

MASTER'S THESIS IN LIBRARY AND INFORMATION SCIENCE
SWEDISH SCHOOL OF LIBRARY AND INFORMATION SCIENCE
2014:11

Scholarly communication activities in the fields of
chemistry and economics
A Polish perspective

Magdalena Anna Szuflita



HÖGSKOLAN I BORÅS
VETENSKAP FÖR PROFESSION

Swedish title: Vetenskaplig kommunikation inom kemi och ekonomi: ett polskt perspektiv.

English title: Scholarly communication activities in the fields of chemistry and economics: A Polish perspective.

Author(s): Magdalena Anna Szuflińska

Finished: 2014

Supervisor: Helena Francke

Abstract: This study examines the scholarly communication activities in two scientific fields, chemistry and economics, in a Polish context. The dissertation aims at investigating what characterises the publishing choices of researchers and what supplementary forms for the dissemination of research output are used by scholars. In addition, the paper is looking into what are the views and awareness of open access and institutional repositories within this scientific community. This thesis gives the results of semi-structured interviews and an online survey at two academic faculties at a Polish technical university. As its theoretical framework, the study uses Whitley's theory of the intellectual and social organisation of academic fields and Latour and Woolgar's study regarding various motivations for publishing. The study found that there are some similarities between the two investigated disciplines, especially in the context of extra-disciplinary factors that have impact on scholars' publishing choices. The study also revealed that the general awareness of open access is rather good among the participating academics, however the number of open access publications is not very high. In addition, the findings suggest that there were some misunderstanding about the definitions and functions of institutional repositories among scholars.

Key-words: chemistry, economics, institutional repository, open access, Poland, publishing behaviour, scholarly communication activities

ACKNOWLEDGMENTS

My thesis would not have been possible without the assistance of several wonderful people.

First, I cannot express enough thanks to my father without whom it would not be possible to write this thesis.

I am particularly grateful for the support, comments and guidance throughout writing my thesis to my supervisor Helena Francke. Thanks to my fellow students at the University of Borås (Elisabeth Mueller Nylander, Wilhelm Utoni and Ramune Kuzminiene) and our supervisor Elena Maceviciute.

I would not forget to remember about my manager Mrs. Bożena Kray for her assistance and valuable support.

Last but not least I would like to thank my mother and grandmother for their encouragement throughout my study.

My deepest love goes to my fiancé and our son, Dawid who was born during writing my thesis.

ABBREVIATIONS

ACS - American Chemical Society
APC - Article Processing Charge
BOAI - The Budapest Open Access Initiative
CC - Creative Commons
CCPP - Centrum Cyfrowe: Projekt Polska
DL – digital library
DOAJ - Directory of Open Access Journals
ECNIS - Environmental Cancer Risk, Nutrition and Individual Susceptibility
ERIH - European Reference Index for the Humanities
IF – Impact Factor
IR – institutional repository
JCR - Journals Citations Report
JIF – Journal Impact Factor
JISC – Joint Information Systems Committee
NGO - Non-Governmental Organisations
OA – open access
OAI-PMH - OAI Protocol for Metadata Harvesting
RePEc - Research Papers in Economics
ROARMAP - Registry of Open Access Repositories Mandatory Archiving Policies
RSC - Royal Society of Chemistry
SEPB - The Scholarly Electronic Publishing Bibliography
SOAP - The Study of Open Access Publishing
SSRN - Social Science Research Network
UNISIST - The United Nations International Scientific Information System
WoS – Web of Science

TABLE OF CONTENTS

ACKNOWLEDGMENTS

ABBREVIATIONS

LIST OF FIGURES AND TABLES

1. INTRODUCTION / 1

1.1 BACKGROUND / 1

1.2 AIMS AND RESEARCH QUESTIONS / 2

1.3 LIMITATIONS TO THE STUDY / 3

1.4 THESIS STRUCTURE / 4

2. INTRODUCING KEY CONCEPTS / 4

2.1 SCHOLARLY COMMUNICATION / 5

2.2 OPEN ACCESS / 6

2.3 CHEMISTRY / 10

2.4 ECONOMICS / 13

2.5 DIGITAL LIBRARIES AND INSTITUTIONAL REPOSITORIES / 15

3. SCHOLARLY PUBLISHING AND OPEN ACCESS IN POLAND / 16

4. LITERATURE REVIEW / 20

4.1 SCHOLARLY COMMUNICATION / 20

4.2 OPEN ACCESS / 24

4.3 DIGITAL LIBRARIES AND INSTITUTIONAL REPOSITORIES / 26

5. THEORETICAL FRAMEWORK / 28

5.1 MUTUAL DEPENDENCE AND TASK UNCERTAINTY / 29

5.2 MOTIVATIONS / 32

6. METHODS AND MATERIALS / 32

6.1 RESEARCH APPROACH / 33

6.2 QUALITATIVE DATA / 35

6.3 QUANTITATIVE DATA / 36

6.4 DATA ANALYSIS AND PRESENTATION / 38

6.5 LIMITATIONS / 40

6.6 ETHICAL ISSUES / 41

7. RESULTS / 42

7.1 CHEMISTRY / 42

7.2 ECONOMICS / 58

7.3 STATEMENTS CONCERNING OPEN ACCESS / 72

8. DISCUSSION, CONCLUSIONS AND FURTHER RECOMMENDATIONS / 73

8.1 SCHOLARLY COMMUNICATION BEHAVIOUR IN THE FIELDS OF CHEMISTRY AND ECONOMICS / 73

8.2 ADDITIONAL CHANNELS FOR DISSEMINATION OF SCIENTIFIC OUTPUT / 78

8.3 AWARENESS AND VIEWS OF OPEN ACCESS PUBLISHING / 80

8.4 FURTHER RESEARCH / 84

8.5 CONCLUSIONS / 85

REFERENCES / 87

APPENDIX A / 98

APPENDIX B / 99

APPENDIX C / 105

APPENDIX D / 106

List of Figures and tables

Figure 1. Total number of Polish journals registered in the DOAJ (accessed: September 2013).....	19
Figure 2. Selection of participants.....	35
Figure 3. Participants' level of seniority.....	38
Figure 4. What kind of publication do you submit? Chemistry/Academic staff.....	43
Figure 5. What kind of publication do you submit? Chemistry/PhD students.....	44
Figure 6. Via which different types of channels do you usually publish your items? Chemistry/ Academic staff.....	45
Figure 7. Via which different types of channels do you usually publish your items? Chemistry/ PhD students.....	45
Figure 8. Please indicate where you usually publish your items? Chemistry/Academic staff.....	46
Figure 9. Please indicate where you usually publish your items? Chemistry/PhD students.....	46
Figure 10. Please state your preference regarding assigning copyright to publishers/ Chemistry/ Academic staff.....	47
Figure 11. Please state your preference regarding assigning copyright to publishers/ Chemistry/ PhD students.....	47
Figure 12. Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)? / Chemistry/Academic staff.....	48
Figure 13. Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)? / Chemistry/PhD students.....	49
Figure 14. Factors that influence the author's choice of publication channel /Chemistry/Academic staff.....	50
Figure 15. Factors that influence the author's choice of publication channel /Chemistry/PhD students.....	51
Figure 16. Does your university have an Institutional Repository? Faculty of Chemistry PhD students & Academic staff.....	52
Figure 17. How well would you describe your awareness of open access? Chemistry/ PhD students & Academic staff.....	53
Figure 18. How many articles have you published in open access journals? / Chemistry/ PhD students & Academic staff.....	54
Figure 19. Which model of open access, Green or Gold, do you think is more suitable for researchers in your field? / Chemistry/ PhD students & Academic staff.....	55
Figure 20. Is the Article Processing Charge that is necessary in some open access journals expensive for you? / Chemistry/ PhD students & Academic staff.....	56
Figure 21. Have you heard about the open access mandates introduced by universities/ institutions worldwide? / Chemistry/ PhD students & Academic staff.....	57
Figure 22. What kind of publications do you submit? Economics/Academic Staff.....	59
Figure 23. What kind of publications do you submit? Economics/PhD students.....	60
Figure 24. Via which different types of channels do you usually publish your items? / Economics/Academic staff.....	60

Figure 25. Via which different types of channels do you usually publish your items? / Economics/PhD students.....	61
Figure 26. Where do you usually publish your items? / Economics/Academic staff.....	61
Figure 27. Where do you usually publish your items? / Economics/PhD students.....	62
Figure 28. Please state your preference regarding assigning copyright to publishers/ Economics/ Academic staff.....	63
Figure 29. Please state your preference regarding assigning copyright to publishers/Economics/ PhD student.....	63
Figure 30. Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)? / Economics/ Academic staff.....	64
Figure 31. Informal channels/ Economics/ Academic staff.....	64
Figure 32. Factors that influence the author's choice of publication channel/ Economics/Academic staff.....	65
Figure 33. Factors that influence the author's choice of publication channel/ Economics/PhD students.....	66
Figure 34. Does your university have an Institutional Repository? Faculty of Management and Economic.....	66
Figure 35. How well would you describe your awareness of open access? / Economics/ PhD students & Academic staff.....	68
Figure 36. Which model of open access, Green or Gold, do you think is more suitable for researchers in your field? / Economics/ PhD students & Academic staff.....	68
Figure 37. How many articles have you published in open access journals?/ Economics/ PhD students & Academic staff.....	70
Figure 38. Is the Article Processing Charge that is necessary in some open access journals expensive for you?/ Economics/ PhD students & Academic staff.....	70
Table 1. Interview participants.....	36

Chapter 1: Introduction

1.1 Background

In recent years there has been increasing interest in scholarly communication behaviour. Academic life has begun to transform along with the many technological inventions, scientific discoveries as well as social and political issues taking place around the world. These changes have occurred more or less quickly in different parts of the globe, but new initiatives are definitely being created under the umbrella term of “modern scholarly communication”. This term is shaped by issues that include a number of topics, from electronic publishing and digital archiving to informal communication. Scientists have begun to use partly new channels to share their knowledge. At the same time, academic institutions have gained more tools for evaluation and management of scientific work. Fostering scholars to use various publishing channels and to actively engage scientists in the research process has been the major role played by modern universities.

For centuries, scholars have communicated with people around them *via* the written word. However, when Gutenberg invented the printing press he made this process easier. The transition from print to electronic journals has become the key in the modern communication of research. Traditional, printed papers have significantly been replaced by web-based periodicals. This development has had an impact on the whole academic community, including libraries. In addition, most libraries are affected by enormous rising subscription prices that then have significant consequences for scholars. Recently, a lively discussion about scholarly communication was caused by events called the “Academic spring”. The Academic spring began with a blog post by an English mathematician, Timothy Gowers. In April 2012 he wrote a post on his blog to boycott Elsevier Publisher due to its very high journal subscription costs. This petition turned into the Cost of Knowledge project in which scholars committed to reject publishing in Elsevier’s journals. Questions have been raised about expensive pay walls and the dominance on the market of some academic publishers. This debate has caused a new discussion about the role of the publishing industry, new publication models, open access (OA), funding research projects or copyrights.

New technologies also shaped scholarly infrastructure. Many innovations have been created to support interactions between business and science. Knowledge has become the currency in the economic world, and many countries have established national programs to foster domestic research. One example is China and its 973 Program¹, which prepared a special government plan to support the development of research and technology. Emphasis placed on intensively developing scientific publications and patents as well as supporting innovations and investments is visible in almost every country around the world.

Changes in scholarly communication activities have led to focusing on new dissemination channels as well as openness in publishing results. Additionally, one of the issues that may yield new opportunities as well as restrictions for scholars is open access. This movement is developing and shaping research systems in many countries by breaking boundaries and engaging in discussion between different stakeholders, such as: researchers, publishers, funders or librarians. Open access is not only a publication model; it is a complex issue that covers, for example, copyrights, licensing policy, publishing or even philosophy.

A suitable infrastructure needs to be assured to effectively share knowledge and scholarly resources. Digital libraries (DL) and institutional repositories (IR) represent good

¹The National Basic Research Program called 973 Program

opportunities to preserve and make accessible research work in digital form that is generated by universities or other institutions. These services can include a wide range of materials, from journals, books and conference papers to datasets, photographs, pictures or maps. According to infoKit, published by the Joint Information Systems Committee (JISC), “Many institutional repositories initially focused on research outputs and some still limit their collections to this type of content. Others have started to widen the original remit to include learning and teaching materials” (Joint Information Systems Committee, 2010, p. 5). This kind of information infrastructure can be a part of the global network and can be available to the whole community.

The idea of this thesis arose as a result of the changes that have occurred in recent years in scholarly communication around the globe. In light of these metamorphoses it is interesting to observe the situation in each country. So far, however, there has been little discussion about Poland and its condition in that field. In this thesis I shall investigate the core parts of scholarly communication activities in Poland based on two disciplines: chemistry and economics. My personal experience as a librarian working at one of the technical universities in Poland has led me to attempt to conduct this research and to look at some factors which are being used to shape scholarly communication within the Polish academic community. The intended audience for the thesis is the whole community dealing with new forms of scholarly activities, open access and institutional repositories. Scholars, students, librarians or OA advocates from different countries may find it useful and interesting for comparing the situation to that of their own environments.

1.2 Aims and research questions

The main purpose of this study is therefore to investigate the characteristics of scholarly communication behaviour in two scientific fields at a Polish university. The fields that will be examined are chemistry and economics. These two disciplines were selected primarily because they have different research traditions that seem to be interesting to explore. Chemistry represents the STM sciences, and economics belongs to the social sciences². Particular focus is put on the possibilities, restrictions and potentiality associated with open access as part of scientific communication’s transition. Thus the attitudes towards and awareness of institutional repositories will also be investigated. Modern scholarly communication can include several activities and may vary between disciplines, universities or even countries. For this study the author would like to consider “scholarly communication” as including the following main areas:

- publishing and dissemination of articles and other forms of scientific work through formal and informal channels;
- sharing scientific achievements transmitted through the Internet and Web 2.0 technology, such as social networks;
- awareness of scholarly communication phenomena such as the open access movement;
- using an additional information infrastructure represented by institutional repositories.

In relation to those activities some issues arise as important to recognise and cover in the study. A number of detailed questions were identified as interesting for further investigation and led to building up more formal research questions; for instance, what aspects do scientists consider when it comes to selecting a publication channel? It seems

²This is discussed in Chapter 2

that some factors are more important than others when choosing a journal or other form of publishing. Do authors use other ways than journals or publishers to disseminate the content of publications, such as institutional repositories or personal websites? Nowadays, publishers often give authors permission to deposit preprints and postprints of their articles. Another interesting question is whether or not scholars use one or several channels for communicating with different stakeholders.

The research questions used in the thesis to address these issues are as follows:

- What characterises the publishing choices of researchers in the fields of chemistry and economics in a technical university in Poland?
- What supplementary forms (if any) for the dissemination of research output are used within the fields of chemistry and economics in the chosen technical university in Poland?
- What are the views and awareness of the various forms of open access publishing within those two fields?

Semi-structured interviews and an online survey were chosen in order to answer the questions above. Whitley's theory of the intellectual and social organisation of academic fields was chosen to explain the nature and challenges that take place in scholarly communication activities (Whitley, 2000). His theory appears to be relevant to the investigated topic, as well as the use of motives identified by Latour and Woolgar (Latour & Woolgar, 1979) that shapes publishing behaviour. Thus, this project provides an exciting opportunity to add a contribution to the field of scholarly communication studies in Poland.

1.3 Limitations to the study

Due to the practical constraints, this research is limited and was carried out only in one academic institution in northern Poland. There is no guarantee that the findings represent the entire academic community in Poland as related to these two disciplines, so it is only a prelude to further research that can be expanded to other universities. This research provides an important opportunity to understand the needs, expectations and behaviour that are already in use by scholars in a chosen institution. The literature reviews dedicated to general scholarly communication activities around the world partly allow us to understand if the situation at this given Polish university differs from or is similar to other countries.

This study does not reflect other important groups for scholarly communication, such as publishers, and may not apply to all environments involved in this process. This research study cannot be adapted to generalise the situation of scholarly communication behaviour in Poland, thus it is rather an attempt to show a certain perspective and the atmosphere around these important and pressing issues at one of the universities within these two disciplines. Of course it can be suggested that the situation is similar in other Polish universities, but these assumptions cannot be supported. I tried to present the results in such a way so that they could later be used for further research.

1.4 Thesis structure

The overall structure of this thesis takes the form of eight chapters, including this introductory chapter which contains the background of the study, the aims and research questions and the limitation of the study.

Chapter Two begins with a presentation of the main concepts and a description of the traditions of scholarly communication within chemistry and economics that have shaped this entire study. These are: scholarly communication, open access, institutional repositories and digital libraries, and chemistry and economics in terms of their traditions in scholarly communication.

The third chapter tries to map scholarly communication activities, including publishing, open access and institutional repositories in the Polish context.

The fourth chapter provides a comprehensive literature review in light of the research questions and main concepts of this study.

The fifth chapter presents the theoretical framework that was used during this study which is based on Whitley's theory of the intellectual and social organisation of academic fields and Latour and Woolgar's study regarding various motivations for publishing.

The sixth chapter begins by laying out the methods used during this study; these include semi-structured interviews and an online questionnaire.

The seventh chapter analyses and presents the results of the interviews and the online survey that were undertaken during this research.

The final chapter draws upon the entire thesis by tying up the theoretical and empirical strands in order to explain the main findings. This remaining part also includes a conclusion and recommendations for further research.

Chapter 2: Introducing key concepts

Every scientific discipline is characterised by its own culture, tradition and methodologies which are a part of scholarly communication practices. Some scientific branches are more focused on the practical side and others, especially in the humanities, on the conceptual side. These forms of practically and conceptually oriented research are varied and shaped by several factors. Very often disciplines which may seem similar represent extremely different positions with regards to contemporary forms of scholarly communication. This was highlighted by Borgman in one of her books:

The lack of perfect translatability between academic fields is both a strength and a weakness of information infrastructure. It is a strength in that fields can express themselves in the full richness of their own languages. It is a weakness in that rich internal structures can create rigid boundaries between fields. (Borgman, 2007, p. 231)

Furthermore, many scientific disciplines are divided into sub-disciplines that also might differ with regard to scholarly communication. It is also important to bear in mind another criterion, namely the geographical factor. Scholarly communication is very often determined not only by the specifics of the discipline or sub-discipline, but also depends on national scholarly traditions which may differ between countries.

In the pages that follow I will attempt to describe how the literature explains scholarly communication, open access, institutional repositories and digital libraries. Particular

focus is put on the disciplines of chemistry and economics and on the significant features that shape their scholarly activities.

2.1 Scholarly Communication

A variety of definitions of the term “scholarly communication” can be found in the literature, but there is no consensus about using only one explanation. The term is not easy to elucidate and may be perceived slightly differently across scientific disciplines. Traces of scholarly communication can already be observed in ancient cultures, however, its growth occurred during the twentieth and twenty-first centuries. This was mostly associated with new technological advances within scientific disciplines around the world. The changes experienced by scholarly communication over the past several years remain unprecedented and the most dramatic break that could be observed has been a departure from traditional print publishing to electronic journals and databases.

Scholarly communication may be broadly defined as:

The system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The system includes both formal means of communication, such as publication in peer-reviewed journals, and informal channels, such as electronic listservs. (Association of Research Libraries, 2014)

Another definition of scholarly communication is provided by Thorin and refers to:

(1) the process of conducting research, developing ideas and communicating informally with other scholars and scientists; (2) the process of preparing, shaping and communicating to a group of colleagues what will become formal research results; and (3) the ultimate formal product that is distributed to libraries and others in print or electronic format. (Thorin, 2006, p. 221)

From the above definitions it seems scholarly communication behaviour could be represented by formal and informal activities. Formal channels are very often reserved for publishing articles and monographs. They have a long tradition reaching back to the seventeenth century, when one of the first scientific journals was established by Henry Oldenburg. His *Philosophical Transactions* published only scientific output (Merton, 1973). In addition, Oldenburg was far ahead of his time and began the process known as peer review. Mabe stresses his role in scholarly publishing by highlighting:

The four functions of Oldenburg’s journal: registration, dissemination, peer review and archival record are so fundamental to the way scientists behave and how science is carried out that all subsequent journals, even those published electronically in the 21st century, have conformed to Oldenburg’s model. (Mabe, 2009, p. 5)

The peer-reviewed process is an integral part of formal channels and strongly influences the understanding of scholarly communication worldwide. It is a gate-keeping mechanism that allows researchers to decide whether the article should be published or not. Recently, there has been a lively discussion about the necessity and different approaches to this process. The most common types of review are: single-blind review and double-blind review. The former is when the identity of the reviewer is hidden, and in the latter both the author and the reviewer are unknown to each other. Clarke in her blog post highlights the advantages of peer-reviewed procedures as follows:

Researchers profit from the peer-review process in their roles as authors, where it improves their published papers. They also benefit as referees by getting a broad view of leading studies in their field and by enhancing the rigor of their discipline's published literature. (Clarke, 2010)

However, the traditional blind peer-reviewed system is under critique and has several drawbacks as well. Lahiri draws attention to the major problem with finding reviewers that have multidisciplinary experience due to the changes that have occurred in modern research (Lahiri, 2006). Wanted experts should possess thorough knowledge across scientific subfields as well as technical and information skills.

2.2 Open access

Definitions

Open access is a term that generally elucidates a relatively new publication and dissemination model for scholarly output. There are several approaches to OA and no single definition has been agreed upon (Suber, 2012a). Nevertheless, there are three major and recognisable definitions derived from the following documents: the Budapest Open Archives Initiative, the Bethesda Statement on Open Access Publishing and the Berlin Declaration.

The Budapest Open Access Initiative (BOAI) provided the first public explanation of open access that states:

By "open access" to [peer-reviewed research literature], we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited. (Budapest Open Access Initiative, 2002)

The second definition was yielded by the Bethesda Statement on Open Access Publishing and was agreed in 2003 (Bethesda Statement on Open Access Publishing, 2003). A few months later the third statement, called "The Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities", was proposed in Berlin (Max Planck Society, 2003). These three statements have been collectively referred to as 'BBB' (Suber, 2004). They are quite distinguishable but all agree on the crucial factors: that open access has to be free of charge and provided via an Internet connection. Difficulties arise, however, when additional BBB dimensions are applied to understand the key concept of open access. Most difficult to interpret are, especially, permission barriers. However, these are core elements of copyright law and licensing. According to Suber:

All three tributaries of the mainstream BBB definition agree that OA removes both price and permission barriers. Free online access isn't enough. "Fair use" ("fair dealing" in the UK) isn't enough. Note that the three component statements of the BBB definition do not agree on exactly which permission barriers must be removed. There's room for variety here. BBB requires removing barriers to copying and redistribution. It doesn't require removing barriers to commercial re-

use; authors can go either way on this. Two of the three BBB component definitions require removing barriers to derivative works. (Suber, 2004)

To be more specific about open access, further distinctions were noted by Suber, e.g. gratis and libre in terms of permission and financial barriers:

Gratis OA is free of charge but not more free than that. Users must still seek permission to exceed fair use. Gratis OA removes price barriers but not permission barriers. Libre OA is free of charge and also free of some copyright and licensing restrictions. Users have permission to exceed fair use, at least in certain ways...Libre OA removes price barriers and at least some permission barriers. (Suber, 2012a, p. 66)

In the United States the term ‘fair use’ “is a doctrine that limits the exclusive rights granted by copyright law and provides that in some circumstances, people should not be liable for actions otherwise infringing copyrights” (Pekala, 2013, p. 11) and is rooted in the history of the United States. In some countries fair use exists as well, but the meaning and interpretation may be divergent. In contrast, fair use in Poland is distinguished from the private and public domain. It is used only for works that have already been published. According to Pekala, “Polish public fair use follows the general standards known and accepted by most countries and world international copyright organisations” (Pekala, 2013, p. 6). Fair use in the private application means: “use of single copy of works by circle of persons remaining in a personal relationship (consanguinity, affinity, social relationship)” (Krzemińska, 2012, p. 13).

A more restrictive view of describing open access was proposed by Professor Tom Wilson. He distinguishes true OA as “platinum access” that is explained as “the voluntary, collaborative, no-charge model that is usually overlooked in the debates on OA” (Wilson, 2007). In this model, journals should be in electronic format, accessible online, open access and set-up on open source software, mainly hosted by universities and operated by volunteers. The peer review and editing process should also be guaranteed by the hosting institution. In one of his online posts Wilson states that universities should push and support the platinum method, which will significantly reduce the cost of running scientific journals (Wilson, 2010). This definition has been controversial in the scientific world and under critique by some open access advocates (Harnad, 2007). The quality of a journal based on volunteerism is one of the most frequent concerns for Platinum opponents. Wilson also does not object to the principles of gratis and libre open access.

While a variety of approaches to the open access definition have been suggested, throughout this thesis the following explanation will be used to understand OA:

Open-access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions. OA removes price barriers (subscriptions, licensing fees, pay-per-view fees) and permission barriers (most copyright and licensing restrictions) (Suber, 2012b).

Green and Gold

There are two major models of open access scholarly publishing – the Green Road and Gold Road – interchangeably called Green OA and Gold OA. These distinctions are based

mainly on the question as to who provides access to the publications: the author (Green OA) or the publisher (Gold OA) (Harnad, 2003).

Green OA is sometimes equated with “self-archiving”. Self-archiving means that authors make their publication available in the appropriate digital form on the Internet. Oppenheim defines Green OA as follows: “Green OA refers to so-called self-archiving, whereby an author places a copy of the scholarly output in one or more OA repositories (these may be an institutional repository (IR), a subject-based repository, or a combination of them)” (Oppenheim, 2008, p. 579). In addition, Green OA may be expanded to self-archiving scholarly papers on the author’s personal website. However, which dissemination channels are allowed is usually grounded in the publisher’s policy and can be checked, for example, in the SHERPA/RoMEO database. This database “enables easy access to publishers' policies in this area and uses a colour-coding scheme to classify publishers according to their self-archiving status (Jenkins, Proberts, Oppenheim, & Hubbard, 2007).

In Green OA the materials are usually the author’s manuscripts in the form of a preprint or postprint publication. In this thesis the term ‘preprint’ refers to a version of the paper before the peer-review process or to a paper that has gone through a peer review and has been accepted but has not yet been published. ‘Postprint’ describes an article that has already been published and could be deposited after the embargo period (if there is one)³. Preprint already has a strong position in some disciplinary fields such as physics or economics, where it has a “working paper” form. Together, preprints and postprints are called “e-prints”.

The Gold Road is referring primarily to publishing in open access peer-reviewed journals. Access is always free of charge to the reader, but the author (or funding body) usually has to pay for publication. Suber summarises Gold OA as being delivered by journals, whereas Green OA is delivered by repositories (Suber, 2012a). Some researchers argue that the “author-pay” model cannot be a synonym of Gold OA. Commenting on that issue, Morrison notes: “Open access journals rely on a wide variety of business models, ranging from subsidies from their society publishers, libraries, universities or government to advertising, volunteer labour and in-kind support” (Morrison, 2009, p. 119).

Authors have a choice between OA and many subscription-based journals that support the option of publishing an article in an open access format. These types of journals, where the publisher allows the authors to pay for the publication, are called “hybrid journals”. The biggest players on the market, such as Elsevier or Springer, have started the launch of an OA model in parallel with the traditional subscription-based one. However, in order to assess the impact of the hybrid model, Björk concludes that:

The hybrid experiment, at least in the case of the major publishers and with the current price level, has failed as a way of significantly adding to the volumes of OA articles, and that hybrid OA will remain a very marginal phenomenon in the scholarly publishing landscape (Björk, 2012, p. 1503).

