εξοικειωμένος με την ιδέα της Εκδοτικής Δραστηριότητας Ανοιχτής Πρόσβασης; **(Η Εκδοτική Δραστηριότητα Ανοιχτής Πρόσβασης περιλαμβάνει όλες τις ηλεκτρονικές πηγές πληροφοριών π.χ. άρθρα, τα οποία μπορεί να διατίθενται ελεύθερα μέσω του Internet στους αναγνώστες αλλά οι συγγραφείς ή άλλοι φορείς επιβαρύνονται με το κόστος της δημοσίευσης)**

[ ] Ναι [ ] Όχι

B1. Are you familiar with the idea of Open Access Publishing?

(Open Access Publishing includes all the electronic information sources, for example articles, that may be freely available through the Internet for the readers but the authors are burdened with publishing cost.)

[ ] Yes [ ] No

Β2. Είστε ενημερωμένοι για τις Ευρωπαϊκές και Αμερικάνικες Διακηρύξεις Ανοιχτής Πρόσβασης;

Εάν ναι, μπορείτε να δώσετε μερικά παραδείγματα?

……

……

[ ] Ναι

[ ] Όχι

B2. Are you aware of European and US open access initiatives?

[ ] Yes

[ ] No

Β3. Είστε ενημερωμένοι για την δημοσίευση σε ανοιχτής πρόσβασης περιοδικό;

Εάν ναι, ποιος πληρώνει τα έξοδα δημοσίευσης?

[ ]Επιστημονική Εταιρεία

[ ] Ινστιτούτο

[ ] Συγγραφέας

[ ] Όλα τα παραπάνω

[ ] Άλλο……

……

[ ] Ναι

[ ] Όχι

B3. Are you aware of publishing in an open access journal?

[ ] Yes

[ ] No

Β4. Πόσα άρθρα έχετε δημοσιεύσει σε ανοιχτής πρόσβασης περιοδικά τους τελευταίους 18 μήνες;

(Σημειώστε μία απάντηση)

[ ] Κανένα

[ ] 1

[ ] 2-3

[ ] 4-

B4. How many articles have you published in open access journals within the last 18 months?

(Check one)

[ ] 0

[ ] 1

[ ] 2-3

[ ] 4-

Β5. Ποια είναι η γνώμη σας για τη κατάσταση των περιοδικών ανοιχτής πρόσβασης;

(Παρακαλώ εκφράστε την γνώμη σας στα παρακάτω:)

	Συμφωνώ	Διαφωνώ	Δεν έχω άποψη
Δεν είμαι εξοικειωμένος με τα περιοδικά ανοιχτής πρόσβασης.			
Τα περιοδικά ανοιχτής πρόσβασης τείνουν να έχουν χαμηλό Impact Factor.			
Τα περιοδικά ανοιχτής πρόσβασης συνήθως δεν είναι γνωστά.			
Τα περιοδικά ανοιχτής πρόσβασης δεν διαβάζονται ευρέως.			
Τα ανοιχτής πρόσβασης περιοδικά δεν έχουν ασφαλή χρηματοδότηση.			
Το Ίδρυμα μου δεν με ενθαρρύνει να δημοσιεύω σε ανοιχτής πρόσβασης περιοδικά.			
Οι χρεώσεις του συγγραφέα με αποτρέπουν απο το να δημοσιεύσω σε ανοιχτής πρόσβασης περιοδικό.			
Είμαι αβέβαιος για το copyright στα περιοδικά ανοιχτής πρόσβασης.			
Είμαι αβέβαιος για την ποιότητα της διαδικασίας αξιολόγησης στα περιοδικά ανοιχτής πρόσβασης.			

B5. Please indicate your opinion on the following statements

	Yes	**No**	**Don't Know/ No Opinion**
No familiarity with open access journals			
Low impact factor			
Low prestige			
Low readership			
Lack of funding			
Institution influence			
Author charges			
Uncertainty about the copyright			
Uncertainty about the quality of review process			

Β6. Διαθέτει το Ίδρυμα σας ένα Ιδρυματικό Αποθετήριο (ηλεκτρονική βάση η οποία εμπεριέχει την πνευματική παραγωγή του ιδρύματος π.χ. τα άρθρα σας);

[ ] Ναι [ ] Όχι [ ]Δεν γνωρίζω

B6. Has your institution got an institutional repository (the database which includes the writing activity of your institution such as your paper)

[ ] Yes [ ] No [ ] Don't know

Β7. Έχετε κάνει ποτέ τη δουλειά σας προσβάσιμη μέσω της ιστοσελίδας του Ιδρύματος σας ή κάποιου θεματικού αποθετηρίου όπως PubMed Central;

[ ] Ναι [ ] Όχι

B7. Have you ever made your work accessible by internet via an institutional web page? (or subject repository such as PubMed Central?)

[ ] Yes [ ] No

1. **Γ. Αναγνωσιμότητα Ανοιχτής Πρόσβασης Εκδόσεων-C. Open Access Readership**

Γ1. Θεωρείτε την Εκδοτική Δραστηριότητα Ανοιχτής Πρόσβασης ως μέσο ευρύτερης διάδοσης της γνώσης;

[ ] Ναι [ ] Όχι

C1. Do you consider Open Access Publishing as a means for wider information dissemination?

[ ] Yes [ ] No

Γ2. Γνωρίζετε να χρησιμοποιείτε περιοδικά ανοιχτής πρόσβασης;

[ ] Ναι [ ] Όχι

C2. Are you aware of using open access journals?

[ ] Yes [ ] No

Γ3. Πως ενημερωθήκατε για τα περιοδικά ανοιχτής πρόσβασης;

[ ] Επιστημονική Εταιρεία

[ ] Ίδρυμα όπως Πανεπιστήμιο

[ ] Συναδέλφους

[ ]Δεν ήμουν ενημερωμένος-η μέχρι τη στιγμή που έλαβα το Ερωτηματολόγιο

[ ] Άλλο (Παρακαλώ διευκρινίστε)……

……

C3. How have you become aware of open access journals?

[ ] Scientific Company

[ ] Institution such as University

[ ] Colleagues

[ ] Not aware until I received the questionnaire

[ ] Other (please specify)……..

Γ4. Πόσο εύκολο είναι να εντοπίσετε μόνος –η ανοιχτής πρόσβασης πληροφορία;

[ ] Πολύ εύκολο [ ] Εύκολο [ ] Πολύ Δύσκολο [ ] Δύσκολο

C4. How easy is for you to detect open access information on your own?

[ ] Very easy [ ] Easy [ ] Very Difficult [ ] Difficult

Γ5. Πόσο εύκολο είναι για εσάς να εντοπίσετε πληροφορίες για την ελληνική βιοϊατρική έρευνα σε ανοιχτής πρόσβασης περιοδικά;

[ ]Πολύ εύκολο [ ] Εύκολο [ ] Πολύ Δύσκολο [ ] Δύσκολο

C5. How easy is for you to detect information on Greek biomedical research in open access journals?

[ ] Very easy [ ] Easy [ ] Very Difficult [ ] Difficult

Γ6. Η βιβλιοθήκη σας παρέχει πρόσβαση σε ανοιχτής πρόσβασης περιοδικά;

[ ] Ναι [ ] Όχι [ ] Μερικές φορές [ ] Δεν γνωρίζω

[ ] Άλλο (Παρακαλώ διευκρινίστε) ……

C6. Does your library provide access to open access journals?

[ ] Yes [ ] No [ ] Sometimes [ ] Don't know

[ ]Other(please specify)…….

…….

Appendix 3.3: Covering letter for questionnaire survey in Greek and English languages

Αγαπητέ/ή κύριε/α

Ονομάζομαι Βλαχάκη Ασημίνα. Είμαι υπάλληλος της Βιβλιοθήκης Επιστημών Υγείας του Εθνικού και Καποδιστριακού Πανεπιστημίου Αθηνών και υποψήφιος Διδάκτωρ του Πανεπιστημίου της Ουαλίας. Καθώς διεξάγω έρευνα πάνω στα περιοδικά ανοιχτής πρόσβασης, θα σας ήμουν ευγνώμων, εάν μπορούσατε να συμπληρώσετε το συνημμένο ερωτηματολόγιο.

Θα ήθελα να σας διαβεβαιώσω ότι ακολουθώ τους κανόνες δεοντολογίας για την διεξαγωγή έρευνας του Department of Information Studies. Τα συμπληρωμένα ερωτηματολόγια είναι ανώνυμα και θα ομαδοποιηθούν κατά την ανάλυση. Κανένας από τους ερωτηθέντες δεν θα είναι δυνατόν να αναγνωρισθεί στο διδακτορικό ή καμία από τις δημοσιεύσεις που προκύπτουν από την έρευνα του διδακτορικού. Αναλαμβάνω να φυλάξω με ασφάλεια τα δεδομένα και να μην τα κρατήσω για μεγαλύτερο χρονικό διάστημα από το αναγκαίο.

Σας ευχαριστώ εκ των προτέρων.

Τηλ. 210-7461435

E-mail: avlaxaki@lib.uoa.gr

Με τιμή

Βλαχάκη Ασημίνα

Βιβλιοθηκονόμος, MSc

Dear Sir or Madame,

My name is Vlachaki Assimina. I am an officer in the Library of Health Sciences of the University of Athens and a PhD student of the University of Wales. As I am conducting a survey on open access electronic journals, I would be grateful of you if you could complete the enclosed questionnaire.

I would like to confirm you that I follow the ethical code of the Department of Information Studies as it is required for the survey accomplishment. Participants cannot be identified neither in this thesis nor in the publications derived from the phd research. The data will be kept as long as they need to be preserved.

Thank you in advance.

Τηλ. 210-7461435

E-mail: avlaxaki@lib.uoa.gr

With honour

Assimina Vlachaki

Librarian, MSc

Appendix 3.4: Application form for conducting research in hospital clinics

Dear Sir,

My name is Vlachaki Assimina. I am an officer in the Library of Health Sciences of the University of Athens and a phd student of the University of Wales. As I am conducting a survey on open access electronic journals, I would be grateful of you if you permit the physicians and nurses of the following clinics to complete the enclosed questionnaire.

……

…….

…….

I also enclose a confirmation letter about my status as phd student.

Thanks in advance.

With honour

Vlachaki Assimina

Appendix 3.5: Spanish publishers' interview

Revistas científicas españolas y los derechos sobre el auto-archivo de sus trabajos

Esta encuesta se enmarca dentro de un proyecto llamado DULCINEA (http://www.accesoabierto.net/dulcinea) por su analogía con el proyecto ROMEO-Sherpa (http://www.sherpa.ac.uk/about.html).

El objetivo de la misma es conocer las políticas editoriales de las revistas españolas respecto al acceso a sus archivos, los derechos de copyright sobre los mismos y cómo estos pueden afectar a su posterior auto-archivo en repositorios institucionales o temáticos.

Agradecemos de antemano tu ayuda, si tienes alguna duda puedes contactar con el grupo de trabajo, integrado por miembros de la Universitat de València, de la Universitat de Barcelona e investigadores del CSIC (http://www.accesoabierto.net/dulcinea/default.php?contenido=acerca)

Hay 29 preguntas en esta encuesta.

Nota sobre la privacidad
Este cuestionario es anónimo.
Los registros que contienen sus respuestas al cuestionario no contienen ninguna identificación suya a menos que una pregunta específicamente así lo haga. Si responde a este cuestionario utilizando una contraseña que le da acceso al cuestionario, puede estar seguro que la misma no se asocia a ninguna de sus respuestas. Ésto se administra en una tabla de datos separada, que sólo se actualiza para indicar que ha completado o no el cuestionario, pero sin establecer vínculo alguno con la tabla donde se almacenan sus respuestas, por lo que no hay manera de asociar una respuesta con la persona que la hizo.

Datos de identificación de la Revista
Datos relativos a la identificación de la revista en su versión electrónica

***Nombre de la revista**

***Editorial que la publica**

***¿Pertenece a una Institución o Sociedad académica, cultural o científica?**

Sí
No

Si la pregunta anterior es afirmativa, indique el nombre de la Sociedad

Indique el ISSN electrónico

Indique el ISSN en papel

Indique la URL de la revista (por favor, el enlace directo)

Si su revista se encuentra además integrada en un portal temático de publicaciones, por favor indique cual y su URL
Marque las entradas que correspondan

Nombre del portal

URL

***Indique la categoría temática en la que enmarca a su revista**
Marque las entradas que correspondan

Ciencias sociales
Humanidades
Ciencias de la vida
Ciencias de la salud
Artes plástica y escénicas
Ingeniería
Otro:

Por favor, indique una persona de contacto del equipo editorial

Por favor indique el email de la persona de contacto

Por favor, indique un teléfono de contacto.