Among the mainstream scholarly publishers there are several open access publishers such as Hindawi or PLOS that follow the author-pay model, but many open access journals do not charge an upfront fee at all. If authors are obligated to pay the Article Processing Charge (APC), it has to be stressed that these are different between journals and publishers. It has been demonstrated by Solomon & Björk that the highest prices are charged by biomedicine journals with a top-level impact factor (Solomon & Björk, 2012).

³ The embargo period varies between publishers. It can be, for example, 6, 12 or 18 months.

Licenses and open access policies

In their recent study, Björk, Laakso and Welling stressed that the major difference between Green and Gold models is that with Gold OA the entire document is available at a single location (Björk, Laakso, & Welling, 2014). Usually this is a journal's website. In Green OA many copies are uploaded at several locations. This could be a personal website, an institutional repository or a digital archive. They also highlight that:

Another difference between gold and green OA is that although readers of gold OA articles usually have well-defined reuse and data-mining rights (so-called libre OA, often defined using Creative Commons licenses), readers of green OA copies can usually only read the manuscripts (so-called gratis OA). (Björk et al., 2014, p. 238)

Traditionally, the owner of copyrights grants licences to the publisher or to specific entities. In the open access publishing context, the Creative Commons (CC) licences are the most commonly used ones in scholarly papers (they are not available for software) (Morgan, Campbell, & Teelen, 2012). They are also applied by for-profit companies such as Elsevier or the Nature Publishing Groups; however, the publishers impose some restrictions on the authors or offer a choice between licences.

There are several CC licenses that determine different levels of rights with regards to redistribution, re-use, tweaking or building upon others' work, sometimes even commercially, as long as the original author is credited. They contain major elements that have to be considered before using any of the licences: attribution (BY), share-alike (SA), non-commercial (NC), and no derivative works (ND). A number of publishers and associations, such as Elsevier or Sage, have already adopted the CC-BY licence for OA articles. This licence allows for full reuse of the content (article, image, etc.). According to Morrison:

Some open access advocates consider the CC attribution only, or CC-BY license, to be equivalent to the Budapest definition of open access. That is, the work must be appropriately cited and attributed, but otherwise all other uses, including commercial uses, are allowed. (Morrison, 2012b, p. 52)

However, there has been an emerging discussion about CC licences as there are pros and cons in using any of them. They are part of the copyright issues that are gaining importance and are essentials for intellectual property. A focus on the legal issues could produce interesting findings that would account for scholarly communication studies.

The open access landscape is determined, moreover, by mandates and policies. These can be divided into voluntary and mandatory ones (Schmidt & Kuchma, 2012). The voluntary mandates ask scholars to make their scientific papers open access. Scholars can decide on their own if they are willing to do this. The mandatory mandates are implemented by an institution and apply to the whole community associated with the parent unit.

OA mandates and policies are generally classified into types according to the organisation that established them, for example, the research funder's policies (e.g. European Commission, Wellcome Trust), publisher's policies (they can be checked in the SHERPA/RoMEO database), a university's policies (e.g. California Institute of Technology, Duke University) or other institutions (e.g. Microsoft Research). All types

of mandates are registered in the Registry of Open Access Repositories Mandatory Archiving Policies (ROARMAP). As of March 2014, ROARMAP has listed all together 466 policies.

Controversies

Recently, some controversies arose around open access journals. They are considered as scientifically flawed. According to Jeffrey Beall, who created a list of “predatory” publishers and bogus journals:

Conventional scholarly publishers have had an important role in validating research, yet too often advocates of open access seem to overlook the importance of validation in online publishing. They promote access at the expense of quality: a shortcoming that tacitly condones the publication of unworthy scientific research. (Beall, 2012, p. 489)

This view has also been confirmed by a publishing hoax where hundreds of OA journals accepted a fake scientific paper by Bohannon (2013). He revealed that most publishers, even those such as Sage or Wolters Kluwer, accepted his paper without questioning it. Of the 106 journals that conducted the peer-review process, 70% agreed to publish the article. He claimed that many periodicals have a problem with the peer-review process and are focused on gaining profits from publication fees.

One of the most significant current discussions in open access is the choice between the Gold and Green road. There are many reports and recommendations regarding these two models. Notable examples are the British Report of the Working Group on Expanding Access to Published Research Findings (the Finch Report) that supports the Gold OA in the UK or the EU Framework Programme for Research and Innovation: Horizon 2020 that stressed: “both the ‘Green’ and ‘Gold’ models are considered valid approaches to achieve open access” (European Commission, 2012, p. 9).

2.3 Chemistry

New technologies and communication practices are fast becoming a key instrument in modern chemistry. This discipline is heterogeneous and divided into several sub-disciplines. At present, it is organised into 80 sections according to Chemical Abstract Services (American Chemical Society, 2014). This affects the choice of journals or even publication channel by scholars; for example, different periodicals define the trend for biochemistry and for inorganic chemistry.

In 1971, in their paper titled “Changing Patterns in the International Communication of Chemical Research and Technology”, Baker et al. indicated how important and specific chemistry is:

Despite the limitations which any single discipline must have in providing an over-all view of science, chemistry, because of its fundamental position in the science hierarchy, probably offers the broadest available index to the growth of science and to the trends in the communication of science information. (Baker, Tate, & Rowlett, 1971, p. 90)

They drew attention to and envisaged several trends that became important for chemical research, especially the role of technology and computers as well as the strong position of chemical publishers such as of the American Chemical Society (ACS) or the Royal Society of Chemistry (RSC).

Chemistry is predominantly a bench science and most research is conducted in laboratories by teams of researchers. Collaboration is one of the discipline's features because major projects are very rarely performed by individuals. According to Long and Schonfeld, group-based work is a standard for chemistry and very often collaboration involves working with laboratories from other countries, which has a significant influence on the different forms of communication (Long & Schonfeld, 2013).

Traditionally, chemists are representatives of a discipline where the most important channel for dissemination of research output is a scientific article. Chemists primarily publish a few short papers per year (Becher, 1994). Recently, studies highlighted this trend:

Chemists publish frequently and they are strongly committed to the traditional structure of journal articles. Like other scientists, they use publication to push their ideas out into their research community, but they also use articles as a means of entering their data into the scholarly record for future researchers. (Long & Schonfeld, 2013, p. 31)

It has been demonstrated that one of the main reasons for chemists to publish papers is the conviction that archiving is important. In addition, the peer-review process and editor quality that are offered and maintained by journals are also highly valued (Long & Schonfeld, 2013).

The chemical scientific community does not have a culture of publishing their preprints in subject or institutional repositories as other disciplines do, for example, physics. Garson stressed that: "preprint servers in chemistry have not been well accepted, possibly because of greater commercial activities in chemistry" (Garson, 2004, p. 143). At the beginning of the 2000s, Elsevier tried to create a subject-based repository – Chemistry Preprint Server – but this initiative failed shortly after. At the end of 2013 the Royal Society of Chemistry set up a beta version of the Chemical Sciences Article Repository that hosts open access papers (Royal Society of Chemistry, 2014). The primary source of this repository is the Article of Record. This is a final version of the article and can be freely available after the embargo period via a link to the publisher's site. RSC highlighted that this repository does not hold preprints like arXiv, and all papers have to already have been published or accepted for publication. This is a relatively new project and it is difficult to predict if it will be successful.

Chemists are considered to be researchers who publish their output in well-regarded journals from the top of the Journals Citations Report database (JCR)⁴ with a high Impact Factor (JIF)⁵ in their subject categories. The most desirable titles are published by commercial publishers such as: Nature Publishing Group, RSC, ACS or Elsevier.

⁴ The Journal Citations Report is an annual publication and database from Thomson Reuters that provides bibliographic information about indexed journals as well as citations information.

⁵ The Journal Impact Factor is an indicator for journal evaluation from the JCR database. The definition provided by Thomson Reuters states as follows: "The annual *JCR* impact factor is a ratio between citations and recent citable items published. Thus, the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years".

It is becoming increasingly difficult to ignore the fact that chemistry is rather poorly represented in the open access initiatives as compared to other sciences. This view is supported by Long and Schonfeld, who write that: “Chemists do not have a strong commitment to open access publication or to sharing most of their data, in part because of the competitiveness of the field and in part because chemists rarely have trouble getting access to the materials that they need” (Long & Schonfeld, 2013, p. 31). In the same vein, Trager pointed out in her analysis that:

Many chemists, on the other hand, are not eager to share their data before publication because their experiments could be repeated quickly and easily in another lab. In addition, unlike particle physics, significant areas of chemistry lend themselves to patentability and commercial exploitation. (Trager, 2007)

The evidence presented thus far supports the idea that chemists are rather sceptical and conservative in publishing their papers in OA journals. Moreover, they do not have as much choice in finding high quality resources as other disciplines. One of the databases that indexes OA journals from around the world is the Directory of Open Access Journals (DOAJ). The total number of chemical journals, including chemical engineering, analytical chemistry, organic and inorganic chemistry, is 187⁶. This seems to be a relatively low number according to the fact that chemists publish more articles per year than researchers from other disciplines (Long & Schonfeld, 2013). The main Open access publishers of chemistry journals are Chemistry Central and Hindawi. Researchers from sub-disciplines related to chemistry across medicine and biology can publish in the range of PLOS or BioMed Central titles, which are very well recognised and highly ranked. In addition, most commercial publishers and publishing societies, such as RSC, ACS, Elsevier or Springer, support OA and offer the Gold and Green⁷ options for their authors. Regarding information seeking, the main resources are Chemical Abstracts, Reaxys and Web of Science databases. They are locked and available only under huge subscriptions, but are still primary tools for chemists around the globe. On the other hand, a number of open databases already exist, for example ChemSpider. This database contains chemical structures from thousands of available resources and is created by a community of students and researchers and is maintained by RSC. Another example is the PubChem database that was established in 2004. Against PubChem, which is held by the National Center for Biotechnology Information, the American Chemical Society unleashed a huge negative smear campaign (Biello, 2007). PubChem provides access to compound structures and descriptive datasets of chemical molecules and was accused of competing with the Chemical Abstracts Service published by ACS. ACS has been very much criticised, for example for financial lobbying of the U.S. Congress and raising a battle against the open access movement (University of California, 2005).

Chemists are actively involved in a number of new initiatives in scholarly communication, so according to Velden and Lagoze (Velden & Lagoze, 2009b) it is quite difficult to explain why Open access in chemistry has developed so slowly. There are many well-known examples of positive initiatives, for instance, the standardised mark-up language CML or the Open Notebook Science project. The Study of Open Access Publishing (SOAP) that was undertaken in 2010 revealed that one of the reasons for not publishing in chemistry OA journals is funding and the journal’s quality (Dallmeier-Tiessen et al., 2010). Regarding the question: “Would OA journals be beneficial for your field?”, the Chemistry community had the lowest rate of respondents who answered “yes”

⁶ Results retrieved on 4 May 2014.

⁷ Green and Gold OA are explained in Chapter 2.2

– 77% and took the last, 19th place. A total of 9.1 percent of respondents in chemistry answered negatively, 12.1 percent did not have an opinion and 1.9 percent answered “I do not care”. However, with the project running from March 2009 to February 2011, caution must be applied, as the findings might not be transferable to the whole chemistry community and the results might already have changed.

Informal communication channels that serve the community of chemists are not very popular. To some extent, blogs, wikis, RSS feeds and social networks are used, but they cannot be treated as mainstream (Velden & Lagoze, 2009b). These channels are mainly used for dissemination of ideas and for discussions with other scholars. It is also worth noting that informal forms of communication are significantly more frequently used by younger chemist researchers, so there is a strong possibility that these kinds of tools will be more common in the future. Nevertheless, Long & Schonfeld point out that: “Chemists are fairly ‘traditional’ when it comes to scholarly communication; they have been slow to embrace new forms of sharing information about their research results” (Long & Schonfeld, 2013, p. 33).

2.4 Economics

Economics belongs to disciplines that are generally considered as a homogeneous field with empirical as well as theoretical areas of research. Economics may be broadly defined as a social science that is concerned with how society manages its scarce resources. As noted by Dawson and Rascoff: “[in] theoretical economics, working papers and journal articles are sufficient because economists work with abstract proofs. In applied economics, economists run analyses on datasets, then draw conclusions based on the data to write papers” (Dawson & Rascoff, 2006, p. 11). There are different subfields that are connected with other fields, such as psychology, which is represented by behavioural economics or mathematics applied in econometrics. Despite this fact, economics is still classified as “a high-paradigm field in which scholars generally share a core base of knowledge and epistemological practices” (Harley, Krzys Acord, Earl-Novell, Lawrence, & King, 2010, p. 316).

Economics differs from other disciplines in a number of significant ways that have characterised scholarly communication practices. Traditionally, economists publish their research output in scientific journals. This has not changed over the years. The most important journals are indexed by JCR in its Social Science Edition. It is a very characteristic feature that economists have to wait a very long time to publish their articles in journals with an Impact Factor. The lag time between acceptance and publication is unusually long and takes even up to two years (Dawson & Rascoff, 2006). Azar points out that: “There were striking differences between disciplines with business/economics having around twice the total delay sub-mission to publication compared to chemistry” (Azar, 2004, p. 902). In addition, Azar analyses a previous study by Ellison (2002) on the review times and notes that:

The main reason for this seems to be the increasing number of iterative rounds in the review process. He also found that the average review times vary between different sub-specialties of economics, even for articles published in the same journals with broader scopes, and suggest that the expectations for the type and length of the reviews have been socially shaped within narrow scholarly communities. (Azar, 2004, p. 916)

When the paper is rejected in a top-flight journal, scholars submit it to a less important one. It is somewhat surprising that the publication process is even longer and takes

sometimes over three years. However, according to Dawson & Rascoff: “In economics, publishing in peer-reviewed journals is the gold standard of scholarly achievement, and it is the primary tool tenure committees and provosts use to make decisions about academics promotion and pay” (Dawson & Rascoff, 2006, p. 6).

The most influential economics journals are considered to be the American Economic Review, the Journal of Economic Literature or those from subfields such as the Academy of Management Review or Econometrics, to name a few. Significant is the fact that most of these journals are run by societies. Researchers from these subfields can also publish their papers in more general scientific periodicals. A distinguishing attribute of economics scholarly communication practices is paying for reviews to speed up the time for publishing articles in peer-reviewed journals. This is one of the solutions for the unusually long lag times (Harley et al., 2010), but this issue still remains unresolved. In addition, publishing a monograph in economics, especially in the theoretical sub-disciplines, is also an important component of the scholarly communication process.

Open access journals are still not very popular in the field and are met with mixed responses (Harley et al., 2010). The findings observed in the Harley et al. study mirror those of previous studies by Dawson & Rascoff that have examined publishing in open access journals. According to Mccullough: “the market for publishing economics articles has bifurcated” (Mccullough, 2009) between traditional journals, OA journals and archives. At present, the Directory of Open Access Journals registers 463 journals⁸ in the “Economics” category.

A distinctive role in economics, especially in comparison to other fields, is played by working papers. In some ways they are similar to preprints, for example, they are not peer-reviewed publications. Working papers usually share ideas about a topic or present the objectives of a given project. Very often they are issued at home universities or by domestic associations. As Harley et al. highlight: “There is a robust working paper culture, which functions as a form of early research dissemination and informal peer review” (Harley et al., 2010, p. 317). In addition, working papers are important because of the extraordinarily lengthy lag time for final publication in economics journals.

For dissemination of their working papers as well as other scientific content, researchers can choose from several services, such as RePEc (Research Papers in Economics) or the Social Science Research Network (SSRN). The RePEc is a decentralised bibliographic database that provides access to over “1.4 million research pieces from 1,700 journals and 3,700 working paper series” (“Research Papers in Economics”, 2013). The database does not archive whole documents but holds links to open access papers. It is also a well-known service for commercial publishers to store their bibliographic data. Adding materials is possible for institutional archives or by the Munich Personal RePEc Archive if the university does not have a digital repository. Content is available via RePEc services such as IDEAS and EconPapers, where many papers are downloadable in a full-text format.

The second service, not only for economists, is the Social Science Research Network. This is a network that was established in 1994 by two economists, Michael Jensen and Wayne Marr. The SSRN is considered to be one of the most important tools serving the social science community around the world. It is built up of several networks where each network is a repository for working papers and other scientific documents. The main content includes abstracts as well as full-text publications via the eLibrary service. The SSRN cooperates with many publishers but does not provide formal peer-review.

⁸ Results retrieved on 4 May 2014

Informal communication channels for dissemination of scientific results are used by many economists. These channels include: discussion lists, emails, blogs, personal websites and social networks. It has to be emphasised that these methods play a supportive role in the knowledge sharing process. Harley et al. point out that: “Generally, however, these activities are considered to be outside the realm of standard scholarship and discouraged for pre-tenure scholars” (Harley et al., 2010, p. 317).

Applied economics depends on datasets that are crucial to conduct empirical research. This issue has grown in importance in the light of recent technology development. Dawson & Rascoff stress in their report:

Economists find datasets on the internet, solicit data from corporations or governmental agencies, purchase data, or collect data through field work. While in theory a research question is defined before data are collected, the reality is that the available dataset and the research question often influence each other, especially for researchers at earlier stages in their careers. (Dawson & Rascoff, 2006, p. 11)

One of the initiatives that supports the usefulness of data is the Open Economics project run by the Open Knowledge Foundation in collaboration with Cambridge University (Open Knowledge Foundation, 2013). The main goal of this venture is the dissemination and popularisation of good practices with data openly available for replication, analysis and preservation.

2.5 Digital libraries and institutional repositories

Scholarly communication has matured significantly by using a proper infrastructure for sharing and dissemination of scientific knowledge. With the transition from a traditional paper environment to an online and digital one, the demand for adequate technology has grown. The scientific infrastructure has been upgraded with new actors, such as digital libraries and institutional repositories.

The term “digital library” already evolved during the last two decades and could have different meanings for various users. The first definitions are closely related to information technology and came up in the early 1990s. In 1992 one of the pioneers of digital library research, Christine Borgman, used the term “electronic library”. She stated that it is “(1) a service; (2) an architecture; (3) a set of information resources, databases of text, numbers, graphics, sound, video, etc., and (4) a set of tools and capabilities to locate, retrieve and utilize the information resources available” (Borgman, 1999, p. 41). Most recently, *The Digital Library Manifesto* (DELOS) stated that: “Digital Library is a tool at the centre of intellectual activity having no logical, conceptual, physical, temporal, or personal borders or barriers to information” (Candela et al., 2007). In general, a digital library is a collection of materials in digital form that could be generated through an institution or organisation or from external sources. Digital libraries might collect and preserve information using different types of data. Collection includes several or just one type of media and could be determined by one specific subject or several areas of study. Digital libraries provide several or just one particular service, for example, access to the collection, user trainings, workshops, exhibitions, or learning facilitation. A digital library could be created by different institutions or individuals such as universities, museums, galleries, scientific institutions, government agencies, etc.

An institutional repository may be viewed as one of the types of digital libraries that “provide access to every intellectual output of the academics, researchers and students of an institution. It may contain research publications, research data, teaching materials as well as various other outcomes of the scholarly activities – for example, artistic works, exhibitions etc. – of an institution’s member community” (Chowdhury & Foo, 2012, p. 146). In addition, institutional repositories may contain a collection of various materials that an academic institution offers to its employees to support their scientific communication process, such as different forms of training and courses about spreading and popularising scientific data. There are also subject repositories that could be managed by one or more organisations and dedicated to the whole scientific community. From the technological point of view, an institutional repository is based primarily on software technology, such as DSpace or Fedora, and standards like open archives metadata. Metadata may be harvested from institutional repositories by using the OAI Protocol for Metadata Harvesting (OAI-PMH), which allows repositories to share describing data around the scholarly world by “providing a robust way of automating the exchange of information used to discover and describe open access material” (Morrison, 2009, p. 114). Institutional repositories are primarily tools for Green open access.

Some users can come across some difficulties in distinguishing digital libraries from institutional repositories. One of the main differences, except for software, could be the feature that institutional repositories require self-archiving of the author’s content. Users can upload their documents by themselves, or someone, for example a librarian, can deposit scientific papers. The output belongs to the entire community and is free and open access. Digital libraries, even if they are managed by one institution, could include materials from different stakeholders and access to them may be limited.

Chapter 3: Scholarly publishing and open access in Poland

The Polish higher education system that is based on the Bologna Process is developing very dynamically. Poland tries to follow international trends to construct a modern knowledge society with advanced information and technological skills. As well as the technological changes, an ideological dimension has already reshaped the philosophy of the scientific world.

One of the essential features of scholarly communication in Poland is evaluation of scientific units such as research institutions and universities. In 2010 the Committee for Evaluation of Scientific Units was set up by the Ministry of Science and Higher Education. In accordance with their main goals:

The main task of the Committee is to draw out the project of parameters and criteria for comprehensive evaluation of scientific units and to perform such evaluation not less frequently than every four years. The Committee indicates to the Minister the leading scientific units taking into account the quality of their scientific activity in order to determine the level of financial support granted to fund their research potential. (Ministry of Science and Higher Education, 2014)

All of the scientific units are awarded separate scores in four main categories: scientific achievements, scientific potential, tangible results of scientific activity and other scientific activities. It includes, among others, a score for publication in scientific journals. Institutions are then classified in four categories: A+, A, B and C, where A+ means “a leading level”, A – “very good level”, B – “satisfactory level” and C – “unsatisfactory level”.

Since the late 1990s the Ministry of Science and Higher Education has published a special list that ranks and weights scientific journals. Initially, the list was based only on periodicals with an Impact Factor found in the JCR by Thomson Reuters. The model was changed in early 2000 when more titles were reported to the Ministry. The list of journals has become a kind of indicator for researchers as to where to publish scientific articles. Finally, the Ministry of Science and Higher Education has established a main list that includes three parts: A, B and C. The list, (with some exceptions) is published every year and introduces publication points awarded to scientific journals. In addition, the Ministry provides a list of reference databases in which journals should be registered (minimum two databases for STM journals and one for social and humanities).

List “A” includes all scientific journals that already have an Impact Factor. Publishing in these journals is highly ranked. In accordance with the journal’s Impact Factors, points could be changed every year; for example, from 2011 points from the “A” list oscillated between 15 and 50 per publication. The highest points can be received by an author for articles from the first quartile, such as in *Nature* and the *Journal of Economic Literature* (both 50 points in 2013). Other examples from 2013 are *Library & Information Science Research* (30 points) or *Library Trends* (15 points).

List “B” contains mainly Polish scientific journals that have passed the evaluation process based on surveys that need to be sent to the Ministry every year. For publication in those journals authors can obtain a maximum of 10 points. It is possible for international journals to apply for this list, but the whole process is in Polish and many international publishers do not know about this possibility.

List “C” includes journals that are indexed in the *European Reference Index for the Humanities* (ERIH) database. Papers published in these periodicals receive successively 10, 12 or 14 points.

Other publication channels, such as books, chapters or art works, are also awarded points. It has to be stressed that scientific disciplines are divided into a few scientific areas (for example social sciences or medicine and life science), and research is evaluated according to them. Publication points are awarded to institutions and could have an impact on the amount of the subsidy that is granted by the Ministry. This element has for some time dominated in the debate on the condition of research in Poland.

Recently, researchers have shown increasing interest in checking and counting the Ministry’s points. Initially, collecting of points was intended only for an evaluation of scientific units. However, this process has gradually begun to play a significant role in grant funding and (not officially) in the habilitation process.

In Poland, science degrees are awarded at academic institutions that have special permissions. There are two levels: “doktor” – granted by a fully qualified faculty board, and “doktor habilitowany” – recommended by a fully qualified faculty board and granted by the Central Commission for Academic Titles and Degrees. From those degrees a “professor” has to be distinguished, because this title is awarded by the President of the Republic of Poland.

The habilitation is a core element in the Polish higher education system. This process has also changed recently and new obligatory components have been introduced. At the moment, all candidates have to provide a number of citations and the Hirsch Index according to the Web of Science database as well as an Impact Factor for articles from journals indexed in JCR. In addition, scholars need to summarise all Impact Factors and present the total sum. This criterion is very controversial and raises many concerns, especially in the humanities and social sciences, where the main distribution channels are still Polish scholarly journals. Therefore, the Ministry of Science and Higher Education is planning to create a Polish Impact Factor for journals published in Poland, but this is still in the developing phase.

The changes to scholarly communication in Poland over the past decade remain significant. Several factors have influenced this transition and one of them is open access. This issue has emerged especially in the library and information science environment, but as a phenomenon and philosophy it is increasingly becoming an integral part of the academic and scientific life. Even though the movement itself is already more than 20 years old, in Poland still many researchers are unaware of it.

Publishing scientific journals has quite a long tradition in Poland which dates back to the eighteenth century. However, most Polish periodicals are published by scientific units rather than by commercial publishers (Coalition for Open Education, 2013). According to the ARIANTA database (Polish Scientific and Professional Electronic Journals), there are 3892⁹ scholarly and professional journals in printed and online format. Bednarek-Michalak highlights that about 2200 of them are scientific peer reviewed (Poynder, 2013). In the late 1990s the first Polish open access journals were established, for example, the journal for librarianship called “Biuletyn Ebib”.

Due to the fact that in Poland there is a very low number of commercial publishers, it is worth mentioning that most of the Polish scientific journals are issued by universities, scientific institutions or the Polish Academy of Science. Most of them could be recognized as gratis open access journals where content is free of charge, available via the Internet and readers can use it within ‘fair use’ (see Chapter 2.2). A business model where authors are charged publication fees is not popular in Poland (Szprot, 2012). Thus, many journals provide free access to the articles on their websites without being aware that they are part of the open access movement (Szprot, 2012). The Directory of Open Access Journals (Fig. 1) indexed 169 Polish journals (September 2013) and twelve¹⁰ Polish publishers are registered in the SHERPA/RoMEO database.

In 2002 some Polish scholars and librarians privately signed the Budapest Open Access Initiative. One year later the Interdisciplinary Centre for Mathematical and Computational Modelling signed the Berlin Declaration on Open Access to Scientific Knowledge.

⁹ Accessed 3 July 2014

¹⁰ Accessed 3 July 2014



Fig. 1. Total number of Polish journals registered in the DOAJ (accessed: September 2013)

In 2004, Poland along with another 34 countries signed the OECD Declaration, i.e. the Declaration on Access to Research Data from Public Funding (subsequently extended in the form of OECD Principles and Guidelines for Access to Research Data from Public Funding). This document has recommended, for example, the principle of openness, transparency and interoperability in data which is publicly funded. The document also stressed that: “Ministers recognised that fostering broader, open access to and wide use of research data will enhance the quality and productivity of science systems worldwide” (OECD, 2004).

A number of initiatives supporting the idea of open access have already been founded. The most notable examples are: the Coalition for Open Education and Centrum Cyfrowe: Projekt Polska (CCPP). The Coalition was established in 2008 and is a group of non-governmental organisations from research, cultural and education areas that aim to promote free access to different types of knowledge. One of the leading fields for the coalition are activities related to Open Educational Resources and open access. It is also actively involved in a number of public consultations and takes its position on issues relating, for example, to the penal provisions in copyright law, free textbooks for primary schools or provides comments on the Act on the Re-use of Public Information.

All of CCPP’s projects are connected with three main areas: Open Government, Open NGO (Non-Governmental Organisations) and Open Culture. Poland has also participated in the DRIVER and Communia projects which are dedicated to the public domain in the digital environment, and in 2005 the Creative Commons formed its Polish branch.

Another important example is Citizens for Science, informal social movements that include researchers and other people related to the academic society. They represent different groups and academic fields that want to be involved in the discussion on Polish science and on all changes that have to be made to improve its situation in the future.

There is no open access policy at the moment in relation to the national solution to make public research freely open. In addition, collective initiatives organised by Polish universities or foundations have not been put in place (Poynder, 2013). According to the Registry of Open Access Repositories Mandatory Archiving Policies (ROARMAP), there are three policies that have been registered by the following Polish institutions: Adam Mickiewicz University, Institute of Biochemistry and Biophysics (Polish Academy of Sciences) and Wroclaw University of Technology: Electrical Engineering¹¹.

¹¹Accessed 6 July 2014

At the end of 2012 a new bill titled the “Open Public Resources Act” was introduced in Poland. The act would provide public access to publicly funded research and projects. This act would apply to all publicly funded scientific and cultural materials, such as research publications, movie productions, music, etc. Although the bill was not passed, the whole country is slowly beginning to organise the first conferences, seminars and workshops devoted to open science, open access and Open Educational Resources. These were organised primarily by research libraries that took over the model from western countries and have actively engaged in the campaign for openness. In July 2013 the Bureau of the Conference of Rectors of Polish Academic Schools and the Polish Academy of Sciences adopted a position on the principles of open access to scientific publications.

Digital libraries and repositories have started to play a vital role in Poland. The first digital libraries were created in the late 1990s. In 1999 the Poznan Supercomputing and Networking Centre started working on the Digital Library of Wielkopolska – a joint initiative of Poznan academic institutions – and since 2006 the number of digital initiatives has gradually increased. According to OpenDOAR, which registers all digital and institutional repositories, there are 85 repositories in Poland. It has to be stressed that most of them are digital libraries founded by regional or academic institutions. These are based on Polish software, dLibra, which is created for any digital objects; hence they also contain pictures, music or digitized antiquarian books.

In 2007 the first open subject repository was created; this was the ECNIS (Environmental Cancer Risk, Nutrition and Individual Susceptibility) and built as part of the EU FP6 by the Scientific Library of the Institute of Occupational Medicine in Lodz. In 2010 the Centre for Open Learning created the CEON repository that is addressed to the whole Polish scientific community in accordance with recommendations of the open access policy of the European Commission.

Chapter 4: LITERATURE REVIEW

4.1 Scholarly communication

Scholarly communication models

A large and growing body of resources has investigated issues related to scholarly communication. According to the literature, there are several models of scholarly communication, for example, the Garvey and Griffith communication model¹² that describes all stages in the research communication process which includes its formal and informal aspects (Garvey & Griffith, 1972). Although they described different elements of scholarly communication based on the psychology discipline, the model has been applied to many other disciplines. These elements are, for instance, conference reports, preprints, articles in Current Contents or articles in Annual Reviews. They also provided a time framework for different scientific activities between research being conducted and published in the journal. It has to be stressed that Garvey and Griffith’s model focuses on various forms of disseminating scientific output that were available in the 1970s.

¹² Garvey and Griffith proposed their model of dissemination of the scientific communication process in the 1960s and 1970s.

Almost thirties years later their model was developed by Hurd (Hurd, 2000). She decided to update the existing system by adding “modernised” features. She stresses that: “‘Modernised’ features are those that employ technology to support and update traditional functions that endure because they continue to be valued by a community of scientists” (Hurd, 2000, p. 1281). Hurd also transformed the idea of an “invisible college” (see Chapter 2) into a “virtual invisible college” by applying the Internet to the communication process between researchers. Hurd’s model suggests that in the future there will be significant differences in the adoption of innovations by different scientific disciplines. She highlights in her study that:

For example, the importance of preprints has varied considerably among scientific fields. Some observers have suggested that preprint cultures do not flourish in specialities where patents on products and processes are the norm. In a digital era we might expect to see e-prints, the electronic equivalent of preprints, play a greater role in high energy physics than in chemistry or pharmacology. (Hurd, 2000, p. 1282)

In addition, Hurd draws attention to the three major problems that may occur in the scholarly communication process: economic, legal and behavioural.

Another example that illustrates a social system of communication is the UNISIST model¹³ (United Nations Educational, Scientific and Cultural Organisation, & International Council of Scientific Unions, 1971), which was updated by Søndergaard and others (Søndergaard, Andersen, & Hjørland, 2003). The original UNISIST model presents three levels of communication channels: formal, informal and tabular. Formal channels include published (books, journals) and unpublished (theses, reports) materials. Informal channels contain talks, lectures and conferences, whereas tabular channels are represented by data centres. In addition, the UNISIST report provides a chemistry discipline case study. The main findings highlight the importance of, for example, the Chemical Abstracts database in the chemistry information system. UNISIST’s analyses from the 1970s are still valid because all of the examined chemistry resources are still the most developing and useful ones in the chemistry scientific field.

In the same vein as Hurd, Søndergaard et al. focused primarily on implementing the Internet to the existing UNISIST model. In addition, they wanted to bring out the importance of differences between domains. Their model also highlights three levels of sources, which are: primary, secondary and tertiary. This typology is elaborated in all scholarly documents (Søndergaard et al., 2003).

Scholarly publishing

A considerable amount of literature has addressed scholarly publishing. Many studies have paid particular attention to the several economic crises that forced significant changes upon the publishing system. The studies also highlight the role of technology that caused the transition from print to a web-based model. The whole system was affected by serious cutbacks in the late 1980s, during the 1990s (Kling & Callahan, 2003), and then again in the twenty-first century (Borgman, 2007). The economic issues have been investigated for example by Liu (2014) or by Houghton et al. in their report prepared for JISC (Houghton et al., 2009).

¹³ The United Nations International Scientific Information System (UNISIST) model proposed in 1971 by UNESCO.

Liu investigated journal prices in five business-related disciplines. His findings show, for example, that commercial publishers have much higher prices than non-commercial ones. Thus, academic institutions are overcharged by the publishing industry. He also reveals that UK journals are the most expensive for libraries. In addition, Houghton et al.'s report investigated different publishing models such as open access and stressed that: "The costs, benefits and impacts of alternative scholarly publishing models revealed by this analysis demonstrate that research and research communication are major activities and the costs involved are substantial" (Houghton et al., 2009, p. 231).

One of the most significant resources related to scholarly publishing is *The Scholarly Electronic Publishing Bibliography (SEPB)* published by Charles W. Bailey, Jr. He presents selected articles, books and other materials in English that cover a range of topics, such as digital publishing, open access, metadata, e-books, e-journals, etc. (Bailey, 2011). The SEBP has been published since 1993 until now, where the newest version is dated to 2011.

The role of e-journals and the Internet in scholarly publishing has been investigated for example by Kling and Callahan (Kling & Callahan, 2003). Their study concentrated on publication strategies and how they are transformed by legal and economic issues.

Another aspect of scholarly communication is research evaluation. It can be represented, for example, by bibliometric techniques and can be performed at the individual, institutional or national level. The main aims and assumptions of research evaluation at the two last levels are usually determined by evaluating agencies and vary between countries (Geuna & Martin, 2003). Bibliometrics is a method used, among other things, for tracking citations and to measure the scientific output. It includes various types of citation analyses to evaluate the impact of scholarly publications. The term "bibliometrics" was coined in 1969 by Alan Pritchard, who replaced the term "statistical bibliography". His definition states that 'bibliometrics' is "the application of mathematics and statistical methods to books and other media of communication" (Pritchard, 1969, p. 349). Another factor that had impact on the scientific environment and stems from traditional bibliometrics is the 'Hirsch Index', which can be generated by bibliometric databases such as Web of Science, Scopus or Google Scholar. Recently, this indicator became a hot topic around the globe because of its controversial connotations. The Hirsch Index determines (by citations' number) the importance of scholarly papers for individual authors and is based on the citations received for a particular work. It differs across scientific disciplines and therefore cannot be systematised. However, together with the Journal Impact Factor, it has become one of the most important evaluation indicators of scientists. During research evaluation processes both are often used to obtain promotions and financial grants. Nowadays, new approaches to traditionally known bibliometrics are emerging and additional forms of Web-based techniques, such as almetrics, have been developed. These are used to measure the social aspects of scholarly communication by, for instance, analysing tweets about publications or the number of downloads for a given article.

Informal communication channels

There is a large volume of studies describing the role of formal and informal scholarly communication channels that have been published during the last few decades. The

relationships among various channels of dissemination of scientific output have been the subject of research for many scientists, both now and in the past (Garvey & Griffith, 1972; Kaufer & Carley, 1993; Fry, 2006; Mukherjee, 2010). Garvey and Griffith highlighted that: “The most crucial point in the process of dissemination of *scientific* information is the transfer of information from the informal to the formal domain, which occurs with the journal publication of the article” (Garvey & Griffith, 1972, p. 132). The American Library Association distinguishes between formal communication as that which publishes using for example peer-reviewed journals and informal – electronic listservs (The Association of College and Research Libraries, 2014). Much of the current literature also pays attention to scientific blogs and social media; for example, Kjellberg (2010) draws attention to the different motivations as to why researchers use blogs in their scholarly communication practices. Her empirical material, which includes eleven interviews with researchers from different scientific areas, mainly from the humanities and social sciences, explains the main functions of blogs. These are: dissemination of scholarly content, expressing opinions, being up-to-date with news from the field, as a writing tool, and interacting and establishing relationships. In addition, she stresses that: “the researchers’ intentions for maintaining a blog differed, from using the blog as an add-on to a specific book written by the researcher, to column-like reports on a certain topic, or to general reports on popular science” (Kjellberg, 2010).

The way in which social networks are used in scholarly communication has been investigated for example by Holmberg and Thelwall (2014). They carried out the study of the effect of using Twitter in ten disciplines. Their study revealed that there are significant differences between using this tool among scientific fields. Also, the purpose of using Twitter varies between sharing links, retweeting or having conversations. Nonetheless, Twitter is highly used by researchers from biochemistry, chem-informatics, astrophysics and digital humanities. They highlight that, conversely, “Economics proved to be a difficult discipline to evaluate because economics is a common topic of discussions among citizens and so researchers discussing economics or sharing news and information about economics, are not necessarily involved in scholarly communication” (Holmberg & Thelwall, 2014, p. 10) .

One of the main characteristics of formal scientific communication is the process of peer review that is emphasised by many researchers (Mabe, 2009), (Frandsen, 2009), (Kriegeskorte, 2012); however, Cronin claimed that: “A great deal of scientific communication, indeed, scholarly communication in general, is informal in nature” (Cronin, 2003, p. 1).

Informal and social channels may be represented by: blogs, meetings, academic social networking or conference attendance. Traditionally, these forms of communication mainly use oral forms such as personal contacts. During the process of scholarly communication, researchers play interchangeable roles as authors, readers, reviewers or editors. This is associated with many opportunities for the exchange of information. Personal informal communication channels may be referred to by the term known as “invisible college”. This concept was used by the English chemist Robert Boyle in the seventeenth century to determine a small group of Royal Society of London members and their collaboration (Crane, 1972). Modern usage of this term has been modified by a number of researchers, for example, by sociologist Diane Crane in 1972. In her major study she suggested that scholars view themselves as an informal network in which they can share and disseminate scientific knowledge (Crane, 1972).

All definitions relate to the very important but heterogeneous role that scholarly communication plays in the academic environment. Notwithstanding, scholarly

communication should be viewed as an integrated set of formal and informal activities that can use the power of technology and innovations. According to Baptista & Ferreira, these two channels “are head and tail of the same coin” (Baptista & Ferreira, 2007) and should not be treated separately.

Studies across disciplines

There is a comprehensive number of studies on the subject of differences in scholarly communication practices among scientific disciplines. These may be investigated from various aspects, such as scholars’ behaviour, relationships, and methods accompanying scientific communication (Whitley, 2000). Such studies, primarily within the social sciences and influenced by the emergence of new electronic media, have been conducted, for example, by Kling and McKim (2000) or Palmer and Cragin (Palmer & Cragin, 2009). Palmer and Cragin carried out their research especially in the discipline of information science and highlighted that: “Studies of scholarly information work practices are essential for understanding how to develop digital content and functionality for the actual daily and long-term needs of researchers” (Palmer & Cragin, 2009, p. 198).

Research comparing different scientific disciplines have been conducted by many institutions, for example by the Centre for Studies in Higher Education at Berkeley University and the JISC (Joint Information Systems Committee). The research was based mainly on online surveys as well as interviews and focus groups. The JISC conducted several studies about scholarly communication, open access or information skills. In 2005, the JISC published a report on disciplinary differences. One of the guiding intentions of this study was to “identify several important areas in which preferences and behaviour vary between disciplines” and was completed by 780 UK researchers from different institutions (Sparks, 2005, p. 4). This included five main groups: medical and biological science; the physical sciences, maths and engineering; the social sciences; languages and area studies; and arts and humanities. The results show, for instance, that across all disciplines the journal’s prestige is the most crucial factor in terms of choosing a publishing channel. Interestingly, researchers in general do not know their copyright position, but awareness of the open access debate ranks very high.

Another JISC report was published in 2009 and concerned the publishing and dissemination of research findings across the same scientific disciplines that were mentioned above (Fry et al., 2009). This report was based on several focus groups. The results revealed, for example, that peer-reviewed articles are the most common citation output among all participants and stressed that researchers “were influenced by the impact factor of a journal when citing” (Fry et al., 2009, p. 88) .

A report published by Berkeley had several goals and elements that were relevant to my study:

(It) focuses on understanding faculty needs and practices for *in-progress* scholarly communication as well as archival publication. Among our goals is providing a broader understanding of the full array of activities related to the scholarly communication life cycle in order to enable the accurate assessment of the academy’s future communication and publication landscape (Harley et al., 2010, p. 2).

The study closely examined seven disciplines: archaeology, astrophysics, biology, economics, history, music and political science. The research study considered not only questions investigating scholarly communication practices but also individual information regarding literacy skills and using new discovery tools. The study examined, for example, those factors that are most important for scientists when selecting the channel to spread their scientific achievements, for using informal channels to share their

publications and how they collaborate with other scholars. The general findings varied between disciplines, but some of them were universal. The report outlined the common practice of sharing scholarly output through social channels that mostly depended on the scholar's personality. A personal website was one of the most ubiquitous services to post and disseminate not only scientific content.

4.2 Open Access

An overview of the literature on open access shows that over the last twenty years, interest in this subject has risen significantly. This movement already has a few leaders and advocates that have set the tone for a general debate (Suber, 2002; Suber, 2012a; Poynder, 2004; Harnad, 2011).

Many contributions on the impact of open access have been focused on its legal and economic aspects, especially in terms of Creative Commons licences and copyright. Redfield's research (Redfield, 2013) has concerned re-publication of CC-BY articles. Respondents mainly came from the fields of biology and ecology and reached a number of about 20 thousand. The most significant findings revealed that 40% of the survey's respondents would never have agreed to publish their articles under the CC-BY licence if re-publication of their work could occur. Morrison, in her works, has questioned "the trend towards adopting a particular CC license as a standard for open access" (Morrison, 2012a). She conducted several studies and examined particular CC licences as well as provided comments to the Taylor & Francis survey about researchers' attitudes regarding the dissemination of scientific findings.

Some studies have analysed the differences between OA and non-OA journals. Björk and Salomon's study (Björk & Solomon, 2012) was based on open access and subscription journals identified by the DOAJ, Web of Sciences and Scopus databases. They determined the journal's quality by 2-years Impact Factor. Their major findings reported that those OA journals that were indexed in the WoS and Scopus had the same scientific quality and effect as subscription journals. They highlighted that these results are especially noticeable in the discipline of biomedicine and in journals that apply processing fees. Harnad and Brody predicted that:

OA will also increase because of the growing number of journals that have already given their official "green light" to author self-archiving, partly because journal impact factors also benefit from increased article impact, and partly because journals are eager to demonstrate that they have no wish to stand in the way of OA and its benefits to research and researchers. (Harnad & Brody, 2004)

Their forecast was confirmed by Morrison, who investigated the growth of the open access movement from 2005 (Morrison, 2012c). She publishes a quarterly series of data and analyses in the form of blog posts. She reported that the number of fully OA journals and periodicals that make their content as freely available as possible (for example by providing free access to back files) has increased from 15 thousand in 2007 to 36 thousand in 2012. In June 2014 this number increased and reached about 45 thousand journals (Morrison, 2014). In addition, Morrison provided a growth rate for selected resources, such as the Directory of Open Access Journals (growth rate 3.6 titles/day), arXiv (growth rate 200 documents/day) or Social Sciences Research Networks (growth rate 130 full-text papers/day).

In recent years there has been an increasing amount of reports on authors' attitudes towards open access and publishing preferences (Rooyen, 2014; Harjuniemi, 2012; Creaser et al., 2010; OAPEN-UK, 2012). The OAPEN-UK report, which contains data provided by researchers mainly from Great Britain, examined scholars from the humanities and social science disciplines. The findings showed, for example, that an author's priorities in accordance with the publisher's service are primarily "marketing and promotions" and "distribution and sales". In contrast, less important for scholars are "royalties", "citations analysis" and "sales information/data". Open access has been investigated from the perspectives of funding and publishing and the report revealed that the highest awareness of OA is among post-doctoral researchers (OAPEN-UK, 2012). Another example is a report from a survey conducted at the Jyväskylä University on whether or not scholars favoured open access and an institutional repository (Harjuniemi, 2012). In the aggregate the findings suggested that there is a positive attitude towards open access and an institutional repository. However, some concerns were expressed about copyright issues and OA policies. In addition, I discuss similar issues under the heading Digital libraries and institutional repositories below.

Academic publishers have also noted the changing role of open access. They established several studies that have provided detailed information on authors' preferences regarding new publishing models. Wiley's survey explored data received from scholars who published in Wiley's journals (Wiley Publisher, 2013). Respondents came from around the world, and almost half of them came from Europe. The findings reflected, for example, that there is confusion and lack of information about open access funder mandates and policies among researchers from all scientific disciplines. In addition, responses to the topic of Creative Commons licences gave evidence that most respondents prefer one of the more restrictive options (CC-BY-NC) than the commonly used CC-BY (Wiley Publisher, 2013).

Taylor & Francis Publishers conducted a survey on its authors community and on their views about open access (Frass, Cross, & Gardner, 2013). The study reached an audience from around the world and from different scientific fields. The results match, to some extent, those from Wiley's report regarding copyright and licences. The findings illustrate a strong position of most limited licences (CC-BY-NC-ND). In addition, the authors emphasised that open access publishing offers them greater circulation than subscription periodicals, and access to scientific publications should not be restricted by one's ability to pay (Frass et al., 2013).

Most recently, a survey conducted on behalf of EDP Sciences Publishers also provides detailed information on attitudes towards open access (Rooyen, 2014). The participants represented various scientific fields from different geographical regions. This survey was distributed among learned societies represented by scholars, librarians, publishers or consortia managers. One of the significant findings was a marked contrast between access to information between developed and developing countries. Generally, most societies are familiar with open access, however, only about a half of them are strongly in favour of it (Rooyen, 2014).

Open access as a subject of research has not yet widely been explored in Poland. However, some online resources are available, such as an e-learning course about OA (Bednarek-Michalska & Grodecka, 2011). In terms of scholarly communication, open access has been studied by a few scholars in Poland (Kutchma & Nikisch, 2010; Niezgodka, 2012), but comprehensive research has not yet been conducted and described.

Additionally, there is a limited number of articles that focus on licencing and copyrights of Open Access (Ganicz, 2010; Siewicz, 2010; Siewicz, 2012).

4.3 Digital libraries and institutional repositories

Digital libraries are not the subject of this work, however, they are often confused with institutional repositories or even used interchangeably, especially in Poland (Poynder, 2013)(see: Results chapter).

Digital Libraries and repositories have become, over many years, the subject area of scientific research. In the United States the organ responsible for popularising research related to digital libraries is the Digital Library Initiative, while in the UK the Electronic Libraries programme (eLib) has been developed. In the 1990s, according to Marchionini, initial studies were focused primarily on the technology and the content of digital objects, and research completely overlooked the aspect of the user and relationships (Marchionini, 1998). However, this started to change over time and Chowdhury & Chowdhury stressed that scholars had already in the early 2000's recognised the impact of digital libraries in the academic environment (Chowdhury & Chowdhury, 2003).

In terms of institutional repositories, a number of studies have examined the pros and cons of the interactions that repositories have with scholarly communication (Billings, 2008; Watson, Donovan, & Bluh, 2009; Devakos, 2006). Current studies are mostly connected with the number of citations of articles that were placed in repositories. Additionally, these research studies have investigated the role of institutional repositories in the dissemination and popularisation of scientific publications (Xia, 2007; Swan, 2010; Thomas, 2008; Harnad 2011).

From this thesis's perspective, the most important research studies are those conducted regarding attitudes and depositing behaviour towards using institutional repositories between scientific fields. One of the surveys comparing the humanities to STM science was carried out in the UK and examined 25 institutional repositories (Allen, 2005). The most interesting part of this study concluded that STM scientists deposited more content than those from other disciplines. Allen stressed that:

The use of repositories varies considerably between universities, with many of those with few documents being dominated by a small number of departments, sometimes from the arts, humanities or social sciences. However, the larger repositories – in fact all but one with more than 200 documents – are dominated by documents from STM fields. (Allen, 2005, p. 53)

A number of case studies regarding faculties' attitudes towards a digital and institutional repository have been conducted. For example, a survey at the University of Southampton examined the self-archiving activities of physicists (Xia, 2008), and Lercher's study provided data on attitudes towards a digital repository among eight academic departments at Louisiana State University (Lercher, 2008). The Australian point of view was introduced by Kingsley, who attempted to explain the problem of academics using institutional repositories to share their findings (Kingsley, 2008).

In her study, Xia revealed, for example, that more physicists prefer to deposit their output in arXiv than in an institutional repository. In addition, she highlighted that: "when an article has been presented in one repository, the author(s) will be hesitant to make it repeatedly available in a second repository" (Xia, 2008, p. 494). In the same vein, Creaser

et al. showed in their report, with a study across Europe and data obtained from over 3000 scientists, that scholars in the social sciences, humanities and arts are not very well informed about using repositories (Creaser et al., 2010). In addition, the study showed many differences between disciplines regarding the attitude for self-archiving. For instance, a group of physical science and mathematics specialists “expressed a stronger preference for subject-based repositories, while authors from the social sciences, humanities, & arts were more likely to have deposited in an institutional repository than any other disciplinary group” (Creaser et al., 2010, p. 154).

Kingsley identified several barriers that were encountered by scholars when depositing their papers (Kingsley, 2008). First of all, information-seeking behaviour varies between disciplines. Some scholars, in terms of searching for specific databases, do not contribute open access articles. In addition, the government open access mandate that requires scientists to use repositories may not have a positive impact. Scholars do not like to be forced to use a specific method to disseminate their knowledge. On the other hand, Kingsley reported that providing a mandate demonstrated growth in awareness of open access and “and use of a repository, but disciplinary differences in publishing outputs and information seeking behaviour must be taken into consideration for a repository implementation program to have any success” (Kingsley, 2008, p. 12).

In view of everything that has been mentioned so far, one may suppose that there are significant differences between using institutional repositories across different scientific fields. Additionally, it is difficult to compare the situation between various countries or even between some institutions due to the differences in scientific infrastructure development. For example, in Poland, institutional repositories are still under construction. Most of the open access publications are deposited in the digital libraries (see Chapter 3).

Chapter 5: Theoretical framework

For the purpose of this study, Whitley’s theory of the intellectual and social organisation of academic fields was adapted (Whitley, 2000). This theory allows us to understand relationships between scholarly communication activities in different scientific fields, as explained below and in Chapter 8. In addition, it emphasises the development and occurring changes in the nature of particular disciplines. I also sought to understand what kind of factors and tools are crucial for scholars in terms of publishing their scientific findings. Those motivations were studied extensively by Latour and Woolgar in their famous book titled *Laboratory Life* (Latour & Woolgar, 1979). Part of their study is an exploration of the several processes that take place in a scientific lab and that are connected with knowledge production. I relied on their theoretical assumptions and the results they obtained in order to determine the major motivations in chemistry and economy.

5.1 Mutual dependence and task uncertainty

Whitley introduced his theory in 1984, then revised and developed his ideas in 2000 (Whitley, 2000). His theory is used by many researchers and contributes to the process of examining the differences between various disciplines (Al-Aufi & Lor, 2012; Fry & Talja, 2007). Whitley’s principles were used, for example, to understand the diversity in the use of electronic publications in various scientific disciplines (Fry & Talja, 2004), in the

study of information practices in various academic disciplines (Gable, 2008; Roos, 2012), and to analyse the social and institutional aspects of Library and Information Science research (Åström, 2008).

Whitley developed a theoretical framework for the comparison of scientific fields. He used the term “intellectual field” instead of “disciplines” to highlight that a scientific field should be treated as all forms of modern scholarship, where scholars are characterised by “novelty and innovations” in the knowledge process. In addition, scholars have to rely on different factors, such as colleagues, personal connections and cooperation. For Whitley, modern science is reputational work organisations, where reputation states the status and prestige of an individual scientist. Academic disciplines are determined by three major elements: skills training and certification, equipment facilities and material rewards, and the communication system (Whitley, 2000, p. 82). Consolidation of these components may vary between disciplines.

Whitley highlighted that modern science is based on the creation and development of new achievements in knowledge contributed by researchers (Whitley, 2000, p. 85). His theory distinguishes disciplines from one another by using two dimensions: ‘mutual dependence between researchers’ and ‘task uncertainty’.

Mutual dependence is associated with competition between scientists during their research projects, academic career and novelty production. Whitley stressed that: “The degree of mutual dependence between scientists varies, then, between fields and is related to differences in their intellectual structures” (Whitley, 2000, p. 86). To establish their scientific and academic position, researchers have to rely on a particular group of their colleagues, specific information resources or standard procedures. In his general taxonomy, Whitley indicated that chemistry is characterised by a high degree of mutual dependency and low degree of task uncertainty. Interestingly, economics as an exception among the social sciences also has a high degree of mutual dependency but a high level of task uncertainty. Below, both levels are described in more detail.

The degree of mutual dependence may be divided into two parts:

- 1) The degree of functional dependence between researchers in the same field. This is related to scientists using similar methods, techniques, standards, etc. and the desire to achieve a high reputation and acceptance in one’s scientific community. Only knowledge built up on particular standards and methods has a chance of being recognised and affects the reputation of the researcher. Whitley stressed that:

”Contributions which do not clearly fit in with existing knowledge and do not rely on similar techniques, methods, and materials as specialist colleagues are unlikely to be published in fields which exhibit a high degree of functional dependence” (Whitley, 2000, p. 88).

- 2) The degree of strategic dependence which convinces other scientists about the importance of one’s own research and innovations in order to achieve a high reputation from them. Strategic dependence is associated with widely understood co-ordination of several contributions, such as technical and intellectual ones. Researchers have to maintain different strategies, goals, programmes or projects. Whitley highlighted that:

“It is a political activity which sets research agenda, determines the allocation of resources, and affects careers in reputational organisations and employment organisation” (Whitley, 2000, p. 89).