Sólo se aceptan números en este campo

***¿Dispone de instrucciones para autores que puedan consultarse a través de su sitio web?**

Sí
No

Si su respuesta ha sido afirmativa, indique la URL de las mismas.

Datos relativos al acceso a los trabajos de la revista a través de internet
Se trata de averiguar si se permite el acceso a los trabajos inmediatamente después de su publicación a través de internet, con o sin condiciones

***Indique el tipo de acceso a los trabajos publicados en su revista**
Seleccione una de las siguientes opciones

Acceso gratuito a través de internet, inmediato a su publicación
Acceso gratuito a través de internet, después de un periodo de embargo desde su publicación
Acceso restringido, sólo por suscripción

Si existe un periodo de embargo (opción 2 anterior pregunta), indique el número de meses que conlleva

Sólo se aceptan números en este campo

Datos relativos a los derechos de copyright de la revista
Se trata de analizar las políticas editoriales sobre las licencias de uso de los trabajos publicados

***¿En alguna parte del portal/sitio web de su revista se hace mención a los derechos de autor de los trabajos publicados?**

Sí
No

¿En que lugar de su portal/sitio web se hace esta mención?
Marque las entradas que correspondan

En la página de inicio
Dentro de las normas para autores
Mediante un enlace específico
No se hace mención pero existe una indicación de "contacte con el editor"
Otro:

Indique, de acuerdo con la respuesta dada en la pregunta anterior, la URL donde se localizaría la mención a los derechos de copyright de su revista

***¿Utiliza algun tipo particular de licencia de uso de los trabajos publicados en su revista, por ejemplo del tipo Creative Commons?**

Sí
No

Si su respuesta ha sido afirmativa indique el tipo de licencia que utiliza,

si no es una estándar, indique la URL donde poder consultarla.

Políticas sobre el auto-archivo (self-archiving)
El auto-archivo (self-archiving) de las publicaciones científicas es una vía para alcanzar el acceso libre (open access) a la producción científica de nuestros investigadores.

Se trata de averiguar si las revistas consideran el concepto de auto-archivo en repositorios institucionales o temáticos en su política editorial y cómo lo establecen.

El acceso gratuito a la versión online, junto con el auto-archivo son formas que contribuyen a una mayor difusión de la produción científica, a la vez que favorece la visibilidad de la revista.

***¿Su revista permite el auto-archivo de los trabajos publicados?**

Sí
No

¿En que términos?

Indique de estas opciones que versión(es) de los trabajos publicados está permitida para su auto-archivo, de acuerdo con lo respondido en las preguntas anteriores.
Marque las entradas que correspondan

La versión pre-print (versión del autor sin evaluar)

La version post-print del autor (versión del autor con las correcciones hechas después de la evaluación)

La versión post-print publicada por la editorial

Otro:

¿En dónde se permite el auto-archivo? Escoja tantas opciones como respondan a su criterio editorial.
Marque las entradas que correspondan

En una página web personal

En un repositorio institucional

En un repositorio temático

Otro:

¿Cuando o en que momento se permite el auto-archivo? En caso de que el permiso sea después de un embargo, indique en la casilla de comentarios el número de meses del mismo.
Marque las entradas que correspondan

No se menciona

Tras al aceptación del manuscrito

Inmediatamente después de la publicación del manuscrito

Después de un periodo de embargo

Otro:

ROMEO-SHERPA define 4 categorías de revistas en funión de la política de auto-archivo de la revista.
Estas categorias vienen definidas por colores

Blanco: No se permite el auto-archivo en ningún caso
Amarillo: Se permite el auto-archivo de la versión pre-print del artículo
Azul: Se permite el auto-archivo del versión post-print del artículo
Verde: Se permite el auto-archivo de ambas, la pre y post-print
De acuerdo a esta clasificación ¿de qué color definiría a su revista?
Seleccione una de las siguientes opciones

Blanco
Amarillo
Azul
Verde
Sin respuesta

Datos del encuestado
Gracias por su participación. Por favor, indique su datos para poder contactar con usted en caso necesario

Nombre, email, teléfono

Nombre

email

Teléfono

Espacio reservado para comentarios u observaciones que quiera mencionar.

Appendix 3.6: English publishers' interview questionnaire (adapted version of the Spanish publishers' interview questionnaire, see Appendix 3.5)

Spanish scientifc journals and the rights for self-archiving of articles (works)

This survey originates from the DULCINEA project, similar to the ROMEO-Sherpa project.

The objective of this project is to find out what the editorial policies of the Spanish journals are, for access to their archives, copyright policies concerning these, and how these might affect subsequent self-archiving in institutional or subject repositories.

We thank you in advance for your help, and if you have any queries, you may contact the members of the group, who are members of staff at the University of Valencia, or University of Valencia or researchers at CSIC.

There are 29 questions in the survey.

Information about privacy and confidentiality

This questionnaire is anonymised.

The boxes in which the responses are recorded in the questionnaire do not contain identifying details unless a question may specifically ask for this. If you respond to the questionnaire using a password, you can be sure that the password is not associated with any of your responses. This is administered through a separate data table, which is only used to indicate where the questionnaire has been completed or not, but without making any link with the tables containing the responses. There is no way of associating a response with the person who made the response.

Identification details about the journal

Identification details concerning the journal in its electronic form

Name of the journal

Publishers

Does the journal belong to an institution, or academic, cultural or scientific society (learned society)

Yes

No

If the previous response was ‘yes’, please indicate the name of the society.

Please give the electronic ISSN

Please give the paper ISSN

Please give the URL of the journal (the direct hyperlink)

If the journal is also to be found within a subject-based publication portal, please indicate which and its URL.

Name of portal:

URL:

Please indicate the subject category in which the journal is based.

Check (tick) the categories that fit.

Social science

Humanities

Physical sciences

Health sciences

Art and design

Engineering

Other

Please indicate a contact person in the editorial team

Please provide the email address of the contact

Please provide a telephone number for the contact

(Only numbers allowed in this field)

Do you provide instructions for authors that may be consulted through your website?

If you have responded ‘yes’ please indicate the URL of the website instructions.

Information about access to published works in the journal through the Internet

This concerns whether you allow Internet access to the published works immediately after publication, with or without conditions.

Indicate the type of access to published works in your journal

Select one of the following options

Free Internet access, immediately on publication

Free Internet access after an embargo period set by your publication

Restricted access, only by subscription

If there is an embargo period (option two, above), indicate the number of months required

(only numbers allowed in this field)

Details about copyright conditions in the journal

(This question concerns the editorial policies about licensing practices for the published works)

In any part of the journal website, do you mention author rights for the published works?

Yes

No

In which place in the website are they mentioned?

Indicate the corresponding entry points

On the home page

Among the author guidelines

Through a specific link

No mention, but there is a ‘contact the editor’ link

Other

Please indicate, according to the response given in the previous question, the URL where mention of the journal’s copyright conditions are held.

Do you use any type of usage licence for published works in your journal, for example, of the Creative Commons type?

Yes

No

If you have replied ‘yes’ please indicate the type of licence used, and if it is not a standard licence please indicate the URL where it may be consulted.

Policies for self-archiving

Self-archiving of scientific publications is a way of attaining open access to the scientific production of our researchers.

This question explores if journals are considering self-archiving in institutional or subject-based repositories as publishing policy and how this is arranged.

Free access to an online version, along with self-archiving, contribute to greater diffusion of scientific production, at the same time raising the visibility of the journal

Does the journal permit self-archiving of published works?

Yes

No

With what aims?

Indicate from these options which version of the published work has permission for self-archiving, according to the responses given in the previous questions.

Check/tick the corresponding entries

The preprint version (author version, not reviewed)

The post-print version of the author (author version with corrections made after reviewing)

The post-print version published in the journal

Other

Where is self-archiving permitted? Choose as many options as apply to your publishing policy.

Check/tick the corresponding entries

On a personal web-page

In an institutional repository

In a subject-based repository

Other

When, or at which point is self-archiving permitted? In the case where permission is granted after an embargo period, indicate in the comments box the number of months that apply

Not mentioned

After acceptance of the manuscript

Immediately after publication of the manuscript

After an embargo period

Other

ROMEO-SHERPA define four categories of journal corresponding to their self-archiving policies

These categories are described by colour

White: No self-archiving permitted in any circumstance

Yellow: Self-archiving of the preprint version of the article permitted

Blue: Self-archiving of the post-print version of the article permitted

Green: Self-archiving of both the pre-print and the post-print permitted.

According to the classification – which colour defines your journal? Choose one of the following options.

White

Yellow

Blue

Green

No response

Respondent details

Thank you for your participation. Please indicate your contact details in case it is necessary to contact you.

Name, email, telephone number

This space is reserved for any other comments you would like to make.

Appendix 3.7: Greek English publishers' interview (adapted version of the English publishers' interview questionnaire, see Appendix 3.6)

ΕΛΛΗΝΙΚΑ ΙΑΤΡΙΚΑ ΠΕΡΙΟΔΙΚΑ και ΔΙΚΑΙΩΜΑΤΑ ΥΠΟΒΟΛΗΣ ΑΡΘΡΩΝ ΣΕ ΑΠΟΘΕΤΗΡΙΑ

GREEK MEDICAL JOURNALS AND DEPOSIT RIGHTS TO REPOSITORIES

1. **Στοιχεία ταυτότητας περιοδικού- A. Data relating to the identification of the journal**

1. Τίτλος Περιοδικού

1. Name of the journal

2. Εκδότες

2. Publishers

3.Ανήκει το περιοδικό σε κάποιο ίδρυμα, ή ακαδημαϊκό, πολιτιστικό ή επιστημονικό φορέα?

[ ] Ναι [ ] Όχι

3.Does the journal belong to an institution, or academic, cultural or scientific society (learned society)

[ ] Yes [ ] No

4. Εάν ναι, παρακαλώ αναφέρετε την επωνυμία του φορέα.

……

4.If the previous response was 'yes', please indicate the name of the society

……

5. Παρακαλώ αναφέρετε το ηλεκτρονικό ISSN

……

5. Please give the electronic ISSN

6. Παρακαλώ αναφέρετε το ISSN του έντυπου περιοδικού

……

6. Please give the paper ISSN

7. Ποια είναι η ηλεκτρονική διεύθυνση του περιοδικού (URL DIRECT HYPERLINK) ?

……

7. Please give the URL of the journal (the direct hyperlink)

7. Παρακαλώ αναφέρετε ένα πρόσωπο επικοινωνίας στην editorial team

……

8.Please indicate a contact person in the editorial team

7. Ποια είναι η ηλεκτρονική του διεύθυνση (e-mail address)?

……

9.Please provide the email address of the contact

7. Υπάρχει κάποιο τηλέφωνο επικοινωνίας?

…….

10.Please provide a telephone number for the contact

7. Παρέχετε «Οδηγίες προς τους Συγγραφείς» μέσω της ιστοσελίδα σας?

[ ] Ναι [ ] Όχι

11.Do you provide instructions for authors that may be consulted through your website?

[ ] Yes [ ] No

Β. Πληροφόρηση σχετικά με τη πρόσβαση στα άρθρα του περιοδικού-

B. Information about access to published works in the journal through the

Internet

12. Αναφέρετε τον τύπο πρόσβασης στα άρθρα του περιοδικού σας

(επιλέξτε μία από τις παρακάτω απαντήσεις)

[ ] Ελεύθερη πρόσβαση μέσω Internet αμέσως μετά την δημοσίευση

[ ] Ελεύθερη πρόσβαση μέσω Internet μετά από κάποιο χρονικό διάστημα μετά την δημοσίευση

Εάν ναι, σημειώστε το χρονικό διάστημα που απαιτείται

…….

[ ] Πρόσβαση μόνο μετά από συνδρομή

[ ] Δεν παρέχεται πρόσβαση μέσω Internet

12. Indicate the type of access to published works in your journal

Select one of the following options

[ ] Free Internet access, immediately on publication

[ ] Free Internet access after an embargo period set by your publication

[ ] Restricted access, only by subscription

[ ] If there is an embargo period (option two, above), indicate the number of months required

…….

[ ] No access via Internet

Γ. Πληροφορίες σχετικά με το Copyright του Περιοδικού-

C. Details about copyright conditions in the journal

13. Αναφέρετε στην ιστοσελίδα του περιοδικού τα δικαιώματα των συγγραφέων των δημοσιευμένων εργασιών?

[ ] Ναι [ ] Όχι

13. In any part of the journal website, do you mention author rights for the published works?

[ ] Yes [ ] No

14. Εάν ναι, σε ποιο τμήμα τις ιστοσελίδας αναφέρονται?

[ ] Στην αρχική σελίδα

[ ] Στις «Οδηγίες προς τους Συγγραφείς»

[ ] Μέσω ειδικής σύνδεσης

[ ] Δεν αναφέρεται, αλλά υπάρχει η διασύνδεση «επαφή με τον συντάκτη»

[ ] Άλλο……

14. If so, in which place in the website are they mentioned?

Indicate the corresponding entry points

[ ] On the home page

[ ] Among the author guidelines

[ ] Through a specific link

[ ] No mention, but there is a ‘contact the editor’ link

[ ] Other

15. Παρακαλώ σημειώστε διεύθυνση URL της ιστοσελίδας στην οποία αναφέρονται οι πληροφορίες σχετικά με το Copyright του περιοδικού σας

…….

15. Please indicate, according to the response given in the previous question, the URL where mention of the journal’s copyright conditions are held

16. Χρησιμοποιείτε κάποιο τύπο άδειας για τα δημοσιευμένα άρθρα του περιοδικού σας, όπως τις Creative Commons?

[ ] Ναι [ ] Όχι

16. Do you use any type of usage licence for published works in your journal, for example, of the Creative Commons type?

[ ] Yes [ ] No

Εάν ναι, παρακαλώ αναφέρετε τον τύπο της άδειας που χρησιμοποιείτε, εάν δεν χρησιμοποιείτε μια τυποποιημένη άδεια, παρακαλώ αναφέρετε τη διεύθυνση URL της ιστοσελίδας την οποία συμβουλευτήκατε.

……..

If you have replied 'yes' please indicate the type of licence used, and if it is not a standard licence please indicate the URL where it may be consulted

Δ. Πολιτικές αυτό-αρχειοθέτησης – **D. Policies for self-archiving**

Η αυτό-αρχειοθέτηση των επιστημονικών δημοσιεύσεων επιτρέπει την ανοιχτή πρόσβαση στην επιστημονική παραγωγή των ερευνητών μας.

Self-archiving of scientific publications is a way of attaining open access to the scientific production of our researchers.

17. Επιτρέπει το περιοδικό την αυτό-αρχειοθέτηση των δημοσιευμένων εργασιών?

[ ] Ναι [ ] Όχι

17. Does the journal permit self-archiving of published works?

[ ] Yes [ ] No

18. Εάν ναι, ποια μορφή του άρθρου επιτρέπεται για αυτό-αρχειοθέτηση

[ ] την πριν την εκτύπωση έκδοση (έκδοση συγγραφέα, χωρίς να είναι reviewed)

[ ] την μετά την εκτύπωση έκδοση του συγγραφέα (έκδοση του συγγραφέα με διορθώσεις μετά την κριτική)

[ ] την δημοσιευμένη στο περιοδικό έκδοση του άρθρου

[ ] Άλλο…….

18. If so, indicate from these options which version of the published work has permission for self-archiving

[ ] The preprint version (author version, not reviewed)

[ ] The post-print version of the author (author version with corrections made after reviewing)

[ ] The post-print version published in the journal

[ ] Other

19. Που επιτρέπεται η αυτό-αρχειοθέτηση? Επιλογή περισσοτέρων από μία απαντήσεων.

[ ] σε προσωπική ιστοσελίδα

[ ] σε ιδρυματικό αποθετήριο

[ ] σε θεματικό αποθετήριο

[ ] Άλλο……..

19. Where is self-archiving permitted? Choose as many options as apply to your publishing policy

[ ] On a personal web-page

[ ] In an institutional repository

[ ] In a subject-based repository

[ ] Other

20. Πότε και σε ποιο χρονικό σημείο η αυτό-αρχειοθέτηση επιτρέπεται?

[ ] Δεν αναφέρεται

[ ] Μετά τη αποδοχή του χειρογράφου

[ ] Αμέσως μετά την δημοσίευση

[ ] Μετά από μια χρονική περίοδο (για πόσο χρονικό διάστημα)

[ ] Άλλο……

20. When, or at which point is self-archiving permitted? In the case where permission is granted after an embargo period, indicate in the comments box the number of months that apply

[ ] Not mentioned

[ ] After acceptance of the manuscript

[ ] Immediately after publication of the manuscript

[ ] After an embargo period

[ ] Other

21. Romeo-Sherpa ορίζει τέσσερις κατηγορίες περιοδικών ανταποκρινόμενων στις πολιτικές αυτό-αρχειοθέτησης οι οποίες περιγράφονται ανά χρώμα

Ασπρο: Η αυτό-αρχειοθέτηση δεν επιτρέπεται

Κίτρινο: Επιτρέπεται η αυτό-αρχειοθέτηση της προ – εκτύπωσης έκδοσης του άρθρου

Μπλε: Αυτό-αρχειοθέτηση της μετά την εκτύπωση έκδοση του άρθρου

Πράσινο: Αυτό-αρχειοθέτηση προ και μετά την εκτύπωση του άρθρου

Σε ποιο χρώμα ανήκει το δικό σας περιοδικό?

[ ] Άσπρο

[ ] Κίτρινο

[ ] Μπλε

[ ] Πράσινο

[ ] Καμία απάντηση

21. ROMEO-SHERPA define four categories of journal corresponding to their self-archiving policies

White: No self-archiving permitted in any circumstance

Yellow: Self-archiving of the preprint version of the article permitted

Blue: Self-archiving of the post-print version of the article permitted

Green: Self-archiving of both the pre-print and the post-print permitted.

According to the classification – which colour defines your journal?

[ ] White

[ ] Yellow

[ ] Blue

[ ] Green

[ ] No response

Σας ευχαριστώ για την συμμετοχή σας.

Όνομα……

E-mail……..

Τηλέφωνο……

Thank you for your participation.

Name, email, telephone number

……..

Appendix 3.8: Covering letter for biomedical publishers' interview in Greek and English languages

Αγαπητέ/ή κύριε/α

Ονομάζομαι Βλαχάκη Ασημίνα. Είμαι υπάλληλος της Βιβλιοθήκης Επιστημών Υγείας του Εθνικού και Καποδιστριακού Πανεπιστημίου Αθηνών και υποψήφιος Διδάκτωρ του Πανεπιστημίου της Ουαλίας. Καθώς διεξάγω έρευνα πάνω στα περιοδικά ανοιχτής πρόσβασης, θα σας ήμουν ευγνώμων, εάν μπορούσατε να συμμέτεχετε σ' αυτήν.

Θα ήθελα να σας διαβεβαιώσω ότι ακολουθώ τους κανόνες δεοντολογίας για την διεξαγωγή έρευνας του Department of Information Studies. Κανένας από τους ερωτηθέντες δεν θα είναι δυνατόν να αναγνωρισθεί στο διδακτορικό ή καμία από τις δημοσιεύσεις που προκύπτουν από την έρευνα του διδακτορικού. Αναλαμβάνω να φυλάξω με ασφάλεια τα δεδομένα και να μην τα κρατήσω για μεγαλύτερο χρονικό διάστημα από το αναγκαίο.

Σας ευχαριστώ εκ των προτέρων.

Τηλ. 210-7461435

E-mail: avlaxaki@lib.uoa.gr

Με τιμή

Βλαχάκη Ασημίνα

Βιβλιοθηκονόμος, MSc

Dear Sir or Madame,

My name is Vlachaki Assimina. I am an officer in the Library of Health Sciences of the University of Athens and a PhD student of the University of Wales. As I am conducting a survey on open access electronic journals, I would be grateful of you if you could participate in.

I would like to confirm you that I follow the ethical code of the Department of Information Studies as it is required for the survey accomplishment. Participants cannot be identified neither in this thesis nor in the publications derived from the phd research. The data will be kept as long as they need to be preserved in safety.

Thank you in advance.

Τηλ. 210-7461435

E-mail: avlaxaki@lib.uoa.gr

With honour

Assimina Vlachaki

Librarian, MSc

Appendix 4.1: Frequency tables phase one

Question1 –speciality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physician	43	72,9	72,9	72,9
	Dentists	6	10,2	10,2	83,1
	Nurses	10	16,9	16,9	100,0
	Total	59	100,0	100,0	

Question2-publishing activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	42	71,2	71,2	71,2
	No	17	28,8	28,8	100,0
	Total	59	100,0	100,0	

Question3-high impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	27	45,8	45,8	45,8
	No	32	54,2	54,2	100,0
	Total	59	100,0	100,0	

Question4-Increased prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	54,2	54,2	54,2
	No	27	45,8	45,8	100,0
	Total	59	100,0	100,0	

Question5-nearest to the scientific interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	54,2	54,2	54,2
	No	27	45,8	45,8	100,0
	Total	59	100,0	100,0	

Question6-quick publication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	20,3	20,3	20,3
	No	47	79,7	79,7	100,0
	Total	59	100,0	100,0	

Question7-publication frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	8,5	8,5	8,5
	No	54	91,5	91,5	100,0
	Total	59	100,0	100,0	

Question8-review process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	20,3	20,3	20,3
	No	47	79,7	79,7	100,0
	Total	59	100,0	100,0	

Question9-invitation authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	10,2	10,2	10,2
	No	53	89,8	89,8	100,0
	Total	59	100,0	100,0	

Question10-general invitation of authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	6,8	6,8
	No	55	93,2	93,2	100,0
	Total	59	100,0	100,0	

Question11-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	22,0	22,0	22,0
	No	46	78,0	78,0	100,0
	Total	59	100,0	100,0	

Question12-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,7	1,7
	No	58	98,3	98,3	100,0
	Total	59	100,0	100,0	

Question13-accessible work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	61,0	61,0	61,0
	No	23	39,0	39,0	100,0
	Total	59	100,0	100,0	

Question14-lack of skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	7,7	7,7
	No	48	81,4	92,3	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question15-lack of tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	3,4	3,8	3,8
	No	50	84,7	96,2	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question16-copyright restrictions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,9	1,9
	No	51	86,4	98,1	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question17-limited free time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	20,3	23,1	23,1
	No	40	67,8	76,9	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question18-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	52	88,1	100,0	100,0
Missing	,00	7	11,9		
Total		59	100,0		

Question19-open access publishing activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	42,4	43,9	43,9
	No	32	54,2	56,1	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question20-awareness of European and US oa initiatives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,7	1,7
	No	57	96,6	98,3	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question21- who pays publication fee

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	35,6	35,6	35,6
	No	38	64,4	64,4	100,0
	Total	59	100,0	100,0	

Question22-Scientific company

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	10,2	10,5	10,5
	No	51	86,4	89,5	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question23-Institute

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	3,4	3,5	3,5
	No	55	93,2	96,5	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question24-Author

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	11,9	12,3	12,3
	No	50	84,7	87,7	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question25-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	10,2	10,5	10,5
	No	51	86,4	89,5	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question26-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	57	96,6	100,0	100,0
Missing	,00	2	3,4		
Total		59	100,0		

Question27-article publication activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	41	69,5	70,7	70,7
	one	3	5,1	5,2	75,9
	two-three	9	15,3	15,5	91,4
	four-	5	8,5	8,6	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question28-no familiarity with oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	44,1	44,8	44,8
	No	21	35,6	36,2	81,0
	don't know	11	18,6	19,0	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question29-low impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	23,7	25,9	25,9
	No	17	28,8	31,5	57,4
	don't know	23	39,0	42,6	100,0
	Total	54	91,5	100,0	
Missing	,00	5	8,5		
Total		59	100,0		

Question30-low prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	29,6	29,6
	No	22	37,3	40,7	70,4
	don't know	16	27,1	29,6	100,0
	Total	54	91,5	100,0	
Missing	,00	5	8,5		
Total		59	100,0		

Question31- low readership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	16,9	19,2	19,2
	No	21	35,6	40,4	59,6
	don't know	21	35,6	40,4	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question32-lack of funding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	11,9	13,5	13,5
	No	8	13,6	15,4	28,8
	don't know	37	62,7	71,2	100,0
	Total	52	88,1	100,0	
Missing	,00	7	11,9		
Total		59	100,0		

Question33-institution influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	15,3	17,0	17,0
	No	20	33,9	37,7	54,7
	don't know	24	40,7	45,3	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question34-author charges

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	13,6	14,8	14,8
	No	13	22,0	24,1	38,9
	don't know	33	55,9	61,1	100,0
	Total	54	91,5	100,0	
Missing	,00	5	8,5		
Total		59	100,0		