It has to be stressed that all scientific fields are characterised by at least a minimal level of these two dimensions, however, mutual dependence cannot be absolutely determined. It is possible to measure it only to some extent between disciplines and to achieve a relative degree.

Fry and Talja briefly illustrated this as follows: “In fields with high level of mutual dependence, scholars are depended upon particular groups of colleagues to make competent contribution to collective scientific goals and acquire prestigious reputations that lead to material rewards” (Fry & Talja, 2004, p. 24). This could be reflected in, for example, publication activities. Prestige and reputation could be achieved by publishing in high-ranked journals that already have a recognised position in particular scientific disciplines. Whitley described chemistry as a discipline that has a low degree of strategic dependence and a high degree of functional dependence. On the contrary, economics is shown as a discipline that is characterised by a low level of functional dependency and a high level of strategic dependency (Whitley, 2000, p. 90).

The degree of task uncertainty in the scientific fields is connected with several research components, such as theoretical goals, procedures, standards, and definitions shared among scientists. Task outcomes are unpredictable and not easy to structure. However, they are expected to be innovatory. Whitley pointed out that:

The production and recognition of new knowledge depends, then, on the existence and structure of current knowledge and expectations. The more systematic, general, and precise is existing knowledge, the clearer will any results be in terms of their novelty and significance for this common stock of understanding. (Whitley, 2000, p. 119)

Thus, task uncertainty differs between scientific fields as well and influences the perception of innovations. Standardising procedures, using specific technologies and equipment or resources may be crucial factors in determining significant differences between academic disciplines. Whitley argued that the production of new knowledge is based on the structures as well as on values of the current state of knowledge and the procedures associated with it. Fry and Talja stressed that: “Variation in the extent to which work procedures, problem definitions, and theoretical goals are shared between scholars, and are clearly articulated, are thus related to the degree of task uncertainty in scientific fields” (Fry & Talja, 2004, p. 24).

Task uncertainty can also be divided into two parts:

- 1) Technical uncertainty is related to the technical procedures and methods used in the research process. They need to be well established and understood to ensure that reliable scientific findings are obtained. Whitley explained that fields with a high degree of technical uncertainty may be characterised by not well-established technical procedures as well as ambiguity in the interpretation of results. On the other hand, low technical uncertainty provides well-defined research techniques or methods and the findings obtained are more visible and replicable (Whitley, 2000).

- 2) Strategic task uncertainty refers to the level to which research strategies and goals within an intellectual field are uniform, integrated and stable. Whitley pointed out that:

“The stability of problem formulations, and of hierarchies of problems according to their importance and significance, varies across fields so that, suitably modified, this dimension may be used to differentiate sciences and suggest reasons for variations in knowledge structures and patterns of change” (Whitley, 2000, p. 123).

Strategic task uncertainty may be high when different funding agencies and audiences are involved in the research. Problems and goals are rather not well-established and may be maintained by different groups. Scientists have to deal with many different issues that may be perceived differently by particular groups. On the contrary, low strategic task uncertainty is expressed by research goals and problems that are well defined and particular groups are responsible for different tasks.

Whitley’s theory of intellectual and social organisation of academic fields is used, for example, by Emmeche to explain the differences and to describe the main features of scientific disciplines. According to Emmeche:

Organisations are plural in form and differ in how they organise a field and how they achieve their degree of autonomy. All this depends upon the degrees of uncertainty regarding the kind of tasks the researchers are expected to contribute to solve, and the degree of mutual dependence upon other contributors to the field, technically and functionally, e.g., how many colleagues in the field you depend upon for making a career, whether the internal coherence of a field is strong or weak, the degree of specialisation, and generally how researchers achieve and fight for scientific recognition. (Emmeche, 2011, p. 352)

Overall, Emmeche provided several examples which illustrate Whitley’s theory that the scientific community includes different intellectual organisations. Whitley suggested seven major types of scientific fields that combine the differences in the mutual dependence and task uncertainty dimensions. One of these types he termed technologically integrated bureaucracies. These are characterised by low technical and low strategic task uncertainty, low strategic dependence and high functional dependence, and can be represented by 20th-century chemistry. This scientific field organises its research according to specific problems by using rules and produces empirical knowledge (Emmeche, 2011, p. 364). Skills and procedures are standardised by, for example, training programmes and could be maintained effectively. Due to the low degree of strategic dependence, chemists are able to obtain their reputation among a small and specialised group of colleagues, mainly related to particular sub-fields that are found in chemistry. Whitley also pointed out that: “scientists are encouraged to pursue highly specialised topics and deal with narrowly defined problems” (Whitley, 2000, p. 198). Using similar techniques, equipment, standards and procedures allows chemists to integrate results, even on the international level.

In addition, economics is introduced by Whitley as an unusual academic field with high technical task uncertainty among the social sciences and very low strategic task uncertainty, high strategic dependence and low functional dependence (Whitley, 2000, p. 181). He described economics as “partitioned bureaucracies” that represent very hierarchical and structured domains. This field produces empirical as well as analytical

knowledge, including both applications and theoretical research. According to Fry (2013), economics generally belongs to a group of disciplines that often consider the theoretical side to be more prestigious than the empirical side. However, it can be represented relatively differently in sub-fields, such as energy economics. Siler highlighted that: “As in many facets of economics, there is a clear hierarchy (made possibly by high mutual dependence) of sub-fields in economics, with the more theoretical endeavours enjoying epistemological, and organisational superiority” (Siler, 2005). Nevertheless, Whitley highlighted that economics is a discipline with highly standardised analytical skills and managed through a formal communication system. He stressed:

Within analytical economics there is a high degree of mutual dependence among practitioners, a high degree of formalisation and standardisation of work procedures, assessment standards and problem formulations, and a high degree of task differentiation. (Whitley, 2000, p. 185)

The differences between the various fields of science have an effect on the scholarly communication process. Whitley emphasised that “As a result, the expansion of higher education, changes in state agencies and policies, and other shifts in the environment of research have taken place in different ways in different countries with varied effects” (Whitley, 2000, p. 31). Scientific communication may thus also have different characteristics depending on geographical and national factors.

5.2 Motivations

According to Latour and Woolgar, scientists are strongly connected to a system that motivates and encourages them to publish and share their research output. This system is determined, especially, by a cycle of credit. Credit is explained by Latour and Woolgar as “recognition of merit” and is related to the reward system that is common in the academic environment. They argued that: “scientists are motivated by a quest for credit even though they do not talk about it and deny that credit in the form of reward is their motive” (Latour & Woolgar, 1979, p. 194). Credit can be achieved in different forms, such as funding, grants, equipment, tenure, data or publications. It is also associated with the complex mechanism of building up a reputation throughout one’s academic career. This includes several activities, such as collaboration with other scientists, establishing informal contacts, publishing papers, scholarships, peer reviewing, etc., which determine a researcher’s position.

Latour and Woolgar noticed that starting a career in science is characterised by making a wide range of decisions that could have a significant impact on one’s future. They stressed that: “the beginning of a scientist’s career entails a series of decisions by which individuals gradually accumulate a stock of credentials” (Latour & Woolgar, 1979, p. 195). Especially junior researchers have to choose, for example, where they will obtain their training or scholarship. This is strongly connected with further activities, such as applying for grants, participation in projects or even publication of papers. This could also have an influence on their future employment.

The credibility of a scientist can be determined by several important factors, such as accreditations (education and trainings), positions (employment), grants, funding or awards received. Latour and Woolgar draw our attention to these credentials and stress that: “A scientist’s qualifications constitute cultural capital which is the successful outcome of multiple investments in terms of time, money, energy, and ability” (Latour &

Woolgar, 1979, p. 209). Individual qualifications are, however, strengthened by collaboration with other scientists, reference letters, etc. Collaboration and relationships are thus treated as another factor that guarantees credibility.

The way in which a scientist's position is regulated was studied extensively by Latour and Woolgar. They highlighted the strong position of publishing activities. Researchers also build their prestige on the basis of their scientific papers that have gained citations. They conclude that: "Lists of publications are the main indicators of the strategical positions occupied by a scientist. Names of coauthors, titles of articles, journals in which they have been published, and the size of the list together determine the scientist's total *value*" (Latour & Woolgar, 1979, p. 211).

Chapter 6: Methods and materials

The choice of data collection methods, interpretation and findings are key to the research process. Generally, this thesis is based on techniques that allow for an in-depth look into the characteristics of scholarly communication activities at one of the Polish technical universities, within the disciplines of chemistry and economics. Mixed techniques of collecting and analysing data were chosen to create knowledge that describes the different activities conducted by scholars and which are associated with dissemination of scientific output.

6.1 Research approach

To better understand the complexities of scholarly behaviour, a combination of qualitative and quantitative data collection and analysing techniques was used. Two approaches were selected. First, semi-structured interviews were chosen as the qualitative component. The semi-structured interview was chosen because I wanted to use a technique that would allow two-way communication. I could receive information from my participants and at the same time give them information back. My semi-structured interviews started with general questions and were the basis to identify more specific topics. This gave me the flexibility to discuss interesting issues that appeared during this process.

The second approach was quantitative and I decided to use online questionnaires. This technique is inexpensive and allowed me to reach a greater audience. Participants could complete the survey during the time they needed and the whole process was administrated anonymously, which could be important for some respondents.

In order to complement the other two methods, secondary data from annual reports were retrieved. The data contained a detailed number of publications, such as the number of articles indexed in the JCR databases, number of monographs, etc. This was mainly used to provide a background of the selected faculties. In addition, the study deployed a literature review as a part of the research process that could help to complete the aims and research questions. To understand the participants' communication behaviour, I used my personal experience as a librarian and my knowledge about the university's structure.

Using the qualitative and quantitative techniques helped me to gather different types of knowledge. The qualitative component allowed me to understand the general attitude in new scholarly communication channels and to determine some specific features of publication behaviour. The quantitative component provided detailed patterns of the participants' responses that supplemented the more comprehensive results. The in-depth

data from the interviews and data from the online questionnaires were coded and integrated. The merge process involved quantifying the qualitative data that were used to explain the findings. I used both techniques complementarily to create an in-depth picture of the investigated problem; it is explained below.

This kind of project, i.e. one that explores scientific disciplines from a scholarly communication point of view, is uncommon in Poland. I did not come across any similar analysis during this project.

Selection of study participants

The study was conducted at one technical university in Poland. Initially, the plan included two technical universities. Unfortunately, obtaining data from the other university was difficult and I was forced to choose only one institution.

The main groups at the university include: students, scholars and administration staff. From those main actors other subgroups could be isolated, such as librarians, undergraduate students or professors. The early stage of this research design included a number of decisions that had a significant impact on the entire project.

Prior to commencing the project I decided that the study would be limited to only two scientific disciplines and based on the scholarly practices represented by the Faculty of Chemistry and the Faculty of Management and Economics. These disciplines were selected from the nine faculties offered by the university. Chemistry represents a group of STM science, while economics belongs to the Social Sciences. These two disciplines exemplified an interesting contrast to me. It should be emphasised that each of these scientific fields is divided into sub-disciplines that are represented by different research areas and departments, such as the Department of Polymer Technology, Department of Organic Chemistry, Department of Marketing or Department of Economic Science.

Since I investigated researchers' publication behaviour and attitudes regarding different scholarly channels, this study is limited to only active researchers. According to the level of degrees and positions held by scholars at the university, I resolved to recruit the following academics: PhD students, Assistant Professors, Associate Professors and Professors. It has to be mentioned that in Poland there are three different scientific degrees: doctor, habilitated doctor and professor.

A PhD degree is obtained after graduating from third-degree studies and completing a doctoral dissertation. According to the study programmes established by the university, PhD students are obliged to publish a minimum of 2 to 3 scientific articles in peer-reviewed journals during their studies.

The habilitation process may take a very long time and ends with the writing of a habilitation thesis. It is worth pointing out that a person doing a habilitation for more than eight years cannot occupy the position of Assistant Professor at the university any longer.

The title of Professor is the highest academic title in Poland. It is conferred by the President of Poland to a person who has already obtained a postdoctoral degree. A Professor is obligated to write a scientific monograph on a specific topic.

The pool of participants included academic staff and PhD students. The following graph (Fig. 2) illustrates the selection of participants for this project.

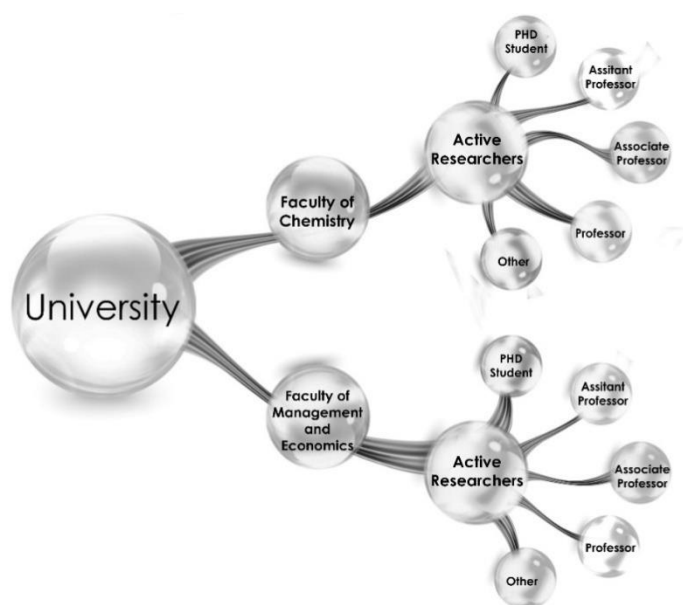


Fig. 2 Selection of participants

In 2013, the Faculty of Chemistry employed 131 academic teachers, while the Faculty of Management and Economics employed 109 teachers. The total number of PhD students consisted of 154 chemistry students and 61 economics students. These numbers refer to full-time and part-time doctoral students. Further down I present the total number of scholars invited to participate in the study.

Participants in the study were 30 scientists associated with the Faculty of Chemistry and 25 representatives of the Faculty of Management and Economics. They came from nearly 50 different research areas. Due to this fact, those subfields were not mentioned in the text. The scholars were divided into two groups, i.e. chemistry and economics, and this simple division was preserved during the project.

6.2 Qualitative data

This research aimed to gain an understanding of the current situation that is taking place in scholarly communication in Poland, thus qualitative data were necessary to support this study. One advantage of qualitative interviews is the possibility of having interactions with respondents during face-to-face interviews or focus groups. The data may be collected from a small group and still allows for an insightful investigation of the study's problems. The second advantage is providing depth by recording the opinions, behaviours and feelings among the researchers. However, this technique also has certain drawbacks. A major problem with the qualitative component is data interpretation, e.g. the researchers might distort the collected data and there is the risk of bias which could be introduced into the analysis of qualitative interview data. This type of data collection is also usually more time-consuming. Additionally, fewer participants than in the quantitative technique can be included.

I started collecting qualitative data by conducting five semi-structured interviews. The whole detailed process is described below. It has to be highlighted that analysing the results included a conversion of the qualitative data into quantitative data, which was explained in section 6.4.

Semi-structured interviews

I started collecting qualitative data by preparing semi-structured interviews. The interviews were based on two types of questions: structured ones that were built on quite specific personal information and open-ended questions which were designed to elicit a more subjective attitude towards the research problems. The first type of questions provided data that determined, for example, the number and type of publications made by the respondents. The second type of questions presented a picture of typical and characteristic methods used by the participants in their scholarly communication process. This type of interview allowed me to have greater flexibility in working with the interviewee than a structured interview; I could follow the new directions during the process and obtain more information. According to Creswell, this method is also risky because it very often represents the participants' indirect view that has to be filtered by the interviewer during the analysis part (Creswell, 2008, p. 179).

Prior to conducting the interviews, an interview guide with a list of semi-structured questions was prepared (see Appendix A). Bryman stressed that the interview process is flexible and huge emphasis needs to be put on the interviewees' perception and understanding of the issues being investigated (Bryman, 2012, p. 471). I created a brief glossary of the key concepts and used it during the interviews to avoid participants' confusion. These concepts included: open access, peer-reviewed article, embargo, institutional repository, digital library, and Gold and Green road of open access. All terms were explained in Polish and English. At the beginning of the sessions the list was given to the interviewees to clarify their knowledge and terminology, especially about open access.

The selection of study participants was done based on my own experience with scholars who had participated in a training session organised by the library. It should be stressed that I encountered difficulties in persuading the scientists to be interviewed. Finally, I managed to receive permission for five interviews: three interviews with PhD students (two from the Faculty of Chemistry and one from the Faculty of Management and Economics) and two interviews with Assistant Professors (one from the Faculty of Chemistry and one from the Faculty of Management and Economics). Four interviews were "face-to-face" and one was conducted by telephone. All of the face-to-face interviews were recorded and transcribed. Additional notes were written up during the process. The phone interview was based only on notes because it could not be recorded due to technical difficulties.

The following table (Tab. 1) shows the interviews along with tags that specify individual participants. These tags were used in the analysis chapter to cite direct quotes from the participants.

TAG	DISCIPLINE	TYPE OF INTERVIEW
PhD1	Chemistry	Face-to-face
PhD2	Chemistry	Telephone
PhD3	Economics	Face-to-face
AP1	Chemistry	Face-to-face
AP2	Economics	Face-to-face

Tab. 1 Interview participants

To ensure a quiet environment where participants could feel natural and relaxed, all face-to-face interviews were held at the university in one of the library's rooms. On arrival at the interview I presented the basic topics of the project. All participants were informed that the interview could be terminated at any time upon request. In addition, I asked them whether they consented to being recorded. The interviews were intended to last for about

thirty minutes. The average length for all interviews was about 35 minutes, where the shortest interview with PhD2 was over the phone (20 minutes), and the longest interview with PhD1 lasted 45 minutes. This was the only interview that was conducted in English. The interviews were recorded by mobile phone with a voice recorder and transcribed without any special software. All answers used in the work have been translated into English. During the process, additional notes were taken and then supplemented to the transcribed text.

6.3 Quantitative data

The quantitative component of the data collection technique consisted of an online survey. The quantitative approach was chosen together with the qualitative approach to increase the reliability of findings and to expand the perspectives of the research. The quantitative approach has a number of interesting features. This procedure allows the researcher to extend the number of participants and to generalise results if the sample of representatives is appropriate. Objectiveness is crucial for quantitative research. Personal bias could easily be avoided, for instance, in the way questions are posed. However, this approach very often collects superficial datasets. The results usually present a numerical description and do not provide depth of the respondents' views. In addition, there is a risk that respondents will not show their exact attitudes towards the issues being investigated or the questions could be misunderstood. The data collected using this technique may sometimes be insufficient.

A self-completion questionnaire was used for this study. It has been highlighted by many that this is one of the most popular and useful tools for gathering data in the era of the Internet (Bryman, 2012); (Mounce, 2011). According to Bryman: "Self-completion questionnaires are more convenient for respondents, because they can complete a questionnaire when they want and at the speed they want to go" (Bryman, 2012, p. 234).

Online questionnaire

The survey was designed using SurveyGizmo software. The survey's questions were based on questions used during the interviews. Throughout the process, several changes were made to the questions in the questionnaire before the final version was introduced. All enquiries were then typed into the application provided by SurveyGizmo (see Appendix B).

A link to the online version of the questionnaires was distributed among the participants by e-mail along with an invitation letter (see Appendix C).

Although the Faculty of Chemistry and the Faculty of Management and Economics have over 400 employees and PhD students altogether, e-mails were sent to about 150 active researchers. It should be emphasised that requests were not distributed to all employees due to occurring difficulties. E-mail addresses were retrieved from the faculties' websites and some academics had not provided them, especially doctoral students who did not have their own website. In addition, I decided to skip the technical staff and retired professors. PhD students who were not employed at the university and part-time students also did not take part in the project. Unfortunately, some e-mail addresses (approximately 15%) were not valid and did not reach the academic staff.

Despite the fact that online questionnaires are becoming increasingly popular and have obvious advantages, such as low cost and automated data entry without the need to retype, this method has some limitations. Bryman highlighted several drawbacks of the web survey. First, they have a very low response rate and are restricted only to the online

population (Bryman, 2012, p. 677). According to research conducted, for example, by Shih and Fan, the average of the response rate for online surveys is 34% (Shih & Fan, 2008). The questionnaire I prepared was sent three times; twice with a reminder and a request for it to be filled in. Nevertheless the response rate was still quite low and was finally approximately 36.42% (49 completed responses and 1 partially completed one). Overall, the study involved 55 participants – 50 from the online survey and 5 who took part in the interview. I included answers from the interviewed researchers with the questionnaire data. This required specific consideration and was justified mainly by standardising the results. I wanted to present my data in a simple way that could easily be understood by readers. I did not want to distinguish it so I decided to merge the data that was collected through different techniques.

Respondents were divided into four groups according to their level of seniority: PhD students, Assistant Professors, Associate Professors and Professors. The following graph (Fig. 3) shows the exact number of participants together with the percentage indicator (category ‘other’ is explained in Chapter 7.1).

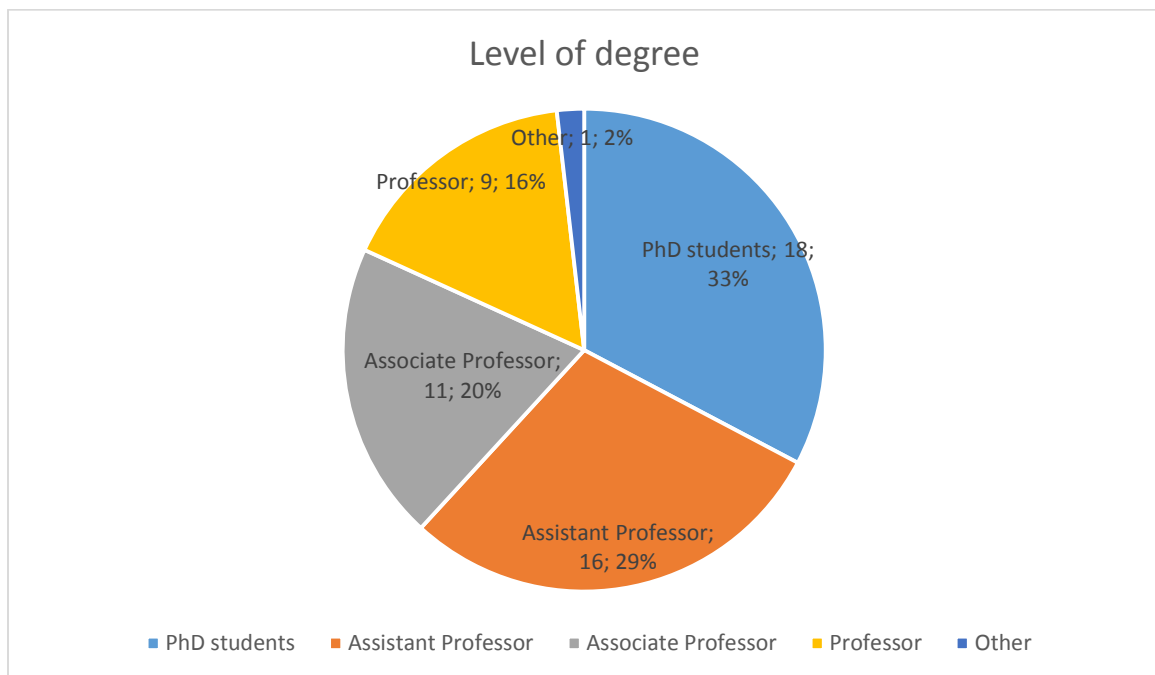


Fig. 3 Participants' level of seniority

Secondary data

In an attempt to provide an overview of the faculties' background, additional data were retrieved. Two annual reports were selected in order to better understand the publication patterns. These provide an overview of the number of publications prepared by researchers from the two examined faculties. There were annual reports for the years 2011 and 2012. The year 2013 could not be included because the report will not be available until mid-2014. Annual reports are issued by the university on the basis of records obtained from different Faculties and Departments. They contain data about the number of publications published by scientists, including articles in journals indexed by the Journals Citations Report or the Web of Science database.

Summary

The data collected through these three techniques (semi-structured interviews, online surveys, and documents from annual reports) complement each other and produced interesting material for analysis. The qualitative phase at the beginning helped to understand the atmosphere that accompanied scholarly communication behaviour. It led to questions that were then used in the quantitative phase. The content of the questionnaire also included open questions that allowed respondents to express their own opinions about the most important issues. However, these remain unanswered to a large extent. All closed questions were related mainly to the number and types of scientific publications. Documents retrieved from the annual reports expand the background of the number of publications in the chosen faculties.

6.4 Data analysis and presentation

Qualitative data

Creswell stressed that analysis of qualitative research “involves making sense out of text and image data” (Creswell, 2008, p. 183). Understanding the data that have been collected is very important for the encoding process. This is based on organising qualitative data into smaller categories that could be explored more in-depth. For this study the qualitative data were gathered from the semi-structured interviews. All interviewees followed the interview guide and I did not have to structure the obtained material. The participants understood my questions and the process was conducted without any obstacles.

I organised my data from the interviews into categories that related to my aims and research questions. This technique involves coding and classifying data in order to emphasise important features and findings. In addition, it allowed me to determine relationships between categories and to look for similar patterns in the responses. All of the categories I created had significant implications for the online survey’s design. I reused them to construct the questions and to categorise the free-text answers to the open questions in the questionnaire. This decision had an impact on further quantification of my qualitative data and made this process much easier. I could use the interview answers as if they were questionnaire answers and thus get a more responses rate. In the future stage they were also important to present my results.

First, I used two main categories that shaped my entire research – “Chemistry” and “Economics”. These categories were treated as different participation groups that were transformed into two main headings to present the study’s results. Once the data were divided I extracted other categories. I looked for similar patterns and defined them as follows:

- publishing behaviour,
- additional forms of dissemination of scientific output,
- factors determining and influencing the choice of scholarly communication channel,
- possibilities and constraints of an institutional repository,
- possibilities and constraints of open access.

After investigating publishing behaviour, additional forms of dissemination of scientific output, and factors determining and influencing the choice of scholarly communication channel, the results were sorted according to research experience. This division included:

academic staff and PhD students. It seemed to be relevant to assume that PhD students do not have as much experience as other groups of participants when it comes to publication activities.

Quantitative data

I designed the questionnaire by using the categories from the qualitative findings and literature review (Appendix B). After obtaining all of the surveys and closing the data collection process, the data were downloaded from the SurveyGizmo software into a Microsoft Excel sheet. The process was managed mainly manually due to difficulties with, for example, various spellings or the use of two languages (Polish and English) by some of the participants. Nevertheless, all data were correlated and segregated according to the main categories and divided between academic staff and PhD students.

Summary

I brought together the data from my qualitative and quantitative techniques in accordance with my aims and research questions. My strategy was to quantify the qualitative data. Responses related to the main categories were able to be converted into numerical form. Data were supplemented and merged into the Excel sheet that was used for statistical purposes for pertinent factors and to display data in a graphic way.