Question35-uncertainty about copyright					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	18,6	20,8	20,8
	No	11	18,6	20,8	41,5
	don't know	31	52,5	58,5	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question36-uncertainty about quality of peer review process					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	16,9	18,9	18,9
	No	18	30,5	34,0	52,8
	don't know	25	42,4	47,2	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question37-existence of institutional repository					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	30,5	30,5	30,5
	No	16	27,1	27,1	57,6
	don't know	25	42,4	42,4	100,0
	Total	59	100,0	100,0	

Question38-work accessible via internet					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	47,5	48,3	48,3
	No	30	50,8	51,7	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question39-oap mean of wider dissemination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	53	89,8	94,6	94,6
	No	3	5,1	5,4	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question40-usage of oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	61,0	61,0	61,0
	No	23	39,0	39,0	100,0
	Total	59	100,0	100,0	

Question41-Scientific Society

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	57	96,6	100,0	100,0
Missing	,00	2	3,4		
Total		59	100,0		

Question42-Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	30,5	31,6	31,6
	No	39	66,1	68,4	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question43-Colleagues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	40,7	42,1	42,1
	No	33	55,9	57,9	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question44-Not aware until questionnaire received

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	33,9	35,1	35,1
	No	37	62,7	64,9	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question45-Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	7,0	7,0
	No	53	89,8	93,0	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question46-detection of open access information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	12	20,3	21,4	21,4
	Easy	27	45,8	48,2	69,6
	Very difficult	2	3,4	3,6	73,2
	Difficult	15	25,4	26,8	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question47-detection of Greek biomedical research in oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	8	13,6	14,5	14,5
	Easy	21	35,6	38,2	52,7
	Very difficult	5	8,5	9,1	61,8
	Difficult	21	35,6	38,2	100,0
	Total	55	93,2	100,0	
Missing	,00	4	6,8		
Total		59	100,0		

Question48-library access to open access journals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	40,7	41,4	41,4
	No	4	6,8	6,9	48,3
	Sometimes	7	11,9	12,1	60,3
	don't know	23	39,0	39,7	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Appendix 4.2: Frequency tables phase two

Question1 -speciality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physician	37	62,7	62,7	62,7
	Dentists	6	10,2	10,2	72,9
	Nurses	16	27,1	27,1	100,0
	Total	59	100,0	100,0	

Q2pubact

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	49,2	49,2	49,2
	No	30	50,8	50,8	100,0
	Total	59	100,0	100,0	

Question3-high impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	40,7	40,7	40,7
	No	35	59,3	59,3	100,0
	Total	59	100,0	100,0	

Question4-Increased prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	47,5	47,5	47,5
	No	31	52,5	52,5	100,0
	Total	59	100,0	100,0	

Question 5-nearest to scientific interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	44,1	44,1	44,1
	No	33	55,9	55,9	100,0
	Total	59	100,0	100,0	

Question6-quick publication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	18,6	18,6	18,6
	No	48	81,4	81,4	100,0
	Total	59	100,0	100,0	

Question7-publication frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	6,8	6,8
	No	55	93,2	93,2	100,0
	Total	59	100,0	100,0	

Question8-review process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	22,0	22,0	22,0
	No	46	78,0	78,0	100,0
	Total	59	100,0	100,0	

Question9-invitation authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	3,4	3,4	3,4
	No	57	96,6	96,6	100,0
	Total	59	100,0	100,0	

Q10geninvaut

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,7	1,7
	No	58	98,3	98,3	100,0
	Total	59	100,0	100,0	

Question11-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	27,1	27,1
	No	43	72,9	72,9	100,0
	Total	59	100,0	100,0	

Question12-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	59	100,0	100,0	100,0

Question13-accessible work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	49,2	49,2	49,2
	No	30	50,8	50,8	100,0
	Total	59	100,0	100,0	

Question14-lack of skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	16,9	18,9	18,9
	No	43	72,9	81,1	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question15-lack of tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	15,3	17,0	17,0
	No	44	74,6	83,0	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question16-copyright restrictions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	5,1	5,7	5,7
	No	50	84,7	94,3	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question17-limited free time					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	23,7	26,4	26,4
	No	39	66,1	73,6	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question18-other					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,9	1,9
	No	52	88,1	98,1	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question19-open access publishing activity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	42,4	42,4	42,4
	No	34	57,6	57,6	100,0
	Total	59	100,0	100,0	

Question20-awareness of European and US oa initiatives					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,7	1,7	1,7
	No	58	98,3	98,3	100,0
	Total	59	100,0	100,0	

Question21- who pays publication fee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	27,6	27,6
	No	42	71,2	72,4	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question22-Scientific company					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	3,4	3,5	3,5
	No	55	93,2	96,5	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question23-Institute					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	3,4	3,5	3,5
	No	55	93,2	96,5	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question24-Author					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	7,0	7,0
	No	53	89,8	93,0	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question25-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	7,0	7,0
	No	53	89,8	93,0	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question26-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	6,8	7,0	7,0
	No	53	89,8	93,0	100,0
	Total	57	96,6	100,0	
Missing	,00	2	3,4		
Total		59	100,0		

Question27-article publication activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	48	81,4	82,8	82,8
	one	7	11,9	12,1	94,8
	two-three	1	1,7	1,7	96,6
	four-	2	3,4	3,4	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question28-no familiarity with oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	30	50,8	56,6	56,6
	No	15	25,4	28,3	84,9
	don't know	8	13,6	15,1	100,0
	Total	53	89,8	100,0	
Missing	,00	6	10,2		
Total		59	100,0		

Question29-low impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	34,8	34,8
	No	14	23,7	30,4	65,2
	don't know	16	27,1	34,8	100,0
	Total	46	78,0	100,0	
Missing	,00	13	22,0		
Total		59	100,0		

Question30-low prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	32,2	39,6	39,6
	No	18	30,5	37,5	77,1
	don't know	11	18,6	22,9	100,0
	Total	48	81,4	100,0	
Missing	,00	11	18,6		
Total		59	100,0		

Question31- low readership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	13,6	17,0	17,0
	No	25	42,4	53,2	70,2
	don't know	14	23,7	29,8	100,0
	Total	47	79,7	100,0	
Missing	,00	12	20,3		
Total		59	100,0		

Question32-lack of funding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	15,3	20,0	20,0
	No	6	10,2	13,3	33,3
	don't know	30	50,8	66,7	100,0
	Total	45	76,3	100,0	
Missing	,00	14	23,7		
Total		59	100,0		

Question33-institution influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	22,0	28,9	28,9
	No	12	20,3	26,7	55,6
	don't know	20	33,9	44,4	100,0
	Total	45	76,3	100,0	
Missing	,00	14	23,7		
Total		59	100,0		

Question34-author charges

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	28,8	37,8	37,8
	No	9	15,3	20,0	57,8
	don't know	19	32,2	42,2	100,0
	Total	45	76,3	100,0	
Missing	,00	14	23,7		
Total		59	100,0		

Question35-uncertainty about copyright

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	34,0	34,0
	No	9	15,3	19,1	53,2
	Don't have an opinion	22	37,3	46,8	100,0
	Total	47	79,7	100,0	
Missing	,00	12	20,3		
Total		59	100,0		

Question36-uncertainty about quality of peer review process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	32,2	41,3	41,3
	No	7	11,9	15,2	56,5
	don't know	20	33,9	43,5	100,0
	Total	46	78,0	100,0	
Missing	,00	13	22,0		
Total		59	100,0		

Question37-existence of institutional repository					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	15,3	15,5	15,5
	No	15	25,4	25,9	41,4
	don't know	34	57,6	58,6	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question38-work accessible via internet					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	37,3	37,3	37,3
	No	37	62,7	62,7	100,0
	Total	59	100,0	100,0	

Question39-oap mean of wider dissemination					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	53	89,8	91,4	91,4
	No	5	8,5	8,6	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

on40-usage of oaj					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	59,3	59,3	59,3
	No	24	40,7	40,7	100,0
	Total	59	100,0	100,0	

Question41-Scientific Society

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	5,1	5,4	5,4
	No	53	89,8	94,6	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question42-Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	25,4	26,8	26,8
	No	41	69,5	73,2	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question43-Colleagues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	24	40,7	42,9	42,9
	No	32	54,2	57,1	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question44-Not aware until questionnaire received

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	27,1	28,6	28,6
	No	40	67,8	71,4	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question45-Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	11,9	12,5	12,5
	No	49	83,1	87,5	100,0
	Total	56	94,9	100,0	
Missing	,00	3	5,1		
Total		59	100,0		

Question46-detection of open access information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	7	11,9	11,9	11,9
	Easy	35	59,3	59,3	71,2
	Very difficult	3	5,1	5,1	76,3
	Difficult	14	23,7	23,7	100,0
	Total	59	100,0	100,0	

Question47-detection of Greek biomedical research in oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	3	5,1	5,2	5,2
	Easy	20	33,9	34,5	39,7
	Very difficult	7	11,9	12,1	51,7
	Difficult	28	47,5	48,3	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Question48-library access to open access journals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	39,0	39,7	39,7
	No	1	1,7	1,7	41,4
	Sometimes	7	11,9	12,1	53,4
	don't know	27	45,8	46,6	100,0
	Total	58	98,3	100,0	
Missing	,00	1	1,7		
Total		59	100,0		

Apendix 4.3: Frequency tables phase three

Question1 -speciality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Physician	39	48,1	48,1	48,1
	Dentists	1	1,2	1,2	49,4
	Nurses	41	50,6	50,6	100,0
	Total	81	100,0	100,0	

Question2-publishing activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	39,5	39,5	39,5
	No	49	60,5	60,5	100,0
	Total	81	100,0	100,0	

Question3-high impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	46,9	49,4	49,4
	No	39	48,1	50,6	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question4-Increased prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	39,5	41,6	41,6
	No	45	55,6	58,4	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question5-nearest to the scientific interests

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	44,4	46,8	46,8
	No	41	50,6	53,2	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question6-quick publication

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	24,7	26,0	26,0
	No	57	70,4	74,0	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question7-publication frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	6,2	6,5	6,5
	No	72	88,9	93,5	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question8-review process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	22,2	23,4	23,4
	No	59	72,8	76,6	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question9-invitation authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	8,6	9,1	9,1
	No	70	86,4	90,9	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question10-general invitation of authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	1,3	1,3
	No	76	93,8	98,7	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question11-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	6,2	6,5	6,5
	No	72	88,9	93,5	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question12-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	1,3	1,3
	No	76	93,8	98,7	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question13-accessible work

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	49	60,5	62,0	62,0
	No	30	37,0	38,0	100,0
	Total	79	97,5	100,0	
Missing	,00	2	2,5		
Total		81	100,0		

Question14-lack of skills

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	3,7	4,2	4,2
	No	69	85,2	95,8	100,0
	Total	72	88,9	100,0	
Missing	,00	9	11,1		
Total		81	100,0		

Question15-lack of tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	,00	9	11,1	11,1	11,1
	Yes	3	3,7	3,7	14,8
	No	69	85,2	85,2	100,0
	Total	81	100,0	100,0	

Question16-copyright restrictions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,5	2,8	2,8
	No	70	86,4	97,2	100,0
	Total	72	88,9	100,0	
Missing	,00	9	11,1		
Total		81	100,0		

Question17-limited free time

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	17,3	19,4	19,4
	No	58	71,6	80,6	100,0
	Total	72	88,9	100,0	
Missing	,00	9	11,1		
Total		81	100,0		

Question18-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	4,9	5,6	5,6
	No	68	84,0	94,4	100,0
	Total	72	88,9	100,0	
Missing	,00	9	11,1		
Total		81	100,0		

Question19-open access publishing activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	56,8	57,5	57,5
	No	34	42,0	42,5	100,0
	Total	80	98,8	100,0	
Missing	,00	1	1,2		
Total		81	100,0		

Question20-awareness of European and US oa initiatives

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,5	2,5	2,5
	No	78	96,3	97,5	100,0
	Total	80	98,8	100,0	
Missing	,00	1	1,2		
Total		81	100,0		

Question21- who pays publication fee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	42,0	43,0	43,0
	No	45	55,6	57,0	100,0
	Total	79	97,5	100,0	
Missing	,00	2	2,5		
Total		81	100,0		

Question22-Scientific company					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	3,7	4,0	4,0
	No	72	88,9	96,0	100,0
	Total	75	92,6	100,0	
Missing	,00	6	7,4		
Total		81	100,0		

Question23-Institute					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	2	2,5	2,7	2,7
	No	73	90,1	97,3	100,0
	Total	75	92,6	100,0	
Missing	,00	6	7,4		
Total		81	100,0		

Question24-Author					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	11,1	12,0	12,0
	No	66	81,5	88,0	100,0
	Total	75	92,6	100,0	
Missing	,00	6	7,4		
Total		81	100,0		

Question25-all the above

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	16	19,8	21,3	21,3
	No	59	72,8	78,7	100,0
	Total	75	92,6	100,0	
Missing	,00	6	7,4		
Total		81	100,0		

Question26-other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	1,2	1,3	1,3
	No	74	91,4	98,7	100,0
	Total	75	92,6	100,0	
Missing	,00	6	7,4		
Total		81	100,0		

Question27-article publication activity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	72	88,9	88,9	88,9
	one	6	7,4	7,4	96,3
	two-three	2	2,5	2,5	98,8
	four-	1	1,2	1,2	100,0
	Total	81	100,0	100,0	

Qustion28-no familiarity with oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	40	49,4	51,9	51,9
	No	23	28,4	29,9	81,8
	don't know	14	17,3	18,2	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question29-low impact factor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	28,4	29,5	29,5
	No	18	22,2	23,1	52,6
	don't know	37	45,7	47,4	100,0
	Total	78	96,3	100,0	
Missing	,00	3	3,7		
Total		81	100,0		

Question30-low prestige

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	28,4	29,9	29,9
	No	33	40,7	42,9	72,7
	don't know	21	25,9	27,3	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question31- low readership

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	23,5	24,1	24,1
	No	36	44,4	45,6	69,6
	don't know	24	29,6	30,4	100,0
	Total	79	97,5	100,0	
Missing	,00	2	2,5		
Total		81	100,0		

Question32-lack of funding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	24,7	26,3	26,3
	No	5	6,2	6,6	32,9
	don't know	51	63,0	67,1	100,0
	Total	76	93,8	100,0	
Missing	,00	5	6,2		
Total		81	100,0		

Question33-institution influence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	34,6	35,9	35,9
	No	20	24,7	25,6	61,5
	don't know	30	37,0	38,5	100,0
	Total	78	96,3	100,0	
Missing	,00	3	3,7		
Total		81	100,0		

Question34-author charges

		Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	Yes	35	43,2	45,5	45,5	
	No	10	12,3	13,0	58,4	
	don't know	32	39,5	41,6	100,0	
	Total	77	95,1	100,0		
Missing	,00	4	4,9			
Total		81	100,0			

Question35-uncertainty about copyright

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	26	32,1	33,8	33,8
	No	8	9,9	10,4	44,2
	Don't have an opinion	43	53,1	55,8	100,0
	Total	77	95,1	100,0	
Missing	,00	4	4,9		
Total		81	100,0		

Question36-uncertainty about quality of peer review process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	34,6	35,0	35,0
	No	19	23,5	23,8	58,8
	don't know	33	40,7	41,3	100,0
	Total	80	98,8	100,0	
Missing	,00	1	1,2		
Total		81	100,0		

Question37-existence of institutional repository

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	16,0	16,0	16,0
	No	38	46,9	46,9	63,0
	don't know	30	37,0	37,0	100,0
	Total	81	100,0	100,0	

Question38-work accessible via internet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	37	45,7	45,7	45,7
	No	44	54,3	54,3	100,0
	Total	81	100,0	100,0	

Question39-oap mean of wider dissemination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	73	90,1	91,3	91,3
	No	7	8,6	8,8	100,0
	Total	80	98,8	100,0	
Missing	,00	1	1,2		
Total		81	100,0		

Question40-usage of oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	49	60,5	61,3	61,3
	No	31	38,3	38,8	100,0
	Total	80	98,8	100,0	
Missing	,00	1	1,2		
Total		81	100,0		

Question41-Scientific Society

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	7,4	7,4	7,4
	No	75	92,6	92,6	100,0
	Total	81	100,0	100,0	

Question42-Institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	22,2	22,2	22,2
	No	63	77,8	77,8	100,0
	Total	81	100,0	100,0	

Question43-Colleagues

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	37	45,7	45,7	45,7
	No	44	54,3	54,3	100,0
	Total	81	100,0	100,0	

Question44-Not aware until questionnaire received

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	25,9	25,9	25,9
	No	60	74,1	74,1	100,0
	Total	81	100,0	100,0	

Question45-Other

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	6	7,4	7,4	7,4
	No	75	92,6	92,6	100,0
	Total	81	100,0	100,0	

Question46-detection of open access information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	14	17,3	17,7	17,7
	Easy	42	51,9	53,2	70,9
	Very difficult	5	6,2	6,3	77,2
	Difficult	18	22,2	22,8	100,0
	Total	79	97,5	100,0	
Missing	,00	2	2,5		
Total		81	100,0		

Question47-detection of Greek biomedical research in oaj

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very easy	5	6,2	6,4	6,4
	Easy	27	33,3	34,6	41,0
	Very difficult	8	9,9	10,3	51,3
	Difficult	38	46,9	48,7	100,0
	Total	78	96,3	100,0	
Missing	,00	3	3,7		
Total		81	100,0		

Question48-library access to open access journals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	39,5	39,5	39,5
	No	8	9,9	9,9	49,4
	Sometimes	13	16,0	16,0	65,4
	don't know	26	32,1	32,1	97,5
	other	2	2,5	2,5	100,0
	Total	81	100,0	100,0	

Appendix 4.4 : Confidence intervals phase one

	Yes	CI	(+)	No	CI	(+)	(-)	No Opinion	CI	(+)	(-)	No
Q2P1	71,2	11,5	82,7	59,7	28	12	16,7	39,7				
Q3P1	45,8	12,6	58,4	33,2	54	13	41,6	66,8				
Q4P1	54,2	12,6	66,8	41,6	46	13	33,2	58,4				
Q5P1	54,2	12,6	66,8	41,6	46	13	33,2	58,4				
Q6P1	20,3	10,2	30,5	10,1	80	10	69,5	89,9				
Q7P1	8,5	7,1	15,6	1,4	92	7,1	84,4	98,6				
Q8P1	20,3	10,2	30,5	10,1	80	10	69,5	89,9				
Q9P1	10,2	7,7	17,9	2,5	90	7,7	82,1	97,5				
Q10P1	6,8	6,4	13,2	0,4	93	6,4	86,8	99,6				
Q11P1	22	10,5	32,5	11,5	78	11	67,5	88,5				
Q12P1	1,7	3,3	5	-1,6	98	3,3	95	101,6				

Q13P1	61	12,4	73,4	48,6	39	12	26,6	51,4
Q14P1	6,8	6,4	13,2	0,4	81	6,4	75	87,8
Q15P1	3,4	4,6	8	-1,2	85	4,6	80,1	89,3
Q16P1	1,7	3,3	5	-1,6	86	8,7	77,7	95,1
Q17P1	20,3	10,2	30,5	10,1	68	12	55,9	79,7
Q18P1	0	0	0	0	88	8,2	79,9	96,3
Q19P1	42,4	12,5	54,9	29,9	54	13	41,6	66,8
Q20P1	1,7	3,3	5	-1,6	97	4,6	92	101,2
Q21P1	35,6	12,2	47,8	23,4	64	12	52,2	76,6
Q22P1	10,2	7,7	17,9	2,5	86	8,7	77,7	95,1
Q23P1	3,4	4,6	8	-1,2	93	6,4	86,8	99,6
Q24P1	11,9	8,2	20,1	3,7	85	9,1	75,6	93,8
Q25P1	10,2	7,7	17,9	2,5	86	8,7	77,7	95,1
Q26P1	0	0	0	0	97	4,6	92	101,2

Q28P1	44,1	12,6	56,7	31,5	36	12	23,4	47,8	18,6	9,9	8,7	28,5
Q29P1	23,7	10,8	34,5	12,9	29	12	17,3	40,3	39	12,4	26,6	51,4
Q30P1	27,1	11,3	38,4	15,8	37	12	25	49,6	27,1	11,3	15,8	38,4
Q31P1	16,9	9,5	26,4	7,4	36	12	23,4	47,8	35,6	12,2	23,4	47,8
Q32P1	11,9	8,2	20,1	3,7	14	8,7	4,9	22,3	62,7	12,3	50,4	75
Q33P1	15,3	9,1	24,4	6,2	34	12	21,9	45,9	40,7	12,5	28,2	53,2
Q34P1	13,6	8,7	22,3	4,9	22	11	11,5	32,5	55,9	12,6	43,3	68,5
Q35P1	18,6	9,9	28,5	8,7	19	9,9	8,7	28,5	52,5	12,7	39,8	65,2
Q36P1	16,9	9,5	26,4	7,4	31	12	18,8	42,2	42,4	12,5	29,9	54,9
Q37P1	30,5	11,7	42,2	18,8	27	11	15,8	38,4	42,4	12,5	29,9	54,9
Q38P1	47,5	12,7	60,2	34,8	51	13	38,1	63,5				
Q39P1	89,8	7,7	97,5	82,1	5,1	5,6	-0,5	10,7				
Q40P1	61	12,4	73,4	48,6	39	12	26,6	51,4				
Q41P1	96,6	4,6	101,2	92	3,4	4,6	-1,2	8				

Q42P1	30,5	11,7	42,2	18,8	66	12	54,1	78,1
Q43P1	40,7	12,7	53,4	28	56	13	43,3	68,5
Q44P1	33,9	12	45,9	21,9	63	12	50,4	75
Q45P1	6,8	6,4	13,2	0,4	90	7,7	82,1	97,5

Appendix 4.5 : Confidence intervals phase two

	Yes	CI	(+)	No	CI	(+)	(-)	No Opinion	CI	(+)	(-)	No
Q2P2	49,2	12,7	61,9	36,5	50,8	12,7	63,5	38,1				
Q3P2	40,7	12,5	53,2	28,2	59,3	12,5	71,8	46,8				
Q4P3	47,5	12,7	60,2	34,8	52,5	12,7	65,2	39,8				
Q5P2	44,1	12,6	56,7	31,5	55,9	12,6	68,5	43,3				
Q6P2	18,6	9,9	28,5	8,7	81,4	9,9	91,3	71,5				
Q7P2	6,8	6,4	13,2	0,4	93,2	6,4	99,6	86,8				
Q8P2	22	10,5	32,5	11,5	78	10,5	88,5	67,5				
Q9P2	3,4	4,6	8	-1,2	96,6	4,6	101,2	92				
Q10P2	1,7	3,3	5	-1,6	98,3	3,3	101,6	95				
Q11P2	27,1	11,3	38,4	15,8	72,9	11,3	84,2	61,6				
Q12P2			0	0	100							

Q13P2	49,2	12,7	61,9	36,5	50,8	12,7	63,5	38,1
Q14P2	16,9	9,5	26,4	7,4	72,9	11,3	84,2	61,6
Q15P2	15,3	9,1	24,4	6,2	74,6	11	85,6	63,6
Q16P2	5,1	5,6	10,7	-0,5	84,7	9,1	93,8	75,6
Q17P2	23,7	7,8	31,5	15,9	66,1	12	78,1	54,1
Q18P2	1,7	3,3	5	-1,6	88,1	8,2	96,3	79,9
Q19P2	42,4	12,5	54,9	29,9	57,6	12,5	70,1	45,1
Q20P2	1,7	3,3	5	-1,6	98,3	3,3	101,6	95
Q21P2	27,1	11,3	38,4	15,8	71,2	11,5	82,7	59,7
Q22P2	3,4	4,6	8	-1,2	93,2	6,4	99,6	86,8
Q23P2	5,1	5,6	10,7	-0,5	91,5	7,1	98,6	84,4
Q24P2	6,8	6,4	13,2	0,4	89,8	7,7	97,5	82,1
Q25P2	6,8	6,4	13,2	0,4	89,8	7,7	97,5	82,1
Q26P2	6,8	6,4	13,2	0,4	89,8	7,7	97,5	82,1

Q28P2	50,8	12,7	63,5	38,1	25,4	11	36,4	14,4	13,6	8,7	22,3	4,9
Q29P2	27,1	11,3	38,4	15,8	23,7	10,8	34,5	12,9	27,1	11,3	38,4	15,8
Q30P2	32,2	11,9	44,1	20,3	30,5	11,7	42,2	18,8	18,6	9,9	28,5	8,7
Q31P2	13,6	8,7	22,3	4,9	42,4	12,5	54,9	29,9	23,7	10,8	34,5	12,9
Q32P2	15,3	9,1	24,4	6,2	10,2	7,7	17,9	2,5	50,8	12,7	63,5	38,1
Q33P2	22	10,5	32,5	11,5	20,3	10,2	30,5	10,1	33,9	12	45,9	21,9
Q34P2	28,8	11,7	40,5	17,1	15,3	9,1	24,4	6,2	32,2	11,9	44,1	20,3
Q35P2	27,1	11,3	38,4	15,8	15,3	9,1	24,4	6,2	37,3	12,3	49,6	25
Q36P2	32,2	11,9	44,1	20,3	11,9	8,2	20,1	3,7	33,9	12	45,9	21,9
Q37P2	15,3	9,1	24,4	6,2	25,4	11	36,4	14,4	57,6	12,5	70,1	45,1
Q38P2	37,3	12,3	49,6	25	62,7	12,3	75	50,4				
Q39P2	89,8	7,7	97,5	82,1	8,5	7	15,5	1,5				
Q40P2	59,3	12,5	71,8	46,8	40,7	12,5	53,2	28,2				
Q41P2	5,1	5,6	10,7	-0,5	89,8	7,7	97,5	82,1				