A combination of techniques can provide a more extensive approach to the aims of this study. Data were presented underneath the categories in a descriptive text, illustrated by diagrams and quotes from the interviews and open-ended questions. I used descriptive statistics to provide simple summaries of my findings. These helped to describe current scholarly communication behaviour in the two examined faculties. Working with my results, I resolved to use percentages for more general questions such as: “Do you think that a repository would be needed for your university?” where the possible answers can easily be presented. When describing the more specific questions I used the number of responses to give an accurate picture of the answers received. It has to be stressed that for questions with multiple answers, the figures given are number of answers provided by participants, not the number of respondents. I relied on descriptive statistics and visualisations in the form of diagrams to present collected data.

6.5 Limitations

Several limitations of this study need to be acknowledged. The major constraint of this project is the low response rate. This may be related to the following factors:

- The selection of representative groups is limited to active PhD students and academic staff.
- The study ignores other groups, such as librarians, who could have a significant role in the scholarly communication process at the university and this had an impact on the response rate.
- Only two scientific disciplines were chosen to conduct the research.

In the initial phase this thesis was to be a comparison of two Polish universities, but the great difficulty in obtaining responses to questionnaires limited this work to a single study. At the beginning the online survey was sent to two technical universities, but nobody answered from the second university. This forced me to limit the entire project to only one university. Regarding face to face interviews, scientists had to be encouraged to participate in this research, and, eventually, five interviews were conducted. A similar situation occurred with the online surveys. In the first round of the survey I received only 12 questionnaires. The second effort at data collection increased this number to 20. The

last attempt to induce scholars to complete the survey ended with 50 questionnaires that could be analysed. The researchers did not give specific reasons as to why they did not want to participate in the study, however, a recurring issue was lack of time and work overload. These limitations mean that my findings need to be interpreted carefully in terms of its consequences for the study's validity. More research is required to generalise these findings for the entire population.

The choice of two disciplines, i.e. chemistry and economics, was not accidental. I tried to examine whether disciplines belonging to science and the social sciences in terms of scholarly communication differ or are similar. This restriction may be completed in the future by adding more disciplines.

It is difficult to explain why only about a third of researchers chose to take part in the study. This may be related to the reality that in Poland there has not been a general discussion about scholarly communication in the public forum. This could be confirmed by the fact that I did not find any similar studies conducted at other universities. In addition, knowledge about open access or using institutional repositories is still limited and more studies are needed in order to understand why.

6.6 Ethical issues

Each research project is connected with certain, specific issues related to ethics. My thesis is based on the Polish Code of Ethics for Scientists by the Polish Academy of Sciences (Polish Academy of Sciences, 2012). This determines, for example, that all research involving humans should be conducted in accordance with accepted principles of the Declaration of Helsinki, the Charter of Fundamental Rights of the European Union and the Convention on Human Rights.

For the semi-structured interviews as a method of data collection these issues were based on respect for interviewees and recognition of their rights. Creswell points out that: "Interviewing in qualitative research is increasingly being seen as a moral inquiry. As such, interviewers need to consider how the interview will improve the human situation (as well as enhance scientific knowledge)" (Creswell, 2008). All interviews were conducted with respect to the confidentiality of individuals. Respondents were asked for permission to record the interview on a mobile device and were also informed that they could stop the interview at any time. Also, the online survey did not allow for identification of the person, unless the respondent chose to reveal him or herself.

I also decided not to mention the name of the technical university where the study was conducted. This decision was made upon consultation with several researchers who did not want to disclose the name of their place of work. There is still the risk that it will be possible to identify the university, but I have tried to make relevant decisions to weigh confidentiality with the credibility of the study. My readers need some specific types of information or background in order to understand the context of my research.

Chapter 7. Results

This chapter introduces the results gathered from the interviews and online surveys. The data are presented in various forms, i.e. as charts, descriptive text and direct quotations taken from the interviews and open-ended questions from the online questionnaire. It should be emphasised that the quotes from the Polish interviews were translated into English. I tried to keep the original form and meaning. The online questionnaire was provided only in English. All quotes from the questionnaire as well as one interview are presented according to the form in which they were written or spoken by the respondents. Spelling is original and I did not improve any linguistic or grammatical errors.

The data are presented in accordance with the main categories as outlined in Chapter 6. The results were divided into two main groups related to the scientific disciplines: chemistry and economics. I organised my presentation under the main headings that report on the answers to the various questions.

To ensure confidentiality of all interviewees, I used codes introduced in the table presented in Chapter 6 (Tab. 1). Comments from the open questions in the questionnaire were not marked with the respondents' IDs.

7.1 Chemistry

The Faculty of Chemistry was represented by 30 academics: 7 Professors, 4 Associate Professors, 4 Assistant Professors, 15 PhD students and 1 person who indicated him/herself as 'other' in the first question and later assigned him/herself to the group of PhD students. The Faculty of Chemistry is one of the largest faculties at the university examined in this paper.

Regarding the scholars' publication activities, I turned to the last two annual reports published by the university. Together, all scientific employees at the Faculty of Chemistry submitted in the year 2011 a total of 841 scientific papers, including 153 articles in journals indexed in the JCR database and 73 articles from the Polish Ministry's List B (see Chapter 3). The total number also includes 36 monographs and book chapters. The rest of the publications that were mentioned in the annual reports were: scripts, conference papers and items assigned to 'other publications'.

In 2012 the total number of publications declined to 789 items, but the number of articles indexed by JCR grew to 205. The number of articles published in scientific journals from List B also increased and was 79 items. The number of monographs and book chapters also noted a significant increase to 88 items.

Publication behaviour of academic staff and PhD students

Publication activities vary between scientific fields as well as individual authors. The participants were asked to answer several detailed questions in order to seek to understand and map the scholars' publication behaviour.

Six Professors and three Associate Professors in answering the question regarding their publication history stated that 'more than 20 years' have passed since they published their first scientific item. One Associate Professor and three Assistant Professors noted that their publication history oscillated 'between 5 and 10 years', and one Assistant Professor chose the option 'between 11 and 19 years'.

For Professors, in terms of number of publications per year, the most common answers were 'more than 3' and '3' publications per year. More than half of the respondents chose 'more than 3' or '3'. Associate Professors and Assistant Professors selected options: 'more than 3', '3' or '2' publications per year.

Eight PhD students indicated that ‘within 12 months’ had passed since their first publication was submitted and seven of them chose the option of ‘between 2 and 5 years’. Five PhD students published ‘2’ items per year, four PhD students – ‘3’ items per year, four PhD students published just ‘1’ item per year and two PhD students – ‘more than 3’ items per year.

The next section of the questionnaire required that the respondents give some information on the types of publications. The participants could also choose ‘other’ and write in an item that did not occur in the listing. They added materials such as: posters, patents, reviews and handbooks. The results obtained from the academic staff (Fig. 4) and PhD students (Fig. 5) are presented below. Two charts show the number of responses and it has to be stressed that some participants marked more than one option.

Commenting on this issue, AP1 said that:

In Chemistry, due to the huge number and dynamics of research, the most common form of publications seems to be articles. I think, scientific monographs are published as well, but at the later stages of the career when the researcher has already established a position in the scientific environment.

PhD2 also highlighted that:

We usually start from publishing articles or conference papers...sometimes posters. But the conference papers are not very popular because we don't have the chance to go abroad. So everything happens on the local level and they are not really awarded by Ministry's points. Still it is better to have a paper from a Polish conference than nothing.

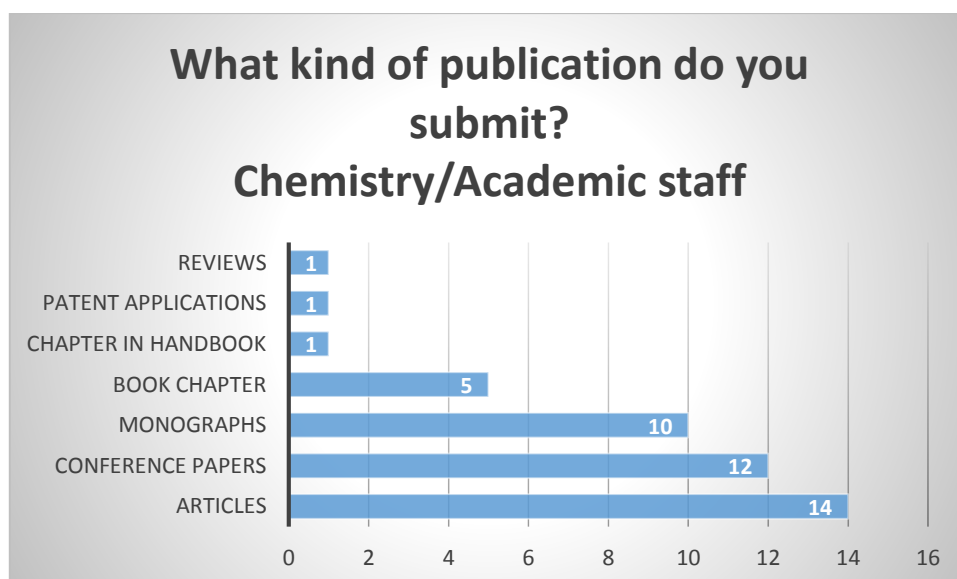


Fig. 4 What kind of publication do you submit? Chemistry/Academic staff

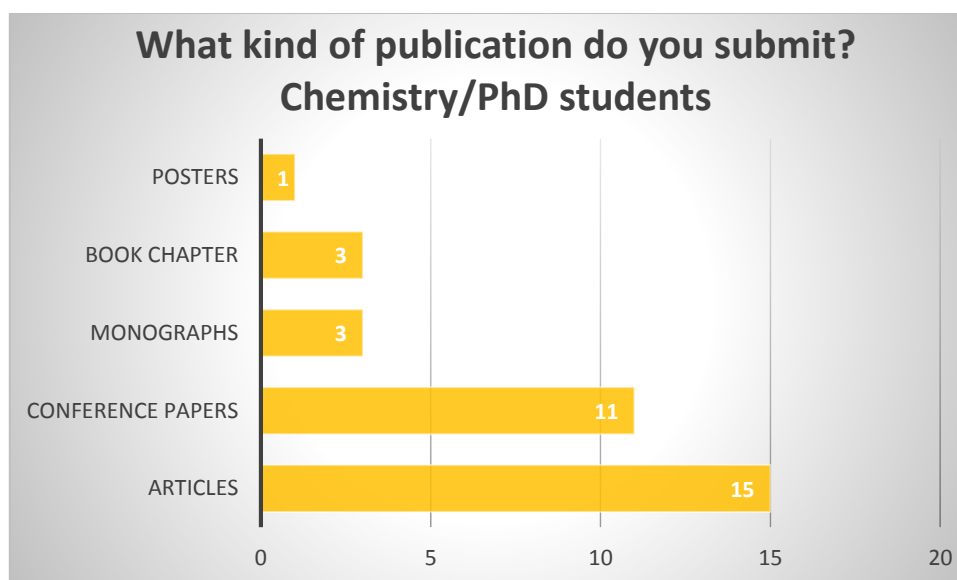


Fig. 5 What kind of publication do you submit? Chemistry/PhD students

From these data it can be seen that ‘articles’ mainly dominated the publication output in both groups. The second most commonly chosen option, ‘conference papers’, points to the conclusion that there are no significant differences between staff and students, except for choosing monographs. This could be explained by the academics’ experience and career level. In addition, professors and people applying for habilitation need to write a monograph as a part of the process.

The survey included a set of questions that explored the publication channels used by the participants. Because multiple answers were possible, the participants usually indicated more than one option. The most frequent response for both academic staff (Fig. 6) and PhD students (Fig. 7) was: ‘Printed/electronic subscription based journals’. This may reflect the fact that periodicals are still the most accepted channels for transmission of scientific output in chemistry. From the data shown below it can be seen that none of the academic staff use a personal website to publish their scientific findings. Among the students this method was indicated two times. In addition, one academic pointed to ‘Publishers in the case of books’ as a type of alternative channel. Interestingly, just over half of the PhD students selected open access journals when only one academic indicated this option. Only a small number of respondents in both groups pointed to the institutional or disciplinary repository as a type of channel used for publishing.

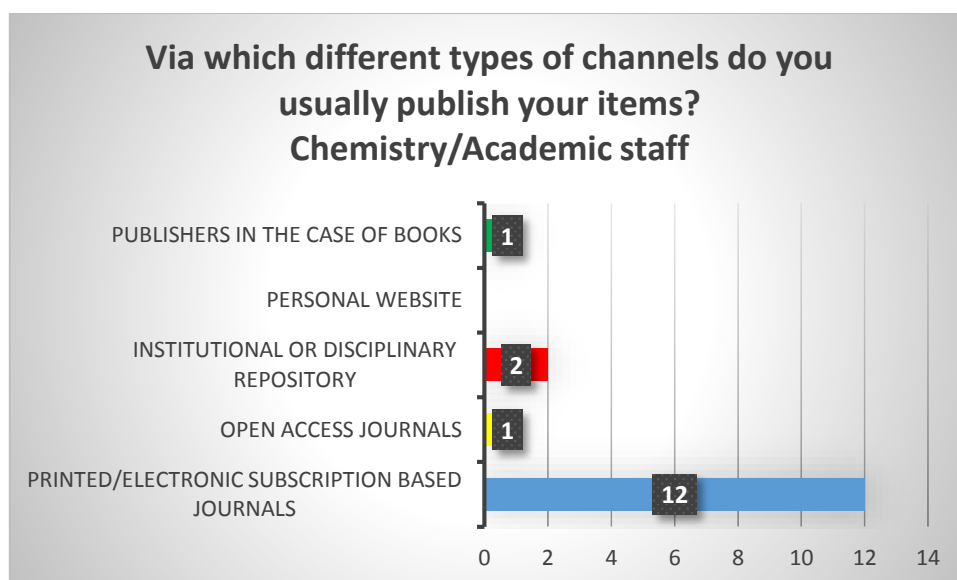


Fig. 6 Via which different types of channels do you usually publish your items?
Chemistry/ Academic staff

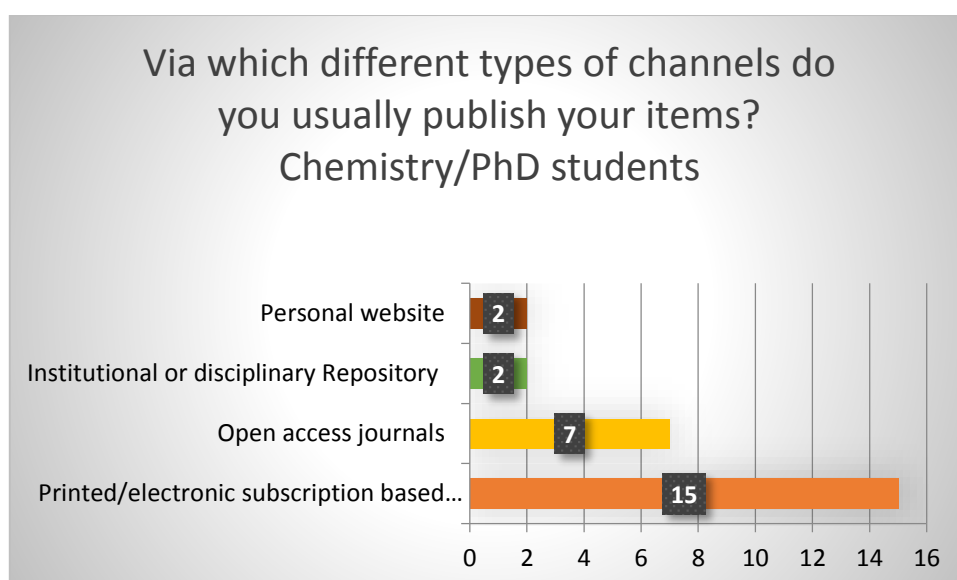


Fig. 7 Via which different types of channels do you usually publish your items?
Chemistry/PhD students

The next issue describes the types of publishers that respondents usually publish their scientific output with. Five main types of publishers were presented: international commercial publishers, national commercial publishers, non-profit publishers, domestic university journals/publisher and learned society periodicals. As shown in Figure 8 and Figure 9, both groups pointed to ‘International commercial publishers’ as the most common publisher type. This may be related to the view that chemistry is an international scientific discipline. When talking about this issue, PhD2 said: *“PhD students, from the very beginning, are prepared to publish in English. Our work is based on the international research so.....There is no surprise that we have to choose to publish our articles in foreign journals”*. ‘National commercial publishers’ was the second common option for all participants. Interestingly, the data showed that academic staff and students indicated ‘Non-profit publishers’ a 3 vs 4 times. In addition, PhD students selected ‘Domestic university journal/publisher’ three times and ‘Learned society periodicals’ two times. The last two options turned out to be of lesser importance among academic staff.

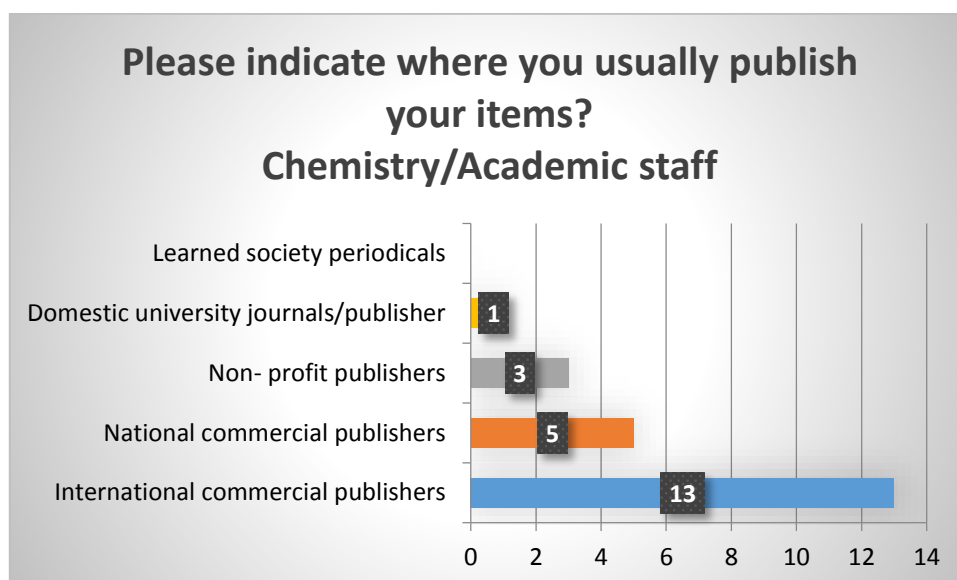


Fig. 8 Please indicate where you usually publish your items? Chemistry/Academic staff

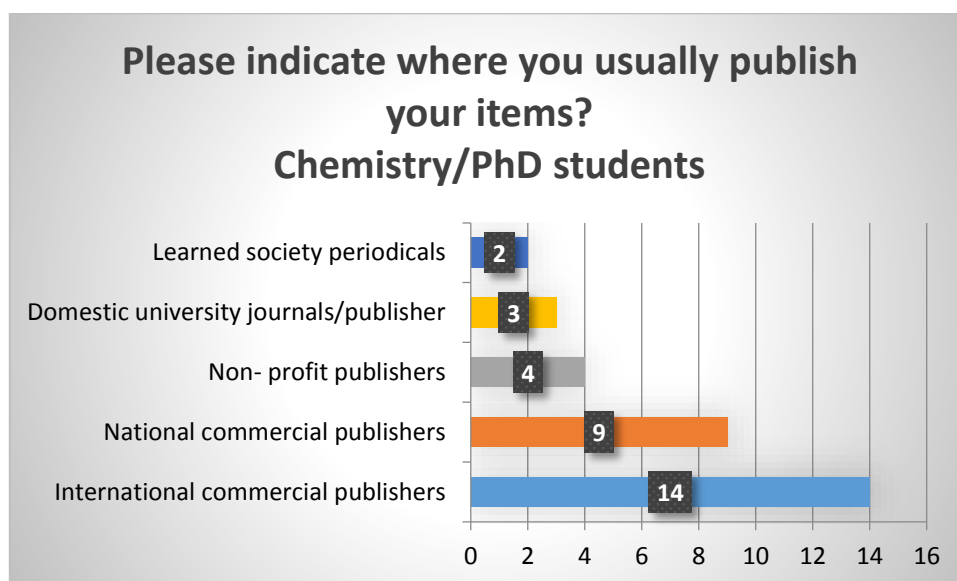


Fig. 9 Please indicate where you usually publish your items? Chemistry/PhD students

Information about self-archiving scientific output was the next part of the survey. Questions regarding the issue were preceded by an explanation of the terms: "preprint" and "postprint". AP1 commented: *"Honestly, I only recently met up with these concepts. For me....the article was always a final form of publishing. I did not wonder if there are any other methods to archive scientific content except those presented by publishers"*.

In response to the question: "Have you ever deposited your preprint items in an open repository?", 100% of the academic staff indicated 'no'. A similar question about archiving postprints in repositories showed that 87% of academic staff have never used this method either. A total of 81% of PhD students who were surveyed reported that they have never deposited a preprint and 73% of them have never archived a postprint.

The next questions were devoted to preferences regarding assigning copyright to publishers. As Figure 10 shows, half of the academic staff have no preferences. AP1 also confirmed that this issue is rarely considered: *"I don't really have time to think about it. I just want to publish my item as soon as possible and I usually rely on publishers. But*

maybe this is a high time to change my attitude?”. Only three of the academic staff members indicated “Assign copyright”, and 4 of them chose the option “I don’t know”.

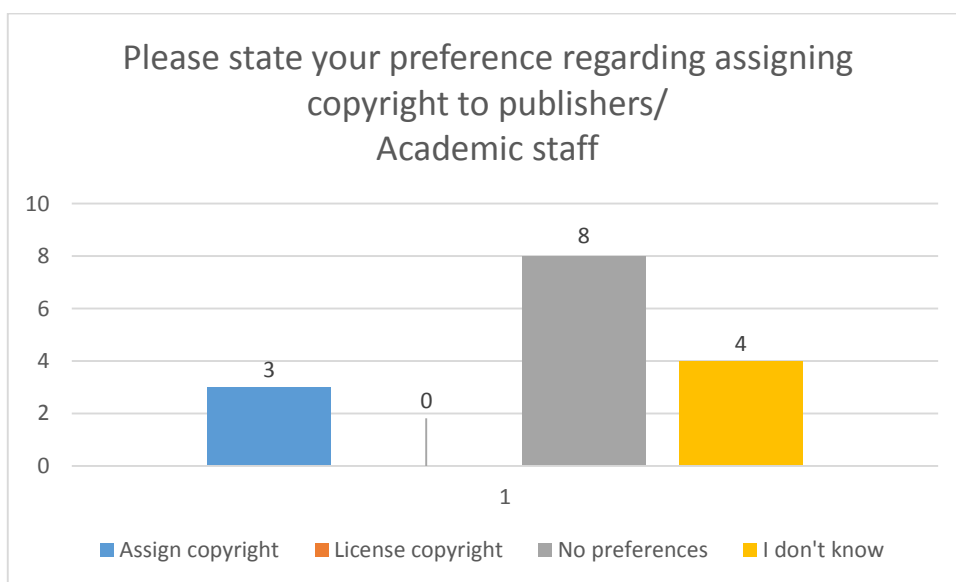


Fig. 10 Please state your preference regarding assigning copyright to publishers/ Chemistry/ Academic staff

As to a separate question: “Have you ever refrained from submitting an article to a journal because their copyright policy did not suit your preferences?”, 100% of the academic staff selected option ‘no’. By asking about Creative Commons licences, the results show that 87% of academics have never heard about these licences. Also, AP1 had nothing to add regarding this issue.

Comparing to data received from the PhD students (Fig. 11), it can be noticed that six students do not have any preferences regarding assigning copyrights to the publisher. PhD1 stressed that: “Last time I was checking if it will be possible to make my article free available but looks it was impossible”. A minority of the participants (two PhD students) selected the ‘License copyright’ and ‘Assign copyright’ options.

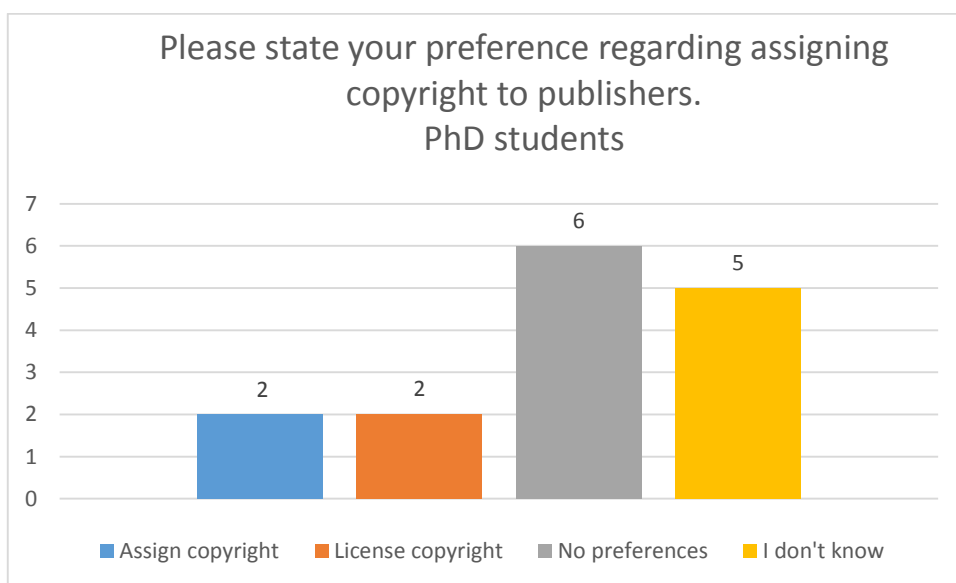


Fig. 11 Please state your preference regarding assigning copyright to publishers/ Chemistry/PhD students

Knowledge about Creative Commons licences is slightly greater than academic staff. Of all PhD students, 20% have heard about these licences. PhD1 added that: *“I am quite familiar but I have never had chance to use them”*.

These responses expose some of the divergent opinions and knowledge about copyright issues. The data received from these questions cannot be applied broadly, however, the data could suggest that there is lack of interest related to this topic.

Additional forms of disseminating scientific output

In the area of sharing scholarly output there are different informal services used to present the research to a wider audience and to promote personal achievements. On the question: “Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?”, six respondents from the academic staff indicated a positive answer, as illustrated in Figure 12. The comments that the participants left in response to the related open-ended question demonstrate that scholars use social networks such as ResearchGate more often (87%) than a personal website. AP1 stressed that:

Yes.....Nowadays we have to think also about....I called it “scientific marketing” [laughing]. It is not enough to write a good article for famous journal. Now you have to tell people that you have published the article in.... On the one hand it's good. Frankly speaking, just recently I have started using ResearchGate. Suddenly, this service is very popular. Previously, I have never thought about that kind of tools. On the other hand, most people use these tools only to gain citations. And also this is really time consuming.