Q42P2	25,4	11	36,4	14,4	69,5	11,7	81,2	57,8
Q43P2	40,7	12,5	53,2	28,2	54,2	12,6	66,8	41,6
Q44P2	27,1	11,3	38,4	15,8	67,8	11,9	79,7	55,9
Q45P2	11,9	8,2	20,1	3,7	83,1	9,5	92,6	73,6

Appendix 4.6 : Confidence intervals phase three

	Yes	CI	(+)	No	CI	(+)	(-)	No Opinion	CI	(+)	(-)	No
Q2P3	39,5	10,6	50,1	28,9	60,5	10,6	71,1	49,9				
Q3P3	46,9	10,8	57,7	36,1	48,1	10,8	58,9	37,3				
Q4P3	39,5	10,6	50,1	28,9	55,6	10,7	66,3	44,9				
Q5P3	44,4	10,7	55,1	33,7	50,6	10,8	61,4	39,8				
Q6P3	24,7	9,3	34	15,4	70,4	9,9	80,3	60,5				
Q7P3	6,2	5,2	11,4	1	88,9	6,8	95,7	82,1				
Q8P3	22,2	9	31,2	13,2	72,8	9,6	82,4	63,2				
Q9P3	8,6	6,1	14,7	2,5	86,4	7,4	93,8	79				
Q10P3	1,2	2,4	3,6	-1,2	93,8	5,2	99	88,6				

Q11P3	6,2	5,2	11,4	1	88,9	6,8	95,7	82,1
Q12P3	1,2	2,4	3,6	-1,2	93,8	5,2	99	88,6
Q13P3	60,5	10,6	71,1	49,9	37	10,4	47,4	26,6
Q14P3	3,7	4,1	7,8	-0,4	85,2	7,7	92,9	77,5
Q15P3	3,7	4,1	7,8	-0,4	85,2	7,7	92,9	77,5
Q16P3	2,5	3,4	5,9	-0,9	86,4	7,4	93,8	79
Q17P3	17,3	8,2	25,5	9,1	71,6	9,7	81,3	61,9
Q18P3	4,9	4,7	9,6	0,2	84	7,9	91,9	76,1
Q19P3	56,8	10,7	67,5	46,1	42	10,7	52,7	31,3
Q20P3	2,5	3,4	5,9	-0,9	96,3	4,1	100,4	92,2
Q21P3	42	10,7	52,7	31,3	55,6	10,7	66,3	44,9
Q22P3	3,7	4,1	7,8	-0,4	88,9	6,8	95,7	82,1
Q23P3	2,5	3,4	5,9	-0,9	90,1	6,5	96,6	83,6
Q24P3	11,1	6,8	17,9	4,3	81,5	8,4	89,9	73,1

Q25P3	19,8	8,6	28,4	11,2	72,8	9,6	82,4	63,2				
Q26P3	1,2	2,4	3,6	-1,2	91,4	6,1	97,5	85,3				
Q28P3	49,4	10,8	60,2	38,6	28,4	9,8	38,2	18,6	17,3	8,2	25,5	9,1
Q29P3	28,4	9,7	38,1	18,7	22,2	9	31,2	13,2	45,7	10,8	56,5	34,9
Q30P3	28,4	9,7	38,1	18,7	40,7	10,6	51,3	30,1	25,9	9,5	35,4	16,4
Q31P3	23,5	9,2	32,7	14,3	44,4	10,7	55,1	33,7	29,6	9,9	39,5	19,7
Q32P3	24,7	9,3	34	15,4	6,2	5,2	11,4	1	63	10,4	73,4	52,6
Q33P2	34,6	10,3	44,9	24,3	24,7	9,3	34	15,4	37	10,4	47,4	26,6
Q34P3	43,2	10,7	53,9	32,5	12,3	7,1	19,4	5,2	39,5	10,6	50,1	28,9
Q35P3	32,1	10,1	42,2	22	9,9	6,5	16,4	3,4	53,1	10,8	63,9	42,3
Q36P3	34,6	10,3	44,9	24,3	23,5	9,2	32,7	14,3	40,7	10,6	51,3	30,1
Q37P3	16	7,9	23,9	8,1	46,9	10,8	57,7	36,1	37	10,4	47,4	26,6
Q38P3	45,7	10,8	56,5	34,9	54,3	10,8	65,1	43,5				
Q39P3	90,1	6,5	96,6	83,6	8,6	6,1	14,7	2,5				

Q40P3	60,5	10,6	71,1	49,9	38,3	10,5	48,8	27,8
Q41P3	7,4	5,7	13,1	1,7	92,6	5,7	98,3	86,9
Q42P3	22,2	9	31,2	13,2	77,8	9	86,8	68,8
Q43P3	45,7	10,8	56,5	34,9	54,3	10,8	65,1	43,5
Q44P3	25,9	9,5	35,4	16,4	74,1	9,5	83,6	64,6
Q45P3	7,4	5,7	13,1	1,7	92,6	5,7	98,3	86,9

Appendix 4.7 –Hypotheses Phase one

Hypothesis one

Is the "familiarity with the idea of Open Access Publishing" (Q.19) associated with "preference for a high impact factor journal to publish in" (Q.3)?			Question19-open access publishing activity		Total
			Yes	No	
Question3-high impact factor	Yes	Count	13	13	26
		Expected Count	11,4	14,6	26,0
		% within Question3-high impact factor	50,0%	50,0%	100,0%
		% within Question19-open access publishing activity	52,0%	40,6%	45,6%
		% of Total	22,8%	22,8%	45,6%
	No	Count	12	19	31
		Expected Count	13,6	17,4	31,0
		% within Question3-high impact factor	38,7%	61,3%	100,0%
		% within Question19-open access publishing activity	48,0%	59,4%	54,4%
		% of Total	21,1%	33,3%	54,4%
Total		Count	25	32	57
		Expected Count	25,0	32,0	57,0
		% within Question3-high impact factor	43,9%	56,1%	100,0%
		% within Question19-open access publishing activity	100,0%	100,0%	100,0%
		% of Total	43,9%	56,1%	100,0%

Table 4.15 OA publishing familiarity against high impact journal publishing preference

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,732[a]	1	,392		
Continuity Correction[b]	,345	1	,557		
Likelihood Ratio	,733	1	,392		
Fisher's Exact Test				,432	,278
Linear-by-Linear Association	,719	1	,396		
N of Valid Cases	57				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 11,40.
b. Computed only for a 2x2 table

Table 4.16 Tests of association for table 4.15

Hypothesis two

Is the state of "preference for publishing in a high impact journal" (Q.3) associated with "awareness of using open access journals" (Q.40)?			Question40-usage of oaj		Total
			Yes	No	
Question3-high impact factor	Yes	Count	17	10	27
		Expected Count	16,5	10,5	27,0
		% within Question3-high impact factor	63,0%	37,0%	100,0%
		% within Question40-usage of oaj	47,2%	43,5%	45,8%
		% of Total	28,8%	16,9%	45,8%
	No	Count	19	13	32
		Expected Count	19,5	12,5	32,0
		% within Question3-high impact factor	59,4%	40,6%	100,0%
		% within Question40-usage of oaj	52,8%	56,5%	54,2%
		% of Total	32,2%	22,0%	54,2%
Total		Count	36	23	59
		Expected Count	36,0	23,0	59,0
		% within Question3-high impact factor	61,0%	39,0%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	61,0%	39,0%	100,0%

Table 4.17 Impact factor publishing criterion for against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,079[a]	1	,778		
Continuity Correction[b]	,000	1	,989		
Likelihood Ratio	,079	1	,778		
Fisher's Exact Test				,796	,495
Linear-by-Linear Association	,078	1	,780		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,53.

b. Computed only for a 2x2 table

Table 4.18 Tests of association for table 4.17

Hypothesis three

Is your "familiarity with Open Access Publishing idea" (Q19) associated with the "familiarity with open access journals"(Q28)?			Question28-no familiarity with oaj		Total
			Yes/not know	No	
Question19-open access publishing activity	Yes	Count	9	16	25
		Expected Count	16,5	8,5	25,0
		% within Question19-open access publishing activity	36,0%	64,0%	100,0%
		% within Question28-no familiarity with oaj	24,3%	84,2%	44,6%
		% of Total	16,1%	28,6%	44,6%
	No	Count	28	3	31
		Expected Count	20,5	10,5	31,0
		% within Question19-open access publishing activity	90,3%	9,7%	100,0%
		% within Question28-no familiarity with oaj	75,7%	15,8%	55,4%
		% of Total	50,0%	5,4%	55,4%
Total		Count	37	19	56
		Expected Count	37,0	19,0	56,0
		% within Question19-open access publishing activity	66,1%	33,9%	100,0%
		% within Question28-no familiarity with oaj	100,0%	100,0%	100,0%
		% of Total	66,1%	33,9%	100,0%

Table 4.19 Familiarity with the idea of OA publishing against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	**18,218[a]**	**1**	**,000**		
Continuity Correction[b]	**15,875**	**1**	**,000**		
Likelihood Ratio	**19,360**	**1**	**,000**		
Fisher's Exact Test				**,000**	**,000**
Linear-by-Linear Association	**17,892**	**1**	**,000**		
N of Valid Cases	**56**				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,48.
b. Computed only for a 2x2 table

Table 4.20 Tests of association for table 4.19

Hypothesis four

Is the "awareness of using open access journals" (Q.40) connected with the "familiarity with the idea of Open Access Publishing (Q.19)?			Question40-usage of oaj		Total
			Yes	No	
Question19-open access publishing activity	Yes	Count	22	3	25
		Expected Count	14,9	10,1	25,0
		% within Question19-open access publishing activity	88,0%	12,0%	100,0%
		% within Question40-usage of oaj	64,7%	13,0%	43,9%
		% of Total	38,6%	5,3%	43,9%
	No	Count	12	20	32
		Expected Count	19,1	12,9	32,0
		% within Question19-open access publishing activity	37,5%	62,5%	100,0%
		% within Question40-usage of oaj	35,3%	87,0%	56,1%
		% of Total	21,1%	35,1%	56,1%
Total		Count	34	23	57
		Expected Count	34,0	23,0	57,0
		% within Question19-open access publishing activity	59,6%	40,4%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	59,6%	40,4%	100,0%

Table 4.21 Familiarity with the idea of OA publishing against awareness of using (reading) OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14,871[a]	1	,000		
Continuity Correction[b]	12,847	1	,000		
Likelihood Ratio	16,196	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	14,610	1	,000		
N of Valid Cases	57				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,09.
b. Computed only for a 2x2 table

Table 4.22 Tests of association for table 4.21

Hypothesis five

Is the state of "uncertainty around copyright issues of open access journals" (Q.35) associated with "familiarity with the idea of Open Access Publishing" (Q.19)?			Question35-uncertainty about copyright		Total
			Yes/don't know	No	
Question19-open access publishing activity	Yes	Count	19	6	25
		Expected Count	20,6	4,4	25,0
		% within Question19-open access publishing activity	76,0%	24,0%	100,0%
		% within Question35-uncertainty about copyright	40,4%	60,0%	43,9%
		% of Total	33,3%	10,5%	43,9%
	No	Count	28	4	32
		Expected Count	26,4	5,6	32,0
		% within Question19-open access publishing activity	87,5%	12,5%	100,0%
		% within Question35-uncertainty about copyright	59,6%	40,0%	56,1%
		% of Total	49,1%	7,0%	56,1%
Total		Count	47	10	57
		Expected Count	47,0	10,0	57,0
		% within Question19-open access publishing activity	82,5%	17,5%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	82,5%	17,5%	100,0%

Table 4.23 Familiarity with the idea of open access publishing against uncertainty aboutcopyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,283[a]	1	,257		
Continuity Correction[b]	,611	1	,434		
Likelihood Ratio	1,275	1	,259		
Fisher's Exact Test				,308	,217
Linear-by-Linear Association	1,261	1	,262		
N of Valid Cases	57				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 4,39.
b. Computed only for a 2x2 table