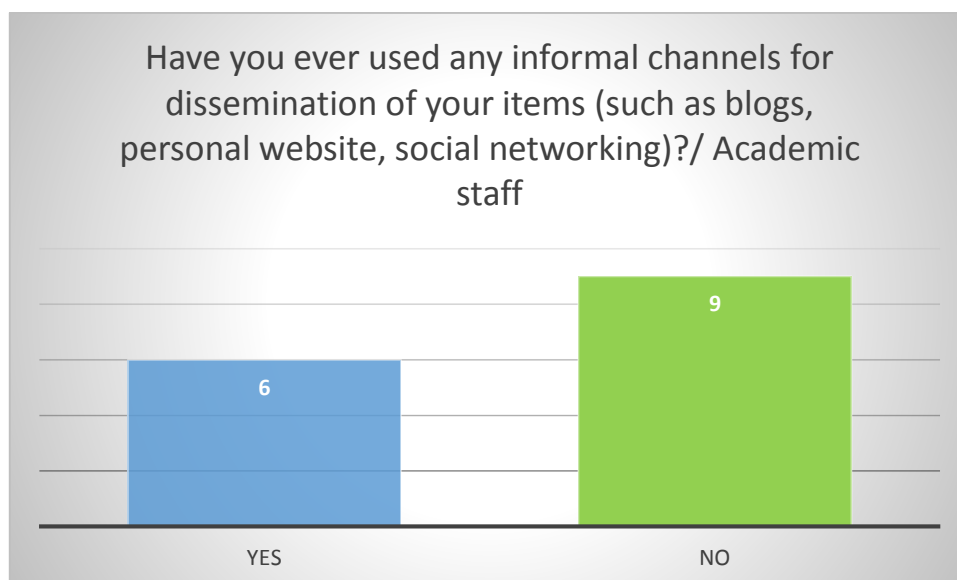


Fig. 12 Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?/ Chemistry/Academic staff

Slightly different results emerged in the group of PhD students. Only three of them were using other forms for dissemination of their scientific achievements (Fig. 13). PhD1 commented on this issue as follows: *“I was trying to set up research website for PhD students but my supervisors didn’t really like that idea”*. Two students indicated social networks and one chose a personal website.

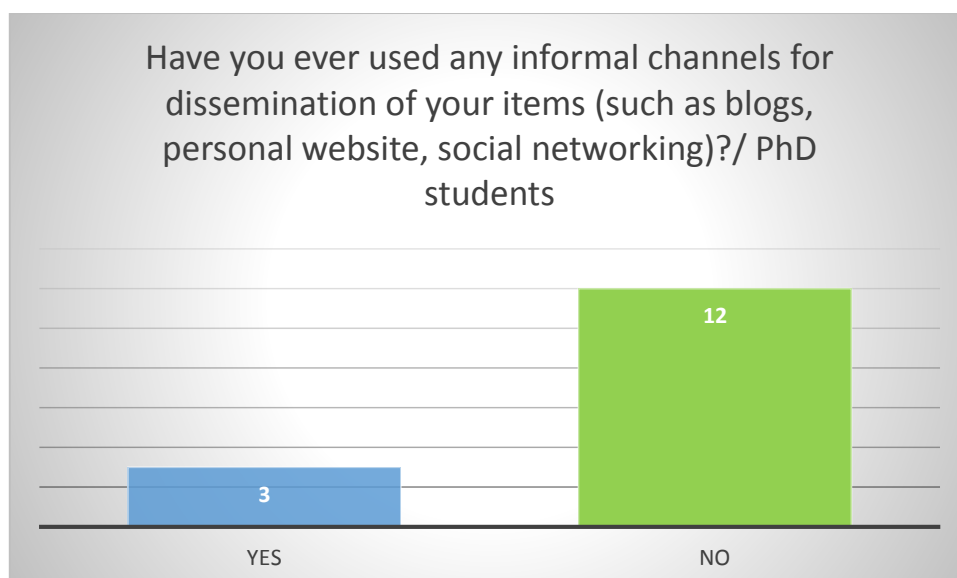


Fig. 13 Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?/Chemistry/ PhD students

Interestingly, the data yielded by those questions suggest that academic staff are more comfortable than PhD students with the idea of using informal channels to disseminate scholarly output or to present information about it.

Factors determining and influencing the choice of the scholarly communication channel

The survey included a section that touched upon the factors influencing the scientists' choice of publication channel. I wanted to know what kind of circumstances are most significant for participants during the selection process. Respondents were asked to indicate several choices from the list and they could also add their own factors.

The diagram below (Fig. 14) shows all of the items that the academic staff listed as influential. Respondents highlighted a number of major themes, e.g. high reputation of the journal, Impact Factor, points awarded by the Polish Ministry of Science and Higher Education and indexing in the Web of Science. This is convincing evidence showing that scholars think about prestige and value top-tier journals.

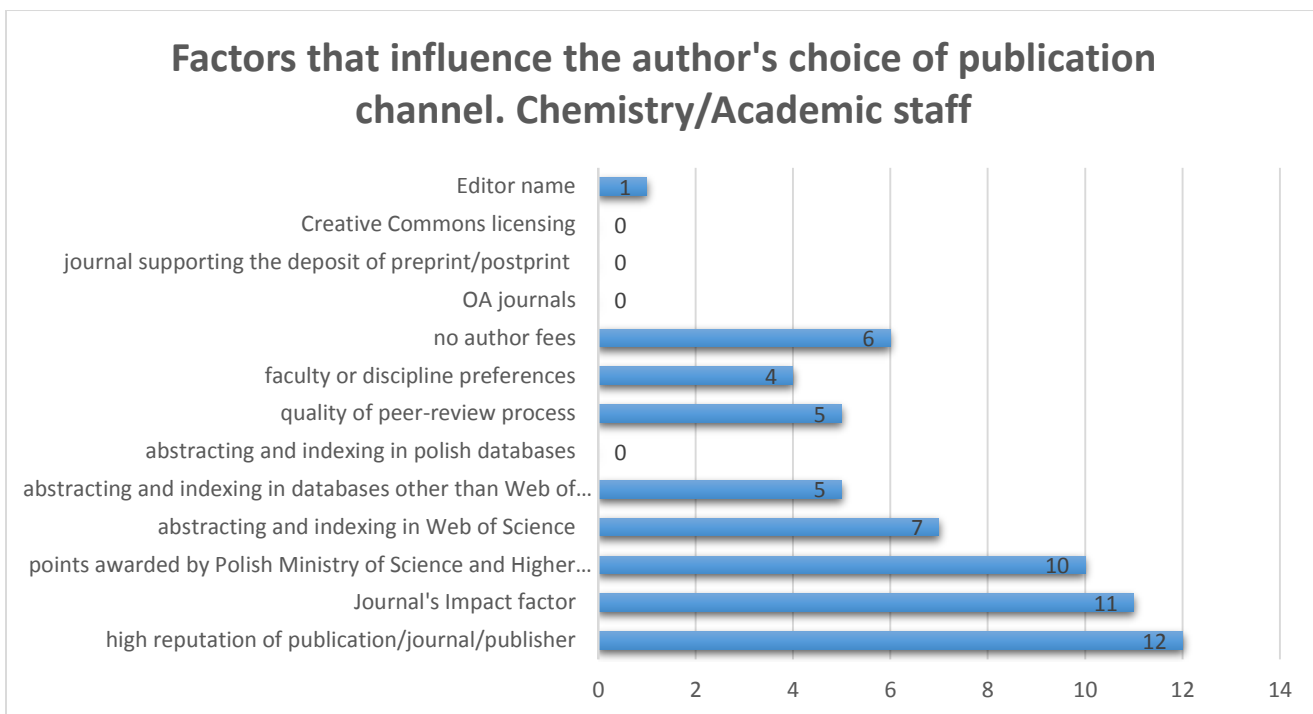


Fig. 14 Factors that influence the author's choice of publication channel /Chemistry/Academic staff

AP1 stressed that:

Well, regarding the crucial factors when it comes to decide where to publish my output, first of all is rank of the journal and its Impact Factor. This is most important to me not only because of the prestige, but also due to the formal requirements imposed by the university and my department. As an employee of the university, I'm also obligated to collect points for my publications. They are needed for my evaluation and promotion.....and of course they are essential in the parametrisation process established by our Ministry.

Among the PhD students the same question closely replicated the results received from the academic staff. As Figure 15 shows, students also chose to publish in well-known periodicals. In addition, they signalled the faculty or supervisor's preference in terms of journal selection. Discussing this issue, the PhD1 added: *"Always, the first factor is my supervisors because they made the choice. Of course we have some independence and we can choose something better. Next factor is Impact factor, of course. And I tried to think about open access, of course, but it wasn't successful, so...."* PhD2 also highlighted that: *"My supervisor always decides where to publish our articles. I think, for him, the most important factors are points from the Ministry, you know, and Web of Science"*.

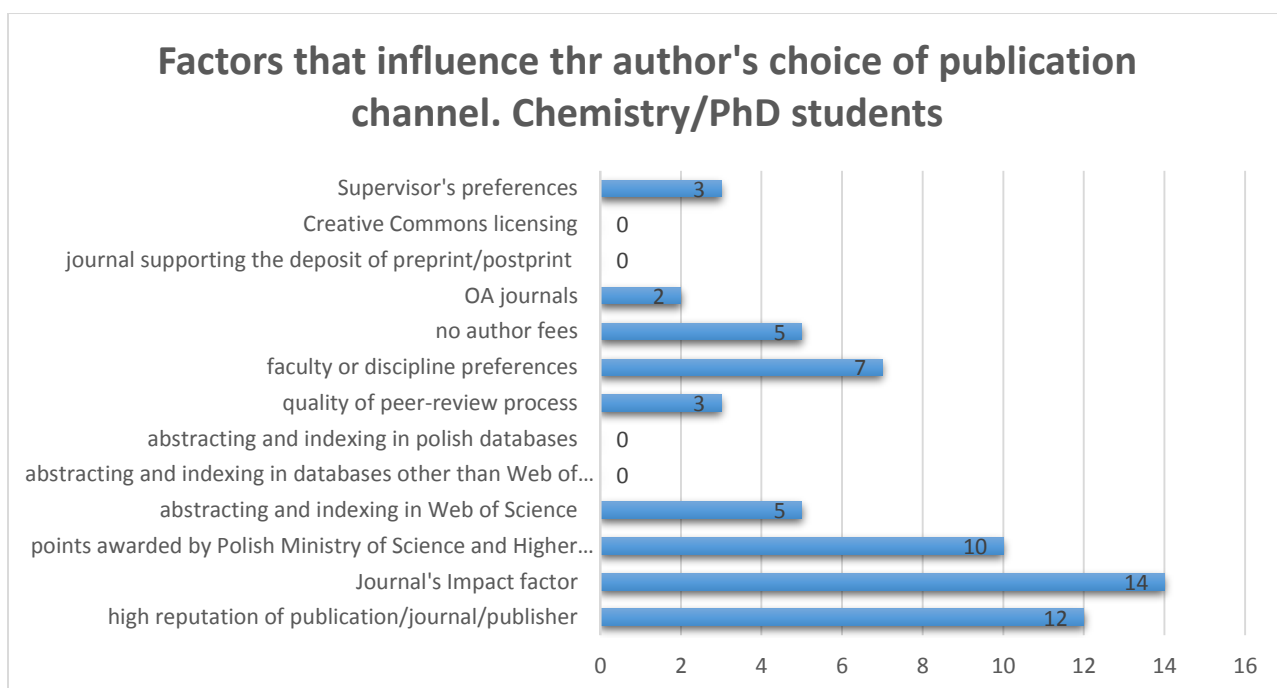


Fig. 15 Factors that influence the author's choice of publication channel Chemistry/PhD students

The combination of factors mentioned above points to the interpretation that chemists, even PhD students, are motivated to publish in international, reputable journals in order to collect points from the Ministry.

Possibilities and constraints of an institutional repository

Another set of questions provided data that illustrate the knowledge of and attitudes towards institutional repositories. To understand the survey's results it has to be mentioned that in Poland there is still a small number of repositories. However, most universities have digital libraries. The distinction between these two services was probably confusing for all respondents. Most of them did not have enough information to distinguish an institutional repository from other types of digital libraries. The university where the study was conducted does have a digital library but not an institutional repository. However, 37% of respondents who represented the Faculty of Chemistry indicated 'yes' for the question of having an institutional repository (Fig. 16). The figures are percentages of the respondents.

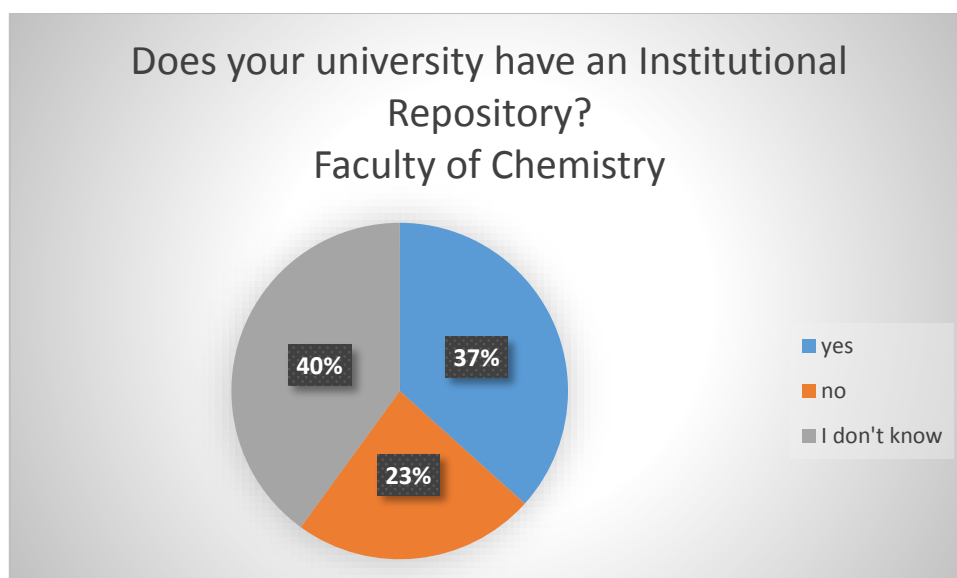


Fig. 16 Does your university have an Institutional Repository? Faculty of Chemistry PhD students & Academic staff

AP1 confirmed the results: *“Is Institutional Repository our digital library? No? Ok then. So it is something like PubMed? I understand now”*. PhD2 supported the response and also confused a repository with a digital library.

Additionally, participants were asked to indicate whether they have ever used this kind of service before. Of all the respondents, 57% reported that they did not deposit their publications, while 43% had archived a thesis, lectures, and postprints at the university. Interestingly, they probably had to use a digital library and asked to store their items. These respondents could have understood the term ‘publish’ differently, for example, by making their scientific content available for readers. AP1 noted that: *“No... I have never used any repository but I think it will be useful for students”*. Using any other repository (disciplinary, national, etc.) was chosen by 11% of academics. PhD1, answering the question if he/she intended to use any institutional repository in the future, said: *“If it would be my publication only – I would consider that. But when there are a lot of authors – it is complicated I think”*.

I think the findings regarding this item provide their own value for future recommendations. The academic community needs further information about using institutional repositories and digital libraries. The survey illustrates the need to clarify these two confusing terms.

The response to the question: “Do you think that a repository would be needed for your university?” gave evidence of moderate interest in setting up this service. A total of 68% of the participants from chemistry indicated ‘yes’ and some of them provided comments concerning this issue. Below, all the reflections are divided into two groups: positive and negative. In particular, the positive comments are mainly about the opportunities that are offered by the repository. The negative responses illustrate that there is no need among scholars to set up an institutional repository.

Positive comments

- “that might be an open access publication”
- “some materials for students”
- “maybe it will spread our papers to countries with lesser ability to have access to journals”

- “we would become more aware of what kind of research academic colleagues are conducting”
- “to learn about activities of other faculties and to make research more interdisciplinary”
- “it is easier to find info about recent work done by co-workers from the university”
- “in case the local disc is destroyed”
- “easier access to information for students”.

Negative

- “scientific information (in chemistry) is well organised and all information is available, provided that respective journals are subscribed to”
- “there are enough accessible repositories”
- “this kind of repository probably won’t have any scientific value and only the university’s members will subscribe to it”.

Possibilities and constraints of open access

Open access was the last topic explored in the survey. This issue has a very broad spectrum and was divided into a number of questions. At the beginning, scholars were asked about their general awareness of open access (Fig. 17).

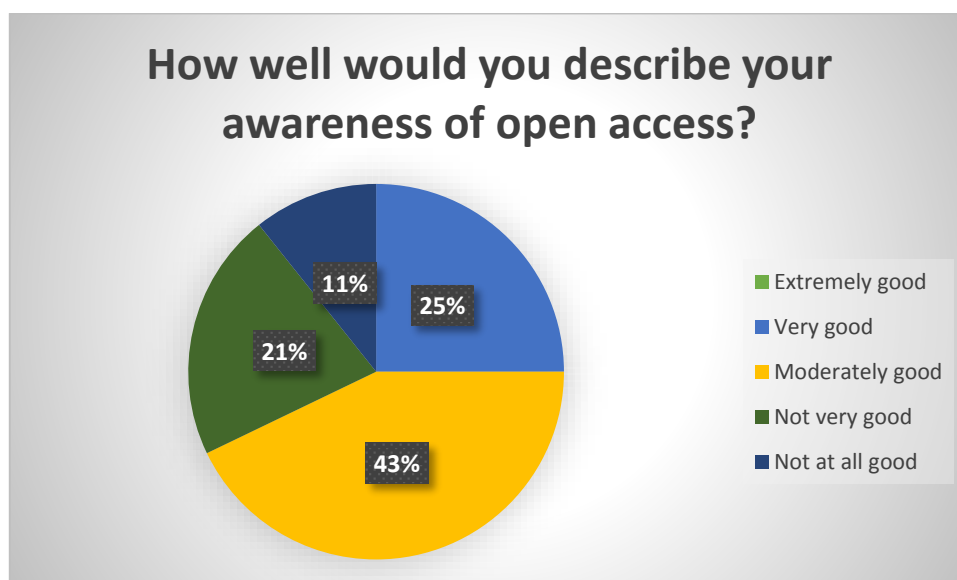


Fig. 17 How well would you describe your awareness of open access? Chemistry/ PhD students & Academic staff

Most notably, the percentage of respondents who rated their knowledge as “moderately good” reached 43%. One - fourth of the respondents identified their knowledge as “very good”, while nobody indicated “extremely good”. To determine what scholars truly think about open access, the question: “What do you mean by open access?” was asked during all of the interviews. AP1 stressed that: “*Open access is something important when you talk about international research and access to the new scientific output....*”. However, he did not provide a clear definition as to what it meant for him, and he described his view on publishing: “*But when it comes to publishing your articles, everybody dreams about Nature, you know. And they don’t really care if it will be open access or not, believe me*”. PhD2 added: “*For me it means that I have free access to the scientific articles*”. In addition, PhD1 said: “*I still don’t have idea what is going on....because....People are talking about everything is being open access – to make everything freely available, but it looks like nothing is freely available [laughing]. So it becomes kind of business, people*

still need to pay for this". PhD1 also highlighted that: *"I also read that some people believe, and it sounds crazy, that open access became like a religion and they don't want to be a part of this. They also discuss negative aspects of open access that it would be dangerous to make all research freely available for everyone. Especially in Medicine and Chemistry..."*.

Representatives of the Faculty of Chemistry, both academic staff and PhD students, were also asked about the number of publications they had in open access journals. The results are presented below (Fig. 18) and the figures are the number of respondents who answered this question. The vast majority of them reported that there is no such publication in their academic career.

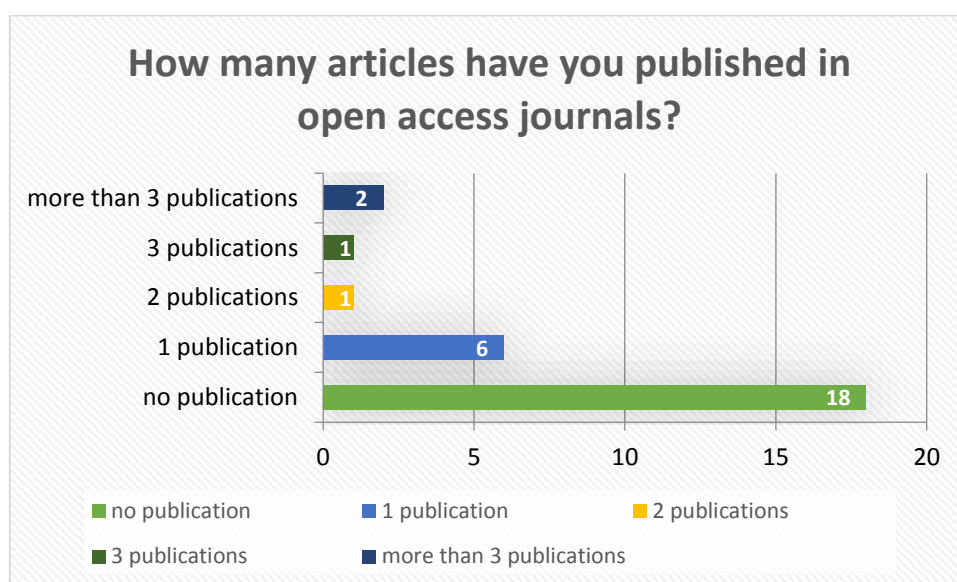


Fig. 18 How many articles have you published in open access journals?/ Chemistry/ PhD students & Academic staff

Six of the respondents had published at least one publication and another four published more than one, which in turn leads to the next open-ended question, i.e. if the scientists intend, in the future, to publish their work in open access journals and why or why not. Most of the respondents indicated 'I don't know' (43%). The unambiguous answers were divided in 29% for 'yes' and 28% for 'no'. The responses from the open section and the interviews expose some of the divergent opinions about this issue.

AP1 admitted that: *"I don't really know. Probably it will be dependent on the financial support from the grants or my university. I don't want to waste my private money and sometimes grants are not enough"*. On the contrary, PhD1 said: *"Absolutely, I would like to do this"*. PhD2 stressed again: *"It depends on my supervisor"*.

Comments from the open question were as follows:

- No, I do not intend to publish in open access journals in the future because of: "low quality journals, an unreliable peer-review process", "these journals are not acceptable worldwide", "no high reputation of the publication/journal/publisher", "additional payment is required", "if I have to pay for it".
- Yes, I intend to publish in open access journals in the future because of: "easier access and more readers", "after subsequent grants", "to increase citations", "if it is a good journal, why not", "I wish, but OA in better journals costs a lot", "more prestige", "other scientists can easily get access to it + it can give you citations",

“it (OA) helps disseminate results but it is too expensive for academic researchers”.

Only 37% of chemists reported that they promote and actively support the idea of open access. One of the common ways to do this was by: “trying to publish in good international journals which give such options”. AP1 and PhD2 did not advocate open access. PhD1 attempted to promote a few open access journals used by him during his research work. However, in terms of publishing he added that: “*First question of my supervisors is always about Impact Factor*”.

The survey also explored the scholars’ opinions about the Green and Gold roads in open access publishing. The graph below (Fig. 19) shows that up to 57% of respondents do not know which of these models is more appropriate for their discipline.

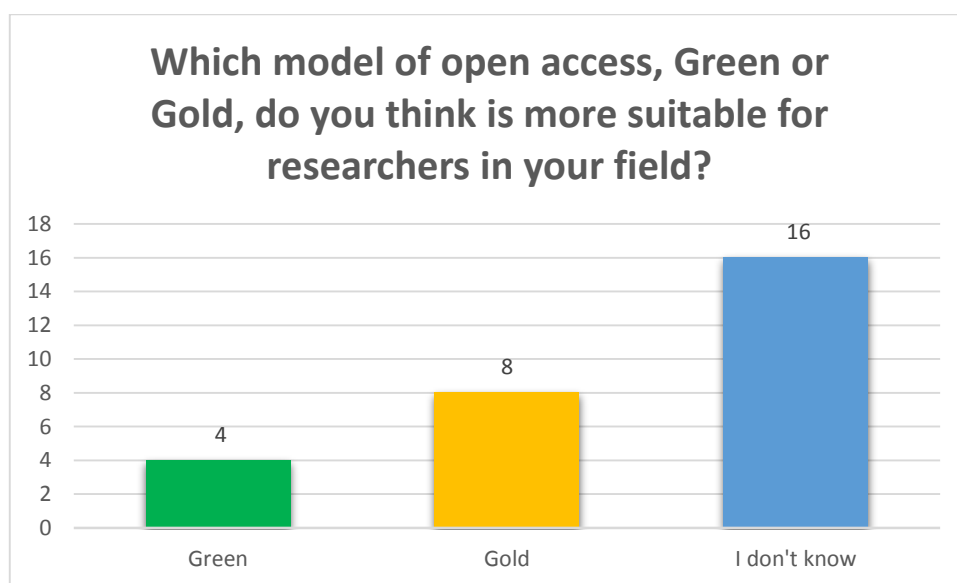


Fig. 19 Which model of open access, Green or Gold, do you think is more suitable for researchers in your field?/ Chemistry/ PhD students & Academic staff

Of the 12 respondents who identified their preferences regarding these models, most of them (8 respondents) chose the “Gold road”. There were some substantial variations in comments that supported this option : “*It is available for users immediately in a corrected form*”, “*open access must be truly open*”, “*It is more suitable for researchers in my field*”. AP1 also highlighted:

I think it is definitely gold with some kind of support from the university. I am not sure about green really but it looks like more time consuming and in my research field it is really important to reach an international audience quickly and officially. I also think that the gold road is more prestigious than the green one.

PhD1 also stressed that: “*I still don’t know but my supervisor said it is gold, yes, he said that in chemistry the more popular is gold....*”. On the contrary, PhD2 commented that: “*In my opinion, the gold open access is more suitable for Professors and Green is better for PhD students. It is not expensive at all and let us to be more visible for our colleagues from abroad*”. Commenting on Gold, one of the respondents reflected on the economic side: “*the money – Open access in Q1 journals costs a lot of money*”.

The financial issue was to some extent addressed in the next question about the Article Processing Charge (APC). Instead of inducing readers to pay for access to articles, some open access journals introduce a fee that is paid by the authors or funding agencies. The APC varies and depends on the journal's policy. A total of 78% of respondents reported that the APC is very expensive for them (Fig. 20). These findings may be related to the fact that open access publishing in many chemical journals that have a Journal Impact Factor costs large amounts of money.

API confirmed these findings: *“Yes, APC is very expensive for us. Not only because we are living in Poland. I spoke with my colleagues from the UK and for them it is also expensive . For example PLoS One journal – is extremely good, you know. But 2500 pounds for publication seems ridiculous to me”*.

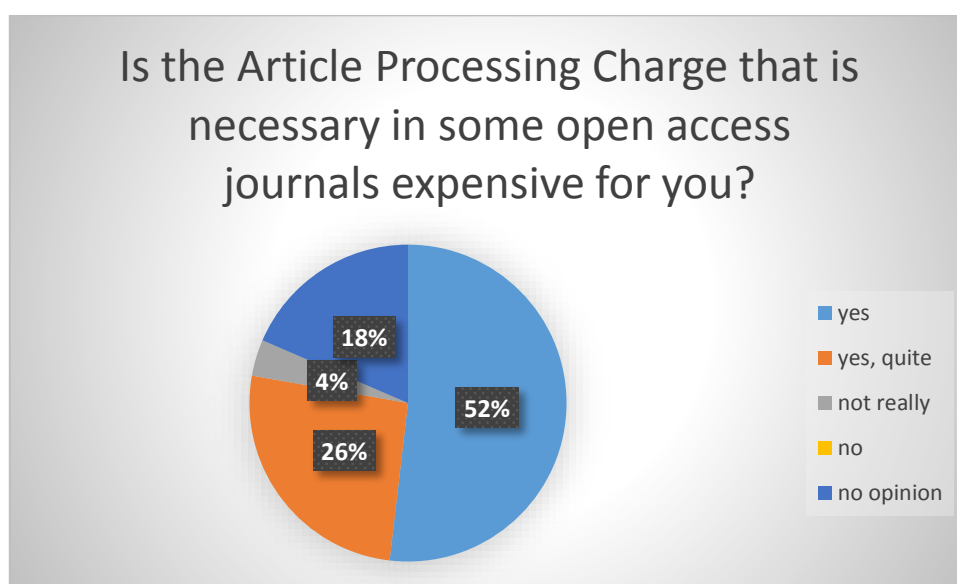


Fig. 20 Is the Article Processing Charge that is necessary in some open access journals expensive for you? / Chemistry/ PhD students & Academic staff

The survey also enquired into knowledge and opinions about open access mandates. Mandates are becoming more common. Worldwide, many universities and funding agencies have already introduced and adopted some regulations regarding publications in the open access model. Despite this fact, the overwhelming majority (89%) of respondents did not know about these kinds of policies (Fig. 21).