Table 4.24 Tests for table 4.23

Sixth hypothesis

Is the "awareness of reading open access journals" (Q.40) associated with "uncertainty around copyright issues with open access journals?" (Q.35).			Question35-uncertainty about copyright		Total
			Yes/don't know	No	
Question40-usage of oaj	Yes	Count	27	8	35
		Expected Count	29,8	5,2	35,0
		% within Question40-usage of oaj	77,1%	22,9%	100,0%
		% within Question35-uncertainty about copyright	58,7%	100,0%	64,8%
		% of Total	50,0%	14,8%	64,8%
	No	Count	19	0	19
		Expected Count	16,2	2,8	19,0
		% within Question40-usage of oaj	100,0%	0,0%	100,0%
		% within Question35-uncertainty about copyright	41,3%	0,0%	35,2%
		% of Total	35,2%	0,0%	35,2%
Total		Count	46	8	54
		Expected Count	46,0	8,0	54,0
		% within Question40-usage of oaj	85,2%	14,8%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	85,2%	14,8%	100,0%

Table 4.25 Awareness of using open access journals against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,098[a]	1	,024		
Continuity Correction[b]	3,448	1	,063		
Likelihood Ratio	7,676	1	,006		
Fisher's Exact Test				,040	,023
Linear-by-Linear Association	5,004	1	,025		
N of Valid Cases	54				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,81.

b. Computed only for a 2x2 table

Table 4.26 Tests of association for table 4.25

Appendix 4.8–Hypotheses Phase two

Hypothesis one

Is the "familiarity with the idea of Open Access Publishing" (Q.19) associated with "preference for a high impact factor journal to publish in" (Q.3)?			Question19-open access publishing activity		Total
			Yes	No	
Question3-high impact factor	Yes	Count	9	15	24
		Expected Count	10,2	13,8	24,0
		% within Question3-high impact factor	37,5%	62,5%	100,0%
		% within Question19-open access publishing activity	36,0%	44,1%	40,7%
		% of Total	15,3%	25,4%	40,7%
	No	Count	16	19	35
		Expected Count	14,8	20,2	35,0
		% within Question3-high impact factor	45,7%	54,3%	100,0%
		% within Question19-open access publishing activity	64,0%	55,9%	59,3%
		% of Total	27,1%	32,2%	59,3%
Total		Count	25	34	59
		Expected Count	25,0	34,0	59,0
		% within Question3-high impact factor	42,4%	57,6%	100,0%
		% within Question19-open access publishing activity	100,0%	100,0%	100,0%
		% of Total	42,4%	57,6%	100,0%

Table 4.29 OA publishing familiarity against high impact journal publishing preference

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,393[a]	1	,531		
Continuity Correction[b]	,129	1	,720		
Likelihood Ratio	,395	1	,530		
Fisher's Exact Test				,598	,361
Linear-by-Linear Association	,387	1	,534		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,17.

b. Computed only for a 2x2 table

Table 4.30 Tests of association for table 4.29

Hypothesis two

Is the state of "preference for publishing in a high impact journal" (Q.3) associated with "awareness of using open access journals" (Q.40)?			Question40-usage of oaj		Total
			Yes	No	
Question3-high impact factor	Yes	Count	12	12	24
		Expected Count	14,2	9,8	24,0
		% within Question3-high impact factor	50,0%	50,0%	100,0%
		% within Question40-usage of oaj	34,3%	50,0%	40,7%
		% of Total	20,3%	20,3%	40,7%
	No	Count	23	12	35
		Expected Count	20,8	14,2	35,0
		% within Question3-high impact factor	65,7%	34,3%	100,0%
		% within Question40-usage of oaj	65,7%	50,0%	59,3%
		% of Total	39,0%	20,3%	59,3%
Total		Count	35	24	59
		Expected Count	35,0	24,0	59,0
		% within Question3-high impact factor	59,3%	40,7%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	59,3%	40,7%	100,0%

Table 4.31 Impact factor criterion for publishing against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,457[a]	1	,227		
Continuity Correction[b]	,878	1	,349		
Likelihood Ratio	1,454	1	,228		
Fisher's Exact Test				,285	,174
Linear-by-Linear Association	1,432	1	,231		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,76.

b. Computed only for a 2x2 table

Table 4.32 Tests of association for table 4.31

Hypothesis three

Is your "familiarity with Open Access Publishing idea" (Q19) associated with the "familiarity with open access journals"(Q28)?			Question28-no familiarity with oaj		Total
			Yes/not know	No	
Question19-open access publishing activity	Yes	Count	8	14	22
		Expected Count	15,8	6,2	22,0
		% within Question19-open access publishing activity	36,4%	63,6%	100,0%
		% within Question28-no familiarity with oaj	21,1%	93,3%	41,5%
		% of Total	15,1%	26,4%	41,5%
	No	Count	30	1	31
		Expected Count	22,2	8,8	31,0
		% within Question19-open access publishing activity	96,8%	3,2%	100,0%
		% within Question28-no familiarity with oaj	78,9%	6,7%	58,5%
		% of Total	56,6%	1,9%	58,5%
Total		Count	38	15	53
		Expected Count	38,0	15,0	53,0
		% within Question19-open access publishing activity	71,7%	28,3%	100,0%
		% within Question28-no familiarity with oaj	100,0%	100,0%	100,0%
		% of Total	71,7%	28,3%	100,0%

Table 4.33 Familiarity with the idea of OA publishing against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	23,143[a]	1	,000		
Continuity Correction[b]	20,261	1	,000		
Likelihood Ratio	25,476	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	22,706	1	,000		
N of Valid Cases	53				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,23.

b. Computed only for a 2x2 table

Table 4.34 Tests of association for table 4.33

Hypothesis four

Is the "awareness of using open access journals" (Q.40) connected with the "familiarity with the idea of Open Access Publishing (Q.19)?			Question40-usage of oaj		Total
			Yes	No	
Question19-open access publishing activity	Yes	Count	24	1	25
		Expected Count	14,8	10,2	25,0
		% within Question19-open access publishing activity	96,0%	4,0%	100,0%
		% within Question40-usage of oaj	68,6%	4,2%	42,4%
		% of Total	40,7%	1,7%	42,4%
	No	Count	11	23	34
		Expected Count	20,2	13,8	34,0
		% within Question19-open access publishing activity	32,4%	67,6%	100,0%
		% within Question40-usage of oaj	31,4%	95,8%	57,6%
		% of Total	18,6%	39,0%	57,6%
Total		Count	35	24	59
		Expected Count	35,0	24,0	59,0
		% within Question19-open access publishing activity	59,3%	40,7%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	59,3%	40,7%	100,0%

Table 4.35 Awareness of using (reading) OA journals against awareness of OA publishing Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	24,185[a]	1	,000		
Continuity Correction[b]	21,619	1	,000		
Likelihood Ratio	28,525	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	23,775	1	,000		
N of Valid Cases	59				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,17.

b. Computed only for a 2x2 table

Table 4.36 Tests of association for table 4.35

Hypothesis five

Is the state of "uncertainty around copyright issues of open access journals" (Q.35) associated with "familiarity with the idea of Open Access Publishing" (Q.19)?			Question35-uncertainty about copyright		Total
			Yes/Do not know	No	
Question19-open access publishing activity	Yes	Count	18	6	24
		Expected Count	19,4	4,6	24,0
		% within Question19-open access publishing activity	75,0%	25,0%	100,0%
		% within Question35-uncertainty about copyright	47,4%	66,7%	51,1%
		% of Total	38,3%	12,8%	51,1%
	No	Count	20	3	23
		Expected Count	18,6	4,4	23,0
		% within Question19-open access publishing activity	87,0%	13,0%	100,0%
		% within Question35-uncertainty about copyright	52,6%	33,3%	48,9%
		% of Total	42,6%	6,4%	48,9%
Total		Count	38	9	47
		Expected Count	38,0	9,0	47,0
		% within Question19-open access publishing activity	80,9%	19,1%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	80,9%	19,1%	100,0%

Table 4.37 Familiarity with the idea of open access publishing against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,084[a]	1	,298		
Continuity Correction[b]	,450	1	,502		
Likelihood Ratio	1,103	1	,294		
Fisher's Exact Test				,461	,253
Linear-by-Linear Association	1,061	1	,303		
N of Valid Cases	47				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 4,40.

b. Computed only for a 2x2 table

Table 4.38 Tests of association for table 4.37

Hypothesis six

Is the "awareness of reading open access journals" (Q.40) associated with "uncertainty around copyright issues with open access journals?" (Q.35).			Question35-uncertainty about copyright		Total
			Yes/Do not know	No	
Question40-usage of oaj	Yes	Count	24	8	32
		Expected Count	25,9	6,1	32,0
		% within Question40-usage of oaj	75,0%	25,0%	100,0%
		% within Question35-uncertainty about copyright	63,2%	88,9%	68,1%
		% of Total	51,1%	17,0%	68,1%
	No	Count	14	1	15
		Expected Count	12,1	2,9	15,0
		% within Question40-usage of oaj	93,3%	6,7%	100,0%
		% within Question35-uncertainty about copyright	36,8%	11,1%	31,9%
		% of Total	29,8%	2,1%	31,9%
Total		Count	38	9	47
		Expected Count	38,0	9,0	47,0
		% within Question40-usage of oaj	80,9%	19,1%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	80,9%	19,1%	100,0%

Table 4.39 Awareness of using open access journals against the uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,217[a]	1	,136		
Continuity Correction[b]	1,191	1	,275		
Likelihood Ratio	2,570	1	,109		
Fisher's Exact Test				,236	,136
Linear-by-Linear Association	2,170	1	,141		
N of Valid Cases	47				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 2,87.
b. Computed only for a 2x2 table

Table 4.40 Tests of association for table 4.39

Appendix 4.9 –Hypotheses Phase three

Hypothesis one

Is the "familiarity with the idea of Open Access Publishing" (Q.19) associated with "preference for a high impact factor journal to publish in" (Q.3)?			Question19-open access publishing activity		Total
			Yes	No	
Question3-high impact factor	Yes	Count	26	12	38
		Expected Count	22,0	16,0	38,0
		% within Question3-high impact factor	68,4%	31,6%	100,0%
		% within Question19-open access publishing activity	59,1%	37,5%	50,0%
		% of Total	34,2%	15,8%	50,0%
	No	Count	18	20	38
		Expected Count	22,0	16,0	38,0
		% within Question3-high impact factor	47,4%	52,6%	100,0%
		% within Question19-open access publishing activity	40,9%	62,5%	50,0%
		% of Total	23,7%	26,3%	50,0%
Total		Count	44	32	76
		Expected Count	44,0	32,0	76,0
		% within Question3-high impact factor	57,9%	42,1%	100,0%
		% within Question19-open access publishing activity	100,0%	100,0%	100,0%
		% of Total	57,9%	42,1%	100,0%

Table 4.43 Familiarity with OA publishing against preference for publishing in high impact journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,455[a]	1	,063		
Continuity Correction[b]	2,645	1	,104		
Likelihood Ratio	3,484	1	,062		
Fisher's Exact Test				,103	,052
Linear-by-Linear Association	3,409	1	,065		
N of Valid Cases	76				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 16,00.

b. Computed only for a 2x2 table

Table 4.44 Tests of association for table 4.33

Hypothesis two

Is the state of "preference for publishing in a high impact journal" (Q.3) associated with "awareness of using open access journals" (Q.40)?			Question40-usage of oaj		Total
			Yes	No	
Question3-high impact factor	Yes	Count	29	9	38
		Expected Count	24,0	14,0	38,0
		% within Question3-high impact factor	76,3%	23,7%	100,0%
		% within Question40-usage of oaj	60,4%	32,1%	50,0%
		% of Total	38,2%	11,8%	50,0%
	No	Count	19	19	38
		Expected Count	24,0	14,0	38,0
		% within Question3-high impact factor	50,0%	50,0%	100,0%
		% within Question40-usage of oaj	39,6%	67,9%	50,0%
		% of Total	25,0%	25,0%	50,0%
Total		Count	48	28	76
		Expected Count	48,0	28,0	76,0
		% within Question3-high impact factor	63,2%	36,8%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	63,2%	36,8%	100,0%

Table 4.45 Impact factor publishing preference against awareness of using (reading) an OA journal

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,655[a]	1	,017		
Continuity Correction[b]	4,580	1	,032		
Likelihood Ratio	5,750	1	,016		
Fisher's Exact Test				,031	,016
Linear-by-Linear Association	5,580	1	,018		
N of Valid Cases	76				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 14,00.

b. Computed only for a 2x2 table

Table 4.46 Tests of association for table 4.45

Hypothesis three

Is your "familiarity with Open Access Publishing idea" (Q19) associated with the "familiarity with open access journals"(Q28)?			Question28-no familiarity with oaj		Total
			Yes	No	
Question19-open access publishing activity	Yes	Count	23	20	43
		Expected Count	30,0	13,0	43,0
		% within Question19-open access publishing activity	53,5%	46,5%	100,0%
		% within Question28-no familiarity with oaj	43,4%	87,0%	56,6%
		% of Total	30,3%	26,3%	56,6%
	No	Count	30	3	33
		Expected Count	23,0	10,0	33,0
		% within Question19-open access publishing activity	90,9%	9,1%	100,0%
		% within Question28-no familiarity with oaj	56,6%	13,0%	43,4%
		% of Total	39,5%	3,9%	43,4%
Total		Count	53	23	76
		Expected Count	53,0	23,0	76,0
		% within Question19-open access publishing activity	69,7%	30,3%	100,0%
		% within Question28-no familiarity with oaj	100,0%	100,0%	100,0%
		% of Total	69,7%	30,3%	100,0%

Table 4.47 Familiarity with the idea of OA publishing activity against familiarity with OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	**12,388[a]**	**1**	**,000**		
Continuity Correction[b]	**10,679**	**1**	**,001**		
Likelihood Ratio	**13,681**	**1**	**,000**		
Fisher's Exact Test				**,000**	**,000**
Linear-by-Linear Association	**12,225**	**1**	**,000**		
N of Valid Cases	**76**				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,99.
b. Computed only for a 2x2 table

Table 4.48 Tests of association for table 4.47

Hypothesis four

Is the "awareness of using open access journals" (Q.40) connected with the "familiarity with the idea of Open Access Publishing (Q.19)?			Question40-usage of oaj		Total
			Yes	No	
Question19-open access publishing activity	Yes	Count	37	8	45
		Expected Count	27,3	17,7	45,0
		% within Question19-open access publishing activity	82,2%	17,8%	100,0%
		% within Question40-usage of oaj	77,1%	25,8%	57,0%
		% of Total	46,8%	10,1%	57,0%
	No	Count	11	23	34
		Expected Count	20,7	13,3	34,0
		% within Question19-open access publishing activity	32,4%	67,6%	100,0%
		% within Question40-usage of oaj	22,9%	74,2%	43,0%
		% of Total	13,9%	29,1%	43,0%
Total		Count	48	31	79
		Expected Count	48,0	31,0	79,0
		% within Question19-open access publishing activity	60,8%	39,2%	100,0%
		% within Question40-usage of oaj	100,0%	100,0%	100,0%
		% of Total	60,8%	39,2%	100,0%

Table 4.49 Familiarity with the idea of OA publishing against awareness of using (reading) OA journals

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	20,201[a]	1	,000		
Continuity Correction[b]	18,164	1	,000		
Likelihood Ratio	20,904	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	19,946	1	,000		
N of Valid Cases	79				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 13,34.

b. Computed only for a 2x2 table

Table 4.50 Tests of association for table 4.49

Hypothesis five

Is the state of "uncertainty around copyright issues of open access journals" (Q.35) associated with "familiarity with the idea of Open Access Publishing" (Q.19)?			Question35-uncertainty about copyright		Total
			Yes/Do not know	No	
Question19-open access publishing activity	Yes	Count	36	7	43
		Expected Count	38,5	4,5	43,0
		% within Question19-open access publishing activity	83,7%	16,3%	100,0%
		% within Question35-uncertainty about copyright	52,2%	87,5%	55,8%
		% of Total	46,8%	9,1%	55,8%
	No	Count	33	1	34
		Expected Count	30,5	3,5	34,0
		% within Question19-open access publishing activity	97,1%	2,9%	100,0%
		% within Question35-uncertainty about copyright	47,8%	12,5%	44,2%
		% of Total	42,9%	1,3%	44,2%
Total		Count	69	8	77
		Expected Count	69,0	8,0	77,0
		% within Question19-open access publishing activity	89,6%	10,4%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	89,6%	10,4%	100,0%

Table 4.51 Familiarity with the idea of OA publishing against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3,628[a]	1	,057		
Continuity Correction[b]	2,337	1	,126		
Likelihood Ratio	4,138	1	,042		
Fisher's Exact Test				,071	,059
Linear-by-Linear Association	3,581	1	,058		
N of Valid Cases	77				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 3,53.

b. Computed only for a 2x2 table

Table 4.52 Tests of association for table 4.51

Hypothesis six

Is the "awareness of reading open access journals" (Q.40) associated with "uncertainty around copyright issues with open access journals?" (Q.35).			Question35-uncertainty about copyright		Total
			Yes/Do not know	No	
Question40-usage of oaj	Yes	Count	40	7	47
		Expected Count	42,1	4,9	47,0
		% within Question40-usage of oaj	85,1%	14,9%	100,0%
		% within Question35-uncertainty about copyright	58,0%	87,5%	61,0%
		% of Total	51,9%	9,1%	61,0%
	No	Count	29	1	30
		Expected Count	26,9	3,1	30,0
		% within Question40-usage of oaj	96,7%	3,3%	100,0%
		% within Question35-uncertainty about copyright	42,0%	12,5%	39,0%
		% of Total	37,7%	1,3%	39,0%
Total		Count	69	8	77
		Expected Count	69,0	8,0	77,0
		% within Question40-usage of oaj	89,6%	10,4%	100,0%
		% within Question35-uncertainty about copyright	100,0%	100,0%	100,0%
		% of Total	89,6%	10,4%	100,0%

Table 4.53 Awareness of using OA journals against uncertainty about copyright

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,628[a]	1	,105		
Continuity Correction[b]	1,533	1	,216		
Likelihood Ratio	3,039	1	,081		
Fisher's Exact Test				,140	,105
Linear-by-Linear Association	2,594	1	,107		
N of Valid Cases	77				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 3,12.

b. Computed only for a 2x2 table

Table 4.54 Tests of association for table 4.53

Appendix 4.10: Publishers websites analysis

Frequency Tables

Copyright transfer

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	73,7	73,7	73,7
	No	5	26,3	26,3	100,0
	Total	19	100,0	100,0	

Termination Terms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	52,6	52,6	52,6
	No	9	47,4	47,4	100,0
	Total	19	100,0	100,0	

Citation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	100,0	100,0	100,0

Work for Hire

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	5,3	5,3	5,3
	No	18	94,7	94,7	100,0
	Total	19	100,0	100,0	

Permitted Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	68,4	68,4	68,4
	No	6	31,6	31,6	100,0
	Total	19	100,0	100,0	

Government

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	100,0	100,0	100,0

Permission

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	47,4	47,4	47,4
	No	10	52,6	52,6	100,0
	Total	19	100,0	100,0	

Original Unpublished

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	19	100,0	100,0	100,0

Further Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	100,0	100,0	100,0

Liability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	36,8	36,8	36,8
	No	12	63,2	63,2	100,0
	Total	19	100,0	100,0	

Law Court

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	5,3	5,3	5,3
	No	18	94,7	94,7	100,0
	Total	19	100,0	100,0	

Proprietary Rights

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	5,3	5,3	5,3
	No	18	94,7	94,7	100,0
	Total	19	100,0	100,0	

Fair Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	100,0	100,0	100,0

Authorship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	26,3	26,3	26,3
	No	14	73,7	73,7	100,0
	Total	19	100,0	100,0	

Frequencies

Notes		
Output Created		2010-11-17T14:29:16.359
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Τα έγγραφά μου\Publishing contracts.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	19
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=Copyright Termination Citation Work Use Government Permission Original Further Liability Court Rights Fair Authorship /ORDER=ANALYSIS.
Resources	Processor Time	0:00:00.140
	Elapsed Time	0:00:01.296

Appendix 5.1: Cronbach's alpha phase one

Reliability

Notes		
Output Created		26-MAY-2013 23:59:13
Comments		
Input	Active Dataset	DataSet9
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,05
	Elapsed Time	00:00:00,05

Scale: ALL VARIABLES

Reliability

Notes		
Output Created		27-MAY-2013 00:08:38
Comments		
Input	Active Dataset	DataSet9
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,02

[DataSet9]

Reliability

Notes		
Output Created		27-MAY-2013 00:16:50
Comments		
Input	Active Dataset	DataSet9
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,05

[DataSet9]

Scale: ALL VARIABLES

Reliability

Notes		
Output Created		27-MAY-2013 00:22:09
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Επιφάνεια εργασίας\PHD STATISTICS SPSS\cronbach alpha phase one right.sav
	Active Dataset	DataSet9
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,03

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	59	100,0
	Excluded[a]	0	,0
	Total	59	100,0
a. Listwise deletion based on all variables in the procedure.			

Reliability Statistics	
Cronbach's Alpha	N of Items
,824	48

Appendix 5.2:Cronbach's alpha phase two

Reliability

Notes		
Output Created		26-MAY-2013 21:57:28
Comments		
Input	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q37eir Q36uqprp Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,03
	Elapsed Time	00:00:00,09

DataSet4]

Scale: ALL VARIABLES

Reliability

Notes		
Output Created		26-MAY-2013 21:58:13
Comments		
Input	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q37eir Q36uqprp Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,03
	Elapsed Time	00:00:00,03

[DataSet4]

Reliability

Notes		
Output Created		26-MAY-2013 22:42:09
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Επιφάνεια εργασίας\PHD STATISTICS SPSS\cronbach alpha phase two right one.sav
	Active Dataset	DataSet4
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	59
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q37eir Q36uqprp Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,03

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	59	100,0
	Excluded[a]	0	,0
	Total	59	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
,781	48

Appendix 5.3: Cronbach's alpha phase three

Reliability

Notes		
Output Created		26-MAY-2013 23:34:39
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Επιφάνεια εργασίας\PHD STATISTICS SPSS\cronbach alpha phase three right one.sav
	Active Dataset	DataSet7
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	81
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,05

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	81	100,0
	Excluded[a]	0	,0
	Total	81	100,0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics	
Cronbach's Alpha	N of Items
,818	48

```
DATASET CLOSE DataSet4.
```

Notes		
Output Created		02-JUN-2013 12:26:57
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Επιφάνεια εργασίας\PHD STATISTICS SPSS\phd questionnaires phase3 15.05.11.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	81
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q35uc Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,02
	Elapsed Time	00:00:00,02

Notes		
Output Created		02-JUN-2013 12:27:45
Comments		
Input	Data	C:\Documents and Settings\Acer 9412 Wsmi\Επιφάνεια εργασίας\PHD STATISTICS SPSS\phd questionnaires phase3 15.05.11.sav
	Active Dataset	DataSet3
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	81
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=Q1speciality Q2pubact Q3hif Q4incrprest Q5incrrelscienti Q6qp Q7pfreq Q8rp Q9invauthor Q10geninvaut Q11alabove Q12other Q13acceswor Q14ls Q15lt Q16lip Q17lft Q18other Q19paoa Q20oapi Q21ppf Q22sc Q23institute Q24author Q25allabove Q26other Q27ap Q28nfwoaj Q29lif Q30lp Q31lr Q32lf Q33ii Q34ac Q36uqprp Q37eir Q38air Q39oawd Q40uoaj Q41aoajSc Q42aoajIns Q43aoajCol Q44aoajNtA Q45aoajO Q46doai Q47dgbr Q48laopj VAR00002 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00,03
	Elapsed Time	00:00:00,03

Appendix 5.4: Albert's timeline (2006)

- In **1991** the physicist Paul Ginsparg created the first preprint self archiving repository arXiv
- In **1994** Steven Harnand, psychologist and Faculty of Physical and Applied Sciences in the University of Southampton, announced via the Internet his "subversive proposal" aiming at the persuasion of scientific community to deposit its works via publicly accessible archives in order that the access barriers because of increasing prices be removed and the readership be increased
- In **1998** a group of libraries introduced the Scholarly Publishing and Academic Resources Coalition (SPARC) which published alternative low – priced journals against over priced subscribed journals
- In **1998** BioMed Central was created by Vitek Tracz, former chair of the Current Science Group. It hosts open access journals based on author pays business model
- In **1999** biomedical scientists having as a head Harold Vermus the then-director of US National Health Institute launched E-Biomed, the synonym of arXiv for the life sciences. E-Biomed was basically the origin of PubMed Central
- In **2000** Harold Vermus, Michael Eisen and Patric Brown founded the Public Library of Science as a protest against the journals which are not freely available via PubMed Central
- In **2002** all the above mentioned innovations led to the Budapest Open Access Initiative

Appendix 6.0: Published papers