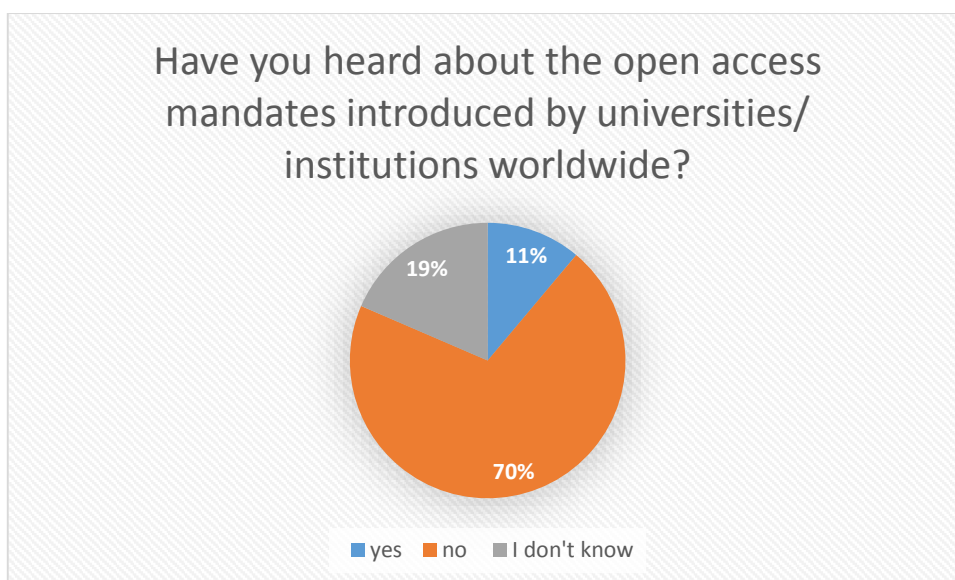


Fig. 21 Have you heard about the open access mandates introduced by universities/ institutions worldwide?/ Chemistry/ PhD students & Academic staff

AP1 said:

I don't really have idea about those mandates. I heard that something is going on in the EU but I don't...I just don't have time to read about it. However I think it will be a good idea for Polish science but unfortunately I am not sure if we can, as a country, if we can afford it. Now we are dealing with increasingly smaller number of students and free education at the state universities ... We can barely afford this. So, I don't want to be a pessimist, but I'm not sure if we could count on the government at this point.

PhD1 noted that: *“What I am thinking is that it is impossible for researchers to do this alone. The government should always take the first step”*. PhD2 also highlighted: *“Support should be on the governmental level. We need help from our Ministry”*.

Questions regarding introducing an open access policy and a data sharing policy at one's home university were the most frequently overlooked and left blank. They gained only a few positive comments: *“It is a good idea”*, *“I would welcome it”*, *“only review papers or theses which are already published”*, *“It's a fantastic idea”*; however, it appears to be of lesser importance than other issues in terms of open access.

Summary

In summary, this section, based on responses from the Faculty of Chemistry, showed that in the group of participants:

- Chemists reported publishing on average '3' or 'more than 3' items per year; and the 'article' is the most dominant form of publishing scientific findings for chemists;
- The most common answer about publication channel is a 'printed/electronic subscription-based journal';
- Chemists prefer to publish in international journals;
- Open access journals as a publication channel are more common for PhD students than for academic staff;
- International commercial publishers are the most common type of publishers among chemists;

- Chemists do not deposit their preprints;
- In some cases, chemists have their postprint items archived;
- Chemists do not have strong preferences regarding copyright or/and Creative Commons licences;
- Chemists do not have any strong commitment towards different informal channels. However, some chemists use them in terms of sharing scientific findings;
- The most influential factors for chemists, in terms of choosing a publication channel, are: high reputation of the journal, Journal Impact Factor, points awarded by the Polish Ministry of Science and Higher Education, or indexing in the Web of Science. In addition, PhD students reported ‘faculty or discipline preferences’;
- There is a misunderstanding among chemists about what an institutional repository is. They usually do not use this tool for dissemination of scientific findings;
- A majority of chemists have knowledge about open access issues. However, the open access publishing model has not caught on widely among chemists, except in some cases;
- Chemists usually do not have any preferences regarding Gold or Green open access.

7.2 Economics

The Faculty of Management and Economics was represented by 25 respondents: 2 Professors, 7 Associate Professors, 12 Assistant Professors and 4 PhD students. This is the smallest faculty unit at the examined university.

Two annual reports provided information for the overview of the number of publications by Economics academics. All scientific employees of the Faculty of Management and Economics submitted 282 scientific papers in 2011, including 10 articles in journals indexed by the JCR database and 124 articles from List B. It is worth mentioning that 103 articles from List B were in Polish and 21 were in English. Academic staff published 112 monographs and book chapters.

In 2012, the total number of publications was 279 items and the number of articles indexed by JCR dropped to 7. The number of articles published in scientific journals from the Ministry’s List B also decreased to 108 items and 89 of them were published in Polish. The number of monographs and book chapters plunged to 93 items.

Publication behaviour of academic staff and PhD students

Academic staff from the Faculty of Management and Economics were asked the same questions as the staff members from the Faculty of Chemistry. The first part of the questions referred to publication activities.

With regard to academic staff, two Professors and three Associate Professors reported that their publication history is ‘more than 20 years’. Three Associate Professors and two Assistant Professors chose the option ‘11-19 years’, whereas seven Assistant Professors indicated ‘between 5-10 years’. One Associate Professor marked ‘between 2 and 5 years’, and one Assistant Professor indicated ‘within 12 months’. I had doubts about the last two answers, as it seems rather impossible to have such a short publication history and to occupy those academic positions; however this may be explained by a misunderstanding of this particular question.

The academics were also asked about how many papers they tended to submit per year. Two Professors, six Associate Professors and seven Assistant Professors said they

published more than three items per year. One Associate Professor and two Assistant Professors published three items and two Assistant Professors just two items per year.

The PhD students turned out to be a very small group, though two of them indicated their publication history as being ‘between 5-10 years’, one chose ‘between 2-5 years’ and one PhD student chose the option ‘within 12 months’. When asked about the number of publications per year, one student reported ‘more than three’ items per year and the rest of the PhD students indicated three publications per year.

The survey yielded data about the types of publication. It is worth noting that this question allowed multiple answers. PhD3 commented that: *“Now, I think, I have to focus more on the articles, but conference proceedings are important as well.....and because of my profession –case studies and reports.”*

The obtained results are illustrated by the following two graphs: academic staff (Fig. 22) and PhD students (Fig. 23). Notably, the categories ‘monographs’ and ‘book chapters’ were indicated by researchers in Economics almost as frequently as the category ‘scientific articles’.

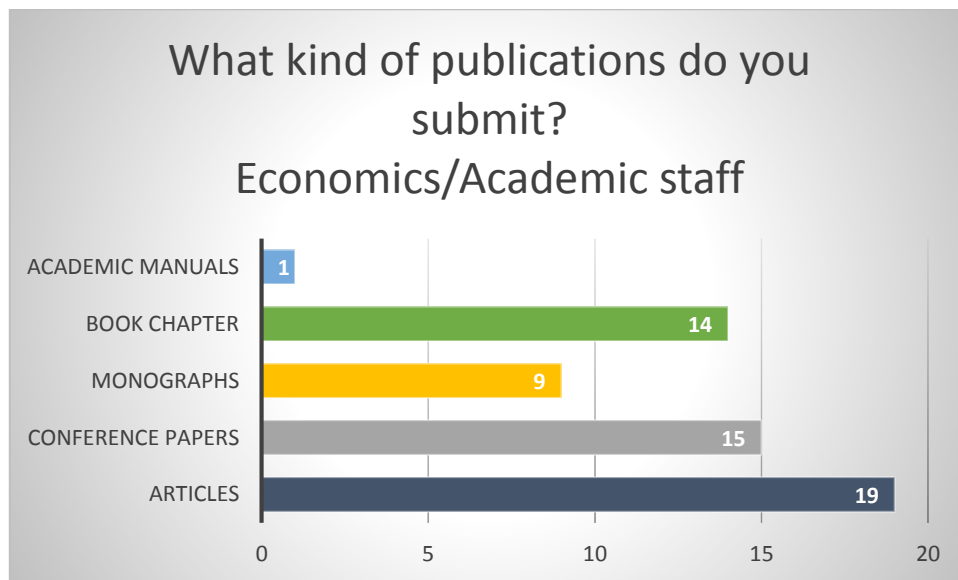


Fig. 22 What kind of publications do you submit? Economics/Academic Staff

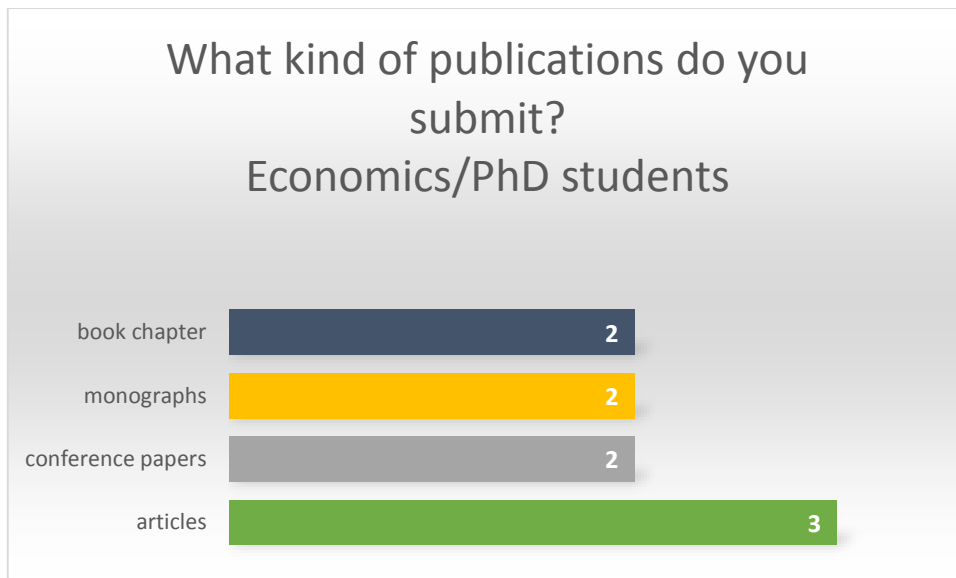


Fig. 23 What kind of publications do you submit? Economics/PhD students

Subsequent questions addressed the issue of different channels for submitting the scholars' items. The survey data show a strong position of subscription-based journals. Both groups indicated this method as the most common for them, as illustrated in Figure 24 and Figure 25.

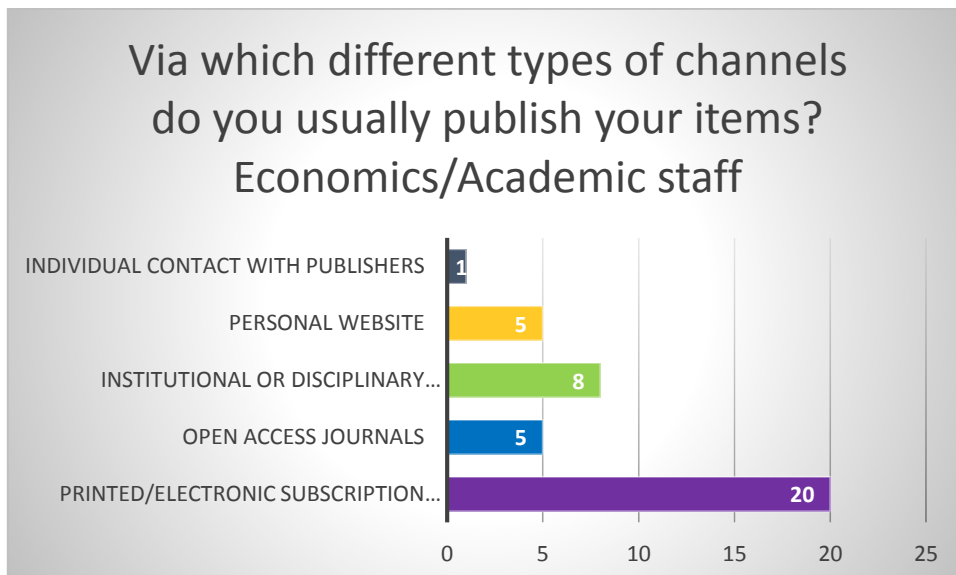


Fig. 24 Via which different types of channels do you usually publish your items? Economics/Academic staff

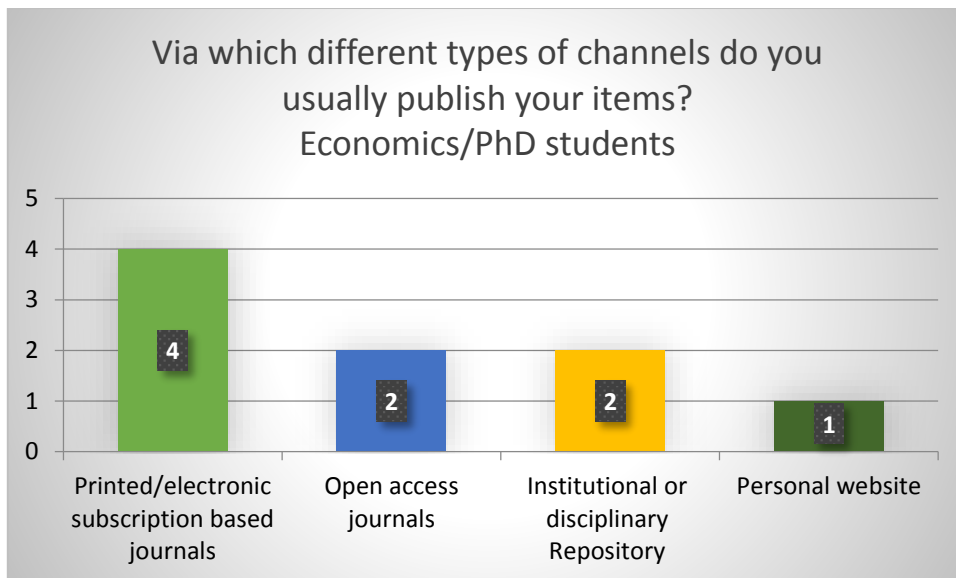


Fig. 25 Via which different types of channels do you usually publish your items?/
Economics/PhD students

Interestingly, the institutional or disciplinary repository was chosen eight times by academics and twice by students. It is difficult to account for the entire Faculty of Economics from this university, however, the data indicated existing interest in this kind of service. In addition, open access journals and personal websites were selected a few times by scholars in both groups.

The next question was devoted to the service where the scientific output was being published. Respondents could select from a list of five types of publishers. The figures below are the numbers of responses. It was recognised that academic staff use many different types of publishers (Fig. 26). Two dominant types were the university and national commercial publishers, but the international commercial publishers were also very high. AP2 said that: *“Just recently I have begun to publish in English. Earlier I primarily published my articles at the domestic market”*.

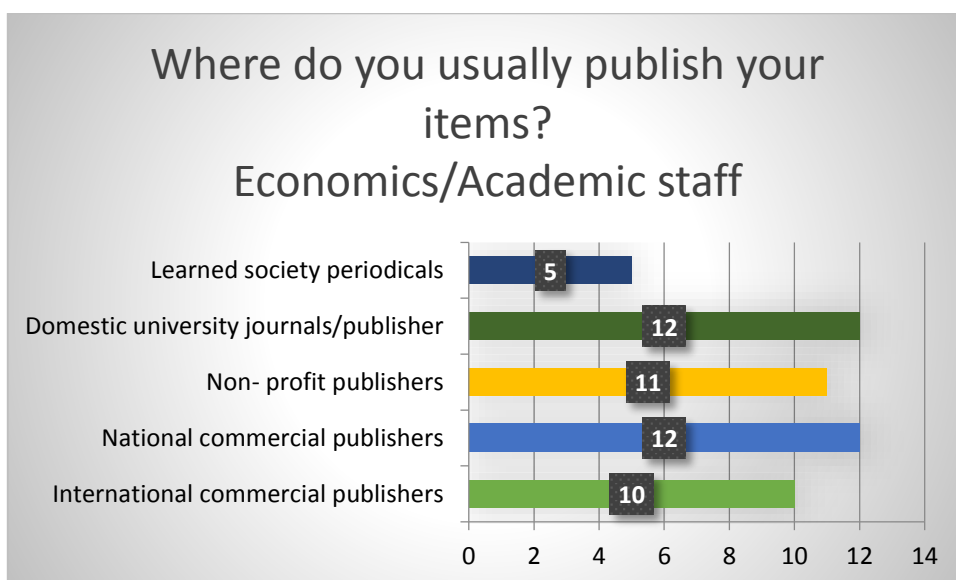


Fig. 26 Where do you usually publish your items? / Economics/Academic staff

Similarly, the doctoral students also indicated ‘National commercial publishers’ as well as ‘Domestic university journals/publisher’ options, as illustrated in Figure 27.

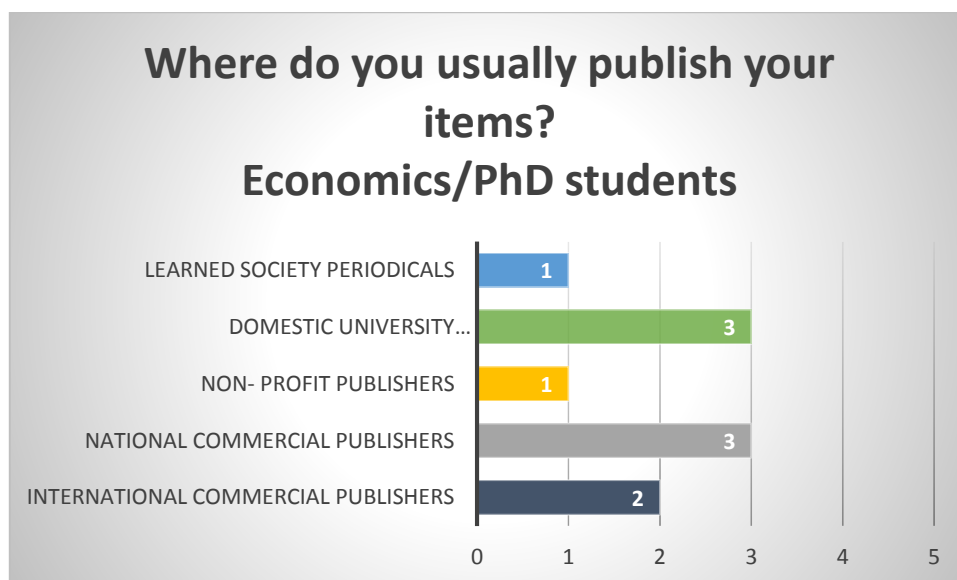


Fig. 27 Where do you usually publish your items? / Economics/PhD students

The survey included a number of questions regarding preferences regarding self-archiving. This section could be difficult to answer due to some confusion between the terms ‘preprint’ and ‘postprint’ for economics. As was mentioned in Chapter Two, in economics there is a strong tradition of publishing working papers. Working papers are pre-publication articles, reports or books, and may be treated as preprint publication. Not surprisingly, more than half of the respondents from the academic staff (62%) have deposited their working papers (preprints). AP2 confirmed that: “Yes, I know that my colleagues use RePEC to publish their working papers. Most of them have financial specialisation so they deposit reports, case studies etc.”. Of all staff who participated in the survey, 52% reported having published postprints of their papers.

Three of the PhD students published their preprints as well, and half of them had deposited a postprint.

The researchers were also asked a few questions that investigated their preferences regarding assigning copyright to publishers. In the aggregate, there was little interest regarding this issue. The number of academic staff members who indicated the ‘no preference’ or ‘I don’t know’ answers remained very high, as illustrated in Figure 28. At the same time, the ‘license copyright’ was selected by three of them. In addition, as for the question: “Have you ever refrained from submitting an article to a journal because their copyright policy did not suit your preferences?”, only 10% of the scholars indicated “yes”. AP2 commented on this issue as follows:

Until now, I have never taken into account such issues, but this year, once, it happened to me.....The publishing house asked me to sign a publishing agreement for an article. However, I had doubts and I submitted a query to the publisher. I didn’t receive any response so I didn’t sign the contract. The agreement was signed only by the second author which did not stop the publishing house from publishing the article.

The PhD students mostly did not pay attention to copyright (Fig. 29), and they have never refrained from submitting papers because of the publisher’s policy. Only one of them indicated the ‘License copyright’ option in the question about preferences.

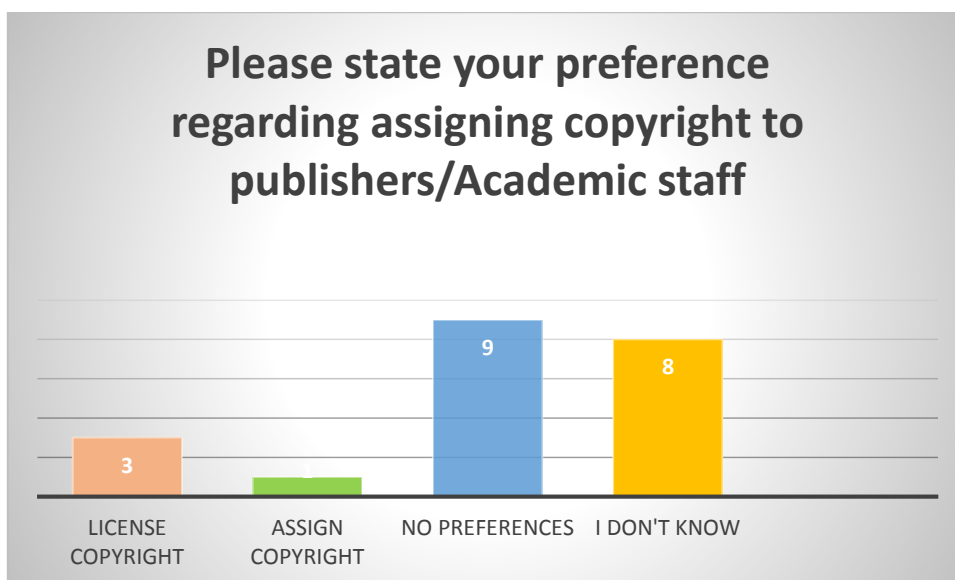


Fig. 28 Please state your preference regarding assigning copyright to publishers/ Economics/ Academic staff



Fig. 29 Please state your preference regarding assigning copyright to publishers/Economics/ PhD student

In the area of familiarity with Creative Commons licences, more than half of the respondents from the academic staff (57%) and three of the PhD students (75%) reported that they knew about these licences. However, AP2 stressed that: “Yes, I know them. But I don’t have experience to distinguish all of them. However, for me, the most suitable would be CC-BY-SA”.

Additional forms of dissemination of scientific output

Informal channels for dissemination of scientific output were the next topic of my survey. The three examples that were highlighted to the respondents included: blogs, personal website and social networks. As Figure 30 shows, over half of the academics from Economics used these channels of communication. Notably, the most frequent channel

turned out to be social networks as well as personal websites. By social networks the respondents meant academic services such as ResearchGate or Academia.edu. However, AP2 drew attention to the fact that: *“Personal websites are great but you must have some computer skills and time also to do this...I think”*. The same number of respondents indicated blogs, Facebook and Twitter. In addition, AP2 stressed: *“Yes, earlier I used to publish information about my scientific publications on the department’s website. They were just links to abstracts or full text, sometimes even library records. Since last year I also use Academic social networks such as Research Gate, as well as Facebook and email”*.

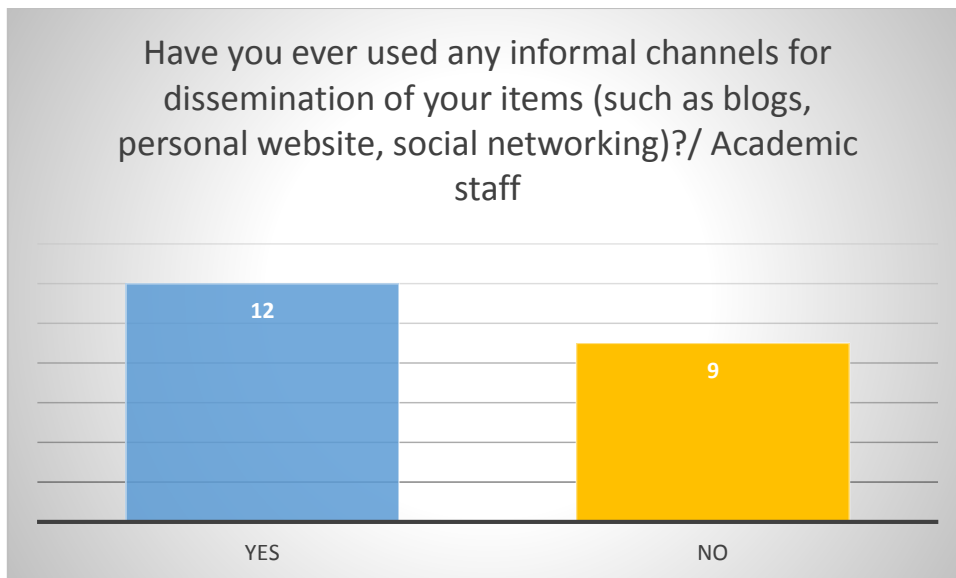


Fig. 30 Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?/ Economics/ Academic staff

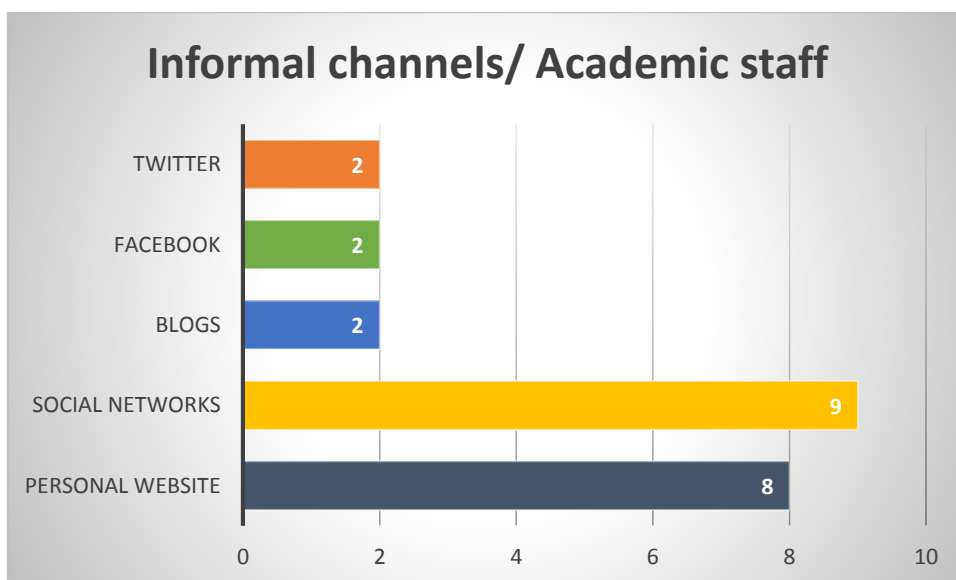


Fig. 31 Informal channels/ Economics/ Academic staff

Among the respondents from the doctoral students, three of them used informal channels to share their publications. All of them pointed to ‘social networks’ as the preferred service, but PhD3 added: *“Not really. I just use Linked In and it’s enough for me. But I do not exclude them in the future”*.

Factors determining and influencing the choice of scholarly communication channel

Several different factors were reported by economics respondents as influencing the communication channel for disseminating scientific papers. The researchers identified many issues that have an impact on their final decision. AP3 commented that: *“First of all it is a journal’s high reputation and its international range. The second factor is the Ministry’s points, firstly Impact Factor, and if the journal does not have it, then points from the B list. Thirdly, I pay attention to the indexing of this journal in the databases”*. As Figure 32 shows, a combination of factors had an influence on the academic staff. The element indicated by most was ‘points awarded by the Ministry of Science and Higher Education’. The next two core factors were ‘high reputation’ as well as ‘Impact Factor’. In addition, the response that also stood out was ‘abstracting and indexing in the Web of Science’. This result is interesting compared to the low number of indexed publications from the Faculty of Management and Economics in the JCR database.

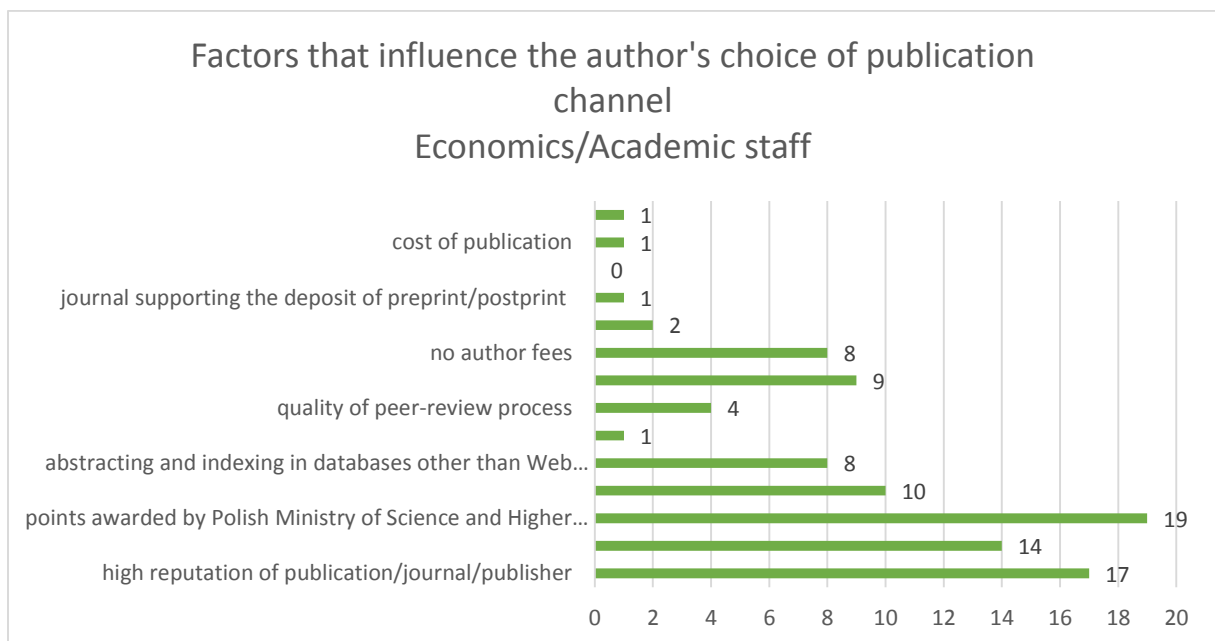


Fig. 32 Factors that influence the author's choice of publication channel Economics/Academic staff

The responses from the PhD students matched the results from the academic staff (Fig. 33). The students also emphasised the importance of points awarded by the Polish Ministry. Additionally, the Impact Factor and journal’s reputation were taken into consideration. PhD3 highlighted that:

When it comes to publishing my articles, it is actually how many points I can receive (...). I have to pay attention to points because I try to get different scholarships andI observedthat they are based on those points. Really. In the future I will focus on conferences that are indexed by the Web of Science and also I have to remember about citations.

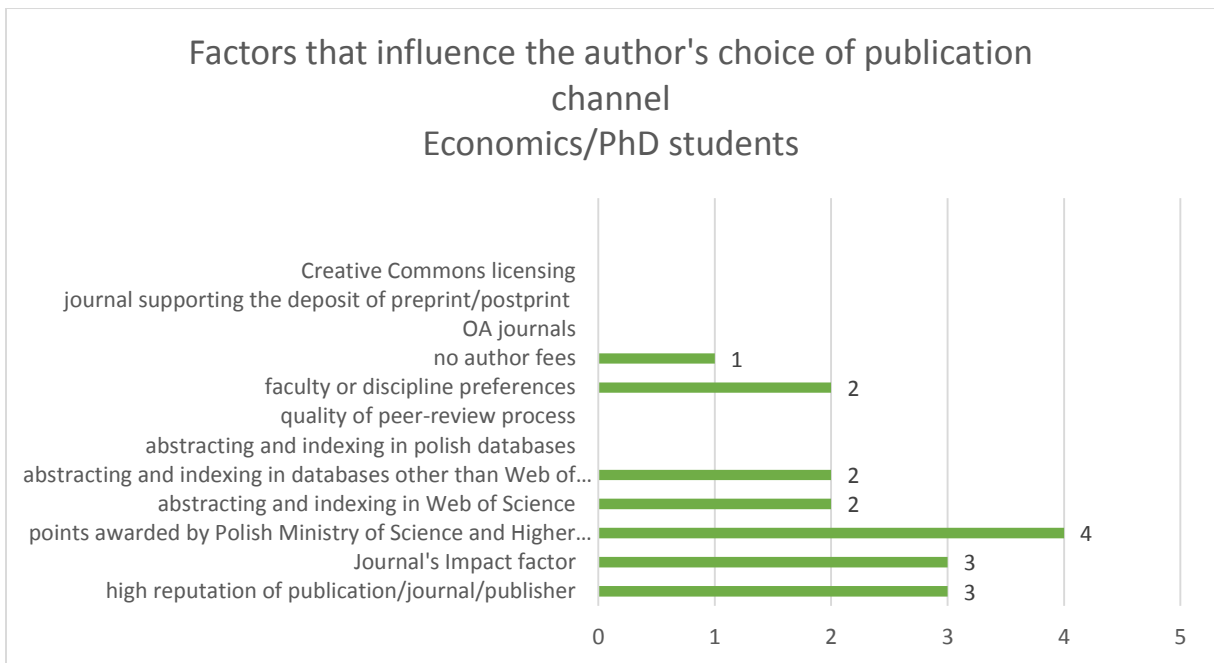


Fig. 33 Factors that influence the author's choice of publication channel Economics/PhD student

All factors mentioned above illustrate the strong position of the Ministry's points in terms of publishing scientific papers. This is important for both groups and suggests that collecting points is necessary at all stages of one's scientific career.

Possibilities and constraints of an Institutional Repository

Questions related to self-archiving academic papers in institutional repositories were the next part of the survey. I have already mentioned that repositories may be confused with digital libraries, but the participants were asked whether their university already had an institutional repository. Over half of the researchers (52%) from the Faculty of Management and Economics indicated that their university did not have an institutional repository, as Figure 34 illustrates below.



Fig. 34 Does your university have an Institutional Repository? Faculty of Management and Economic

The respondents were also asked whether they used any repositories. Of all the participants, 57% reported that they used national or disciplinary repositories for self-

archiving. The examples that scholars wrote in response to this open-ended question included several names, such as: RePEc, CEON, British University repository, Academia.edu, ResearchGate, Mendeley, and PBN.

Over 80% of the targeted respondents thought that an institutional repository is essential as an element of an academic infrastructure for scientific work. AP3 stressed that: *“Such a repository is necessary for scientific work. I use, if I am a co-author, the Institutional Repository from other university and I can see positive effects. I also use CEON for my postprints sometimes.”*

Feelings about having a repository at the home university were highly positive. The respondents supported this idea by the several comments that are presented below:

Positive comments about an Institutional Repository

- “It would be a great channel to publish preprints and postprints. All internationally recognised universities have an institutional repository, it is a shame our institution does not have one”,
- “IR will increase citations of staff publications”,
- “to improve the way of publications”,
- “increased chances of citations”,
- “we have easy access to them”,
- “for increasing citations”,
- “to know what is done”,
- “it helps to spread knowledge”,
- “potentially more citations”,
- “because of prestige”,
- “it is easier to know the field of research of other scientists and of older publications”.

Those who did not support the idea of having an institutional repository explained their decisions as follows: “international repositories are enough” or “researchers might use other repositories if my university won’t provide one”.

Possibilities and constraints of Open Access

The last section included a set of questions regarding open access. Figure 35 shows that over 50% of the respondents described their awareness of open access as ‘moderately good’. Most notably, the combined percentage of respondents (18%) who rated their awareness as ‘extremely good’ and ‘very good’ was also relatively high.

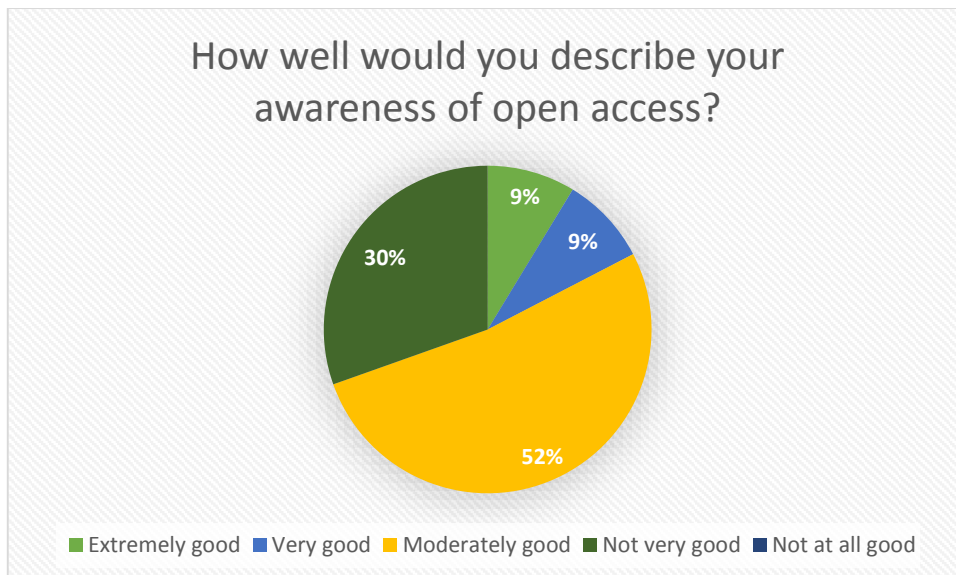


Fig. 35 How well would you describe your awareness of open access?/ Economics/ PhD students & Academic staff

During the interviews I asked my participants what they meant by open access. AP3 said: *“Well.....Open access as an issue was raised by me during discussions with my co-authors when we are preparing articles for publication. But my knowledge of the subject is not very good I must said.”*

PhD3 commented:

Generally I understand that this is a movement that works on the principle of opposition to the closed databases, very expensive and paid.....On the one hand, they are prestigious and everyone wants to be there. On the other hand, the access is really difficult and also disseminate this knowledge.....really complicated.

Despite the perception that respondents from Economics seem to be in favour of open access, slightly more than half of them did not have a single publication in this kind of journal. However, it is worth mentioning that half of the respondents had an open access publication and four scholars indicated that they had already published more than three articles in open access journals (Fig. 36).

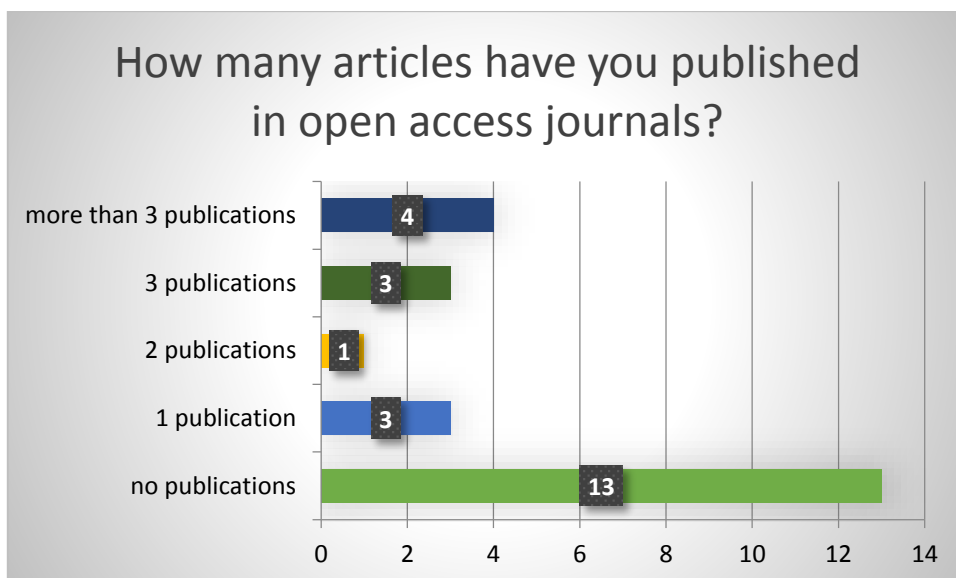


Fig. 36 How many articles have you published in open access journals?/ Economics/ PhD students & Academic staff

Of all the respondents, 48% stated that they intended to publish their articles in open access journals in the future. AP2 stressed that:

It depends. We already checked and sometimes the article is already available in databases which are important for me and my colleagues. It would be unreasonable to spend money for example for the Gold open access. However, there are issues worth checking out I think.....". PhD3 expressed the opinion that: "Open access as a movement itself – yes, and..... Generally publishing for free and disseminate - it is really great. But not necessarily in the form of such expensive publications so I can't say definitely yes".

The scholars also wrote the following in comments that explained their decision for their future plans regarding publishing in the open access format:

- "in order to increase in citations"
- "free access for readers"
- "open access makes articles more accessible"
- "my open access papers have a higher number of citations"
- "it is a good medium for scientific discussion"
- "no, because those journals are not awarded points"
- "no, they usually have no impact factor".

Nevertheless, it has to be noted that 24% of scholars do not plan to use this form of publication. In addition, 76% of academics do not advocate open access in any way. AP2 said: *"No, not really. I don't know what I'm supposed to do. For me it is rather an individual approach"*.

The survey included questions devoted to the Green and Gold roads of open access. The respondents were asked to indicate which road suited them better in their scientific field. AP2 stressed that: *"Both roads are difficult. The gold open access, we had to give up recently because of money. The Green road....I have started to pay more attention to this road when I am reading publishing agreements"*. AP2 also highlighted that:

With Open access journals in Poland, from my discipline, but I suppose that it is not only in my discipline.....I think the problem is that if I pay for publication – it means that this publication is worse. I mean that reviewers can assess this publication worse. Even if it has any Impact Factor or points. If you have to pay, as Gold road, it means it was easier to break through the peer-review process....

Exactly half of the respondents indicated the answer "I don't know" (Fig. 37). The Gold model was slightly more popular than the Green model and raised the following comments:

- "In my opinion, research results should be available for everyone"
- "more convenient"
- "time is important for citations"
- "usually these papers are reviewed"
- "I am for the abolition of any restrictions on access to publications".

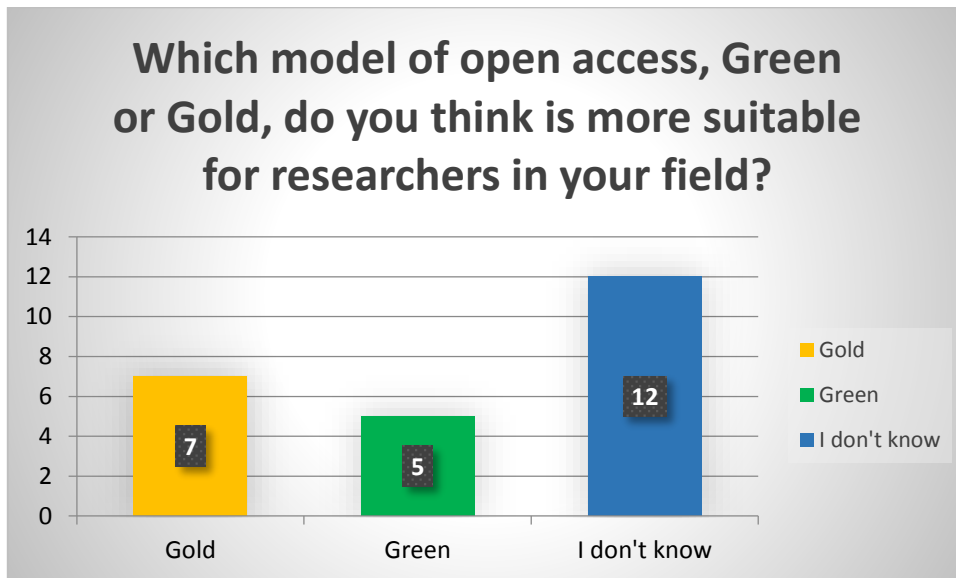


Fig. 37 Which model of open access, Green or Gold, do you think is more suitable for researchers in your field?/
Economics/ PhD students & Academic staff

On the contrary, PhD3 said about the Gold road: *“No, probably I would not be ready for co-financing ... Then - the issue of the inflation of fees in widely recognizable journals, and this is likely to strengthen the position of those who are willing to pay more...”*.

The financial aspect of the Article Processing Charge that is applied in some open access journals and is associated with the Gold road was also taken into account. Figure 38 shows that over 50% of researchers reported that the APC is expensive or quite expensive for them.

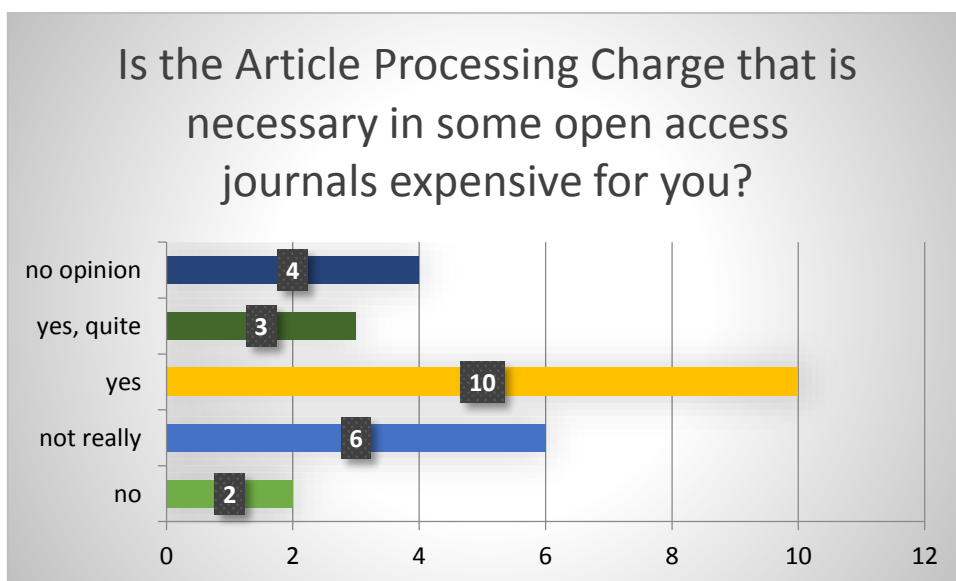


Fig. 38 Is the Article Processing Charge that is necessary in some open access journals expensive for you?/
Economics/ PhD students & Academic staff

When asked about open access mandates, only 8% of all the respondents knew about this issue. A total of 60% of them had never heard of such kinds of policies, and 32% chose the 'I don't know' option.

AP2 said that:

I haven't heard about those mandates but the idea – yes. But I will restrain them only to the research that is financed from public funds, not for all research conducted at the universities. This is due to my experience that at the moment, much of the research conducted at the Polish universities is funded by the business sector.

PhD3 had a very specific response to this issue:

Generally, I understand the postulate that anything that is funded by public money should be immediately published and should be fully available within the open access ... I have no doubt, and I think that it is beneficial to all, and especially for taxpayers paying in a different form....but...I do not think that fees that are really expensive and, in my opinion....are generated from some cost.....Because I do not think it was a particular cost that publisher has to pay to publish an article in such form or another ... one year and half sooner or faster. In this case I do not understand if we, as taxpayers, should pay for this mandate.....

Summary

Overall, economics, based on the responses from the Faculty of Management and Economics, could be characterised by:

- Economists usually publish '3' or 'more than 3' items per year;
- 'Articles', 'book chapters' and 'monographs' are the most common forms of publishing scientific content in economics;
- The most common publication channel is the 'printed/electronic subscription based journal', however, the institutional repository is also mentioned as one of the important channels;
- Polish economists publish more often in national journals than in international ones;
- National commercial publishers and the domestic university publisher are the most common types of publishers among economists;
- Economists have quite a strong commitment towards the working papers culture as a model of sharing scientific findings;
- They do not have a strong preference regarding copyright or Creative Commons licences;
- Economists usually use informal channels to disseminate their scientific work, with an indication towards academic social networks and personal websites;
- The most influential factor for economists, in terms of choosing a publication channel, are points awarded by the Polish Ministry. In addition, they reported: high reputation of the journal and the Journal Impact Factor;
- Some respondents from economics as a discipline use national or disciplinary repositories to archive their papers;
- In general, they are in favour of open access and some of them use this form of publishing;

- An expensive Article Processing Charge is one of the barriers against open access for economists;
- Slightly more respondents from this faculty reported Gold open access as more suitable for their discipline than Green open access.

7.3 Statements concerning open access

Concerns regarding open access were investigated in the last question in the online questionnaire. I decided to combine the results from both faculties, i.e. Chemistry and Economics. My decision was motivated by a few factors. First, I wanted to obtain a more general overview of attitudes regarding open access. This question was posed in the form of several statements and there was no need to divide them according to scientific field. The sentences did not include specific indicators that would be significant for the different disciplines. They were designed for a broader audience and could be used in the future. Second, I decided to compare my results with other reports in Chapter 8. In those publications the data were also merged together or were not split into different disciplines.

Findings on this item are included in Appendix D. The participants could select from a list of fifteen statements by rating them on a scale from one to five, where one meant 'strongly disagree' and five meant 'strongly agree'.

The first most commonly selected item with the highest 'agree' rating was 'open access makes articles accessible', which suggests that scholars are aware of the possibilities and contribution of making a publication available for everybody. The second statement that most respondents agreed with, 'open access makes articles more visible', is closely connected with the previous item. It could reveal that most of the respondents are in favour of making their scientific work more open. Third, the participants agreed with the 'open access makes articles more retrievable' statement, which points to the fact that some concern was expressed about archiving and preserving their scientific papers. These three factors, i.e. 'accessible', 'visible' and 'retrievable', are strongly emphasised in the open access definitions (see Chapter 2). They also have a potential impact on the dissemination of scientific findings.

Open access may increase collaboration between researchers and allow them to expand on prior work. Such a view is indicated by quite high agreement with the statement 'Open access helps researchers build on existing knowledge', with an average rank of 3.56. This may be explained by the fact that both groups of academics conduct complex research projects that can inform one's own research. Most notably, the item that the respondents seemed to agree with the least was 'open access is not a road that scientific communication should follow'. The average rank for this statement reached 2.05 among forty-four responses.

Turning now to Gold and Green open access, the findings either matched or closely replicated those from the previous sections. In general, the researchers indicated that Gold open access has more advantages than Green open access. A possible explanation for these results may be the lack of an institutional repository at the domestic university, however, further work has to confirm this hypothesis.

It has to be mentioned that the respondents expressed some concern and scepticism regarding open access. The statement 'Open access journals do not provide a reliable peer-review processes received an average rank of 3.09. These results therefore need to be interpreted with caution but they match the results observed in other studies (see Chapter 2 and Chapter 8). Researchers are afraid of bogus journals and are strongly committed to reputable periodicals. This view is also supported by a 3.07 average rank

for the ‘Open access is focused on quantity not quality’ statement, which demonstrates a lack of conviction regarding the open access publication model. On the other hand, responses signalled that the open access model could increase citations impact, which has already been investigated (Saberri & Abedi, 2012; Eysenbach, 2006; Gargouri et al., 2010).

The next chapter of the thesis moves on to discuss all of these findings more closely and compares them with results from other studies.

Chapter 8. Discussion, conclusions and further recommendations

This chapter discusses the thesis’s findings and provides a systematic investigation of some assumptions regarding scholarly communication behaviour at a technical university in Poland within the two investigated disciplines. The analysis part is presented below in accordance with the three major themes: (1) scholarly communication practices within chemistry and economics, (2) additional channels for dissemination of scientific output, and (3) awareness and views on open access publishing. These themes stemmed from the research questions and had an unquestionable influence on the whole study process. The findings are discussed in the light of the theoretical framework as well as the literature review that was explained in the previous chapters. Whitley’s theory of the intellectual and social organisation of the sciences was used to establish a framework and to explain the differences and similarities in scholarly communication behaviour across these two disciplines. In addition, this chapter attempts to show what motivates scholars to publish and disseminate scientific output in view of the Latour and Woolgar study.

8.1 Scholarly communication behaviour in the fields of chemistry and economics

Scholarly communication behaviour as a set of many activities could be perceived differently by scholars from various fields as well as by representatives of the same disciplines. According to Kingsley, who used Whitley’s theory of the social organisation of scholarly fields, “having separate communication systems is one of the conditions for establishing scientific fields as distinct systems of work” (Kingsley, 2008, p. 3). Chemistry and economics represent different scholarly traditions and I presumed that they would differ significantly from each other in terms of publication and dissemination behaviour. However, Whitley, as was mentioned in Chapter 5, recognised both disciplines as scientific fields with a high level of mutual dependency and this gave me reason to also search for similarities between them (Whitley, 2000).

In addition, some might state that inside the disciplines individual behaviour would also occur and be completely different than the general characteristics of the entire discipline. Following this, for the purpose of this thesis, I would argue that it is possible to generalise the findings within disciplines to some extent and still be able to retain the disciplines’ individual features. This is supported by Latour and Woolgar, who stressed that: “the overall impression which emerges from the field notes is that before being an individual or a mind, each of our informants was part of a laboratory” (Latour & Woolgar, 1979, p. 188). In my study, ‘a laboratory’ could be treated as the disciplines.

As regards the question what is characteristic in publication behaviour, the study found that some aspects of those activities are similar for the two investigated fields. This could be conditioned by the specific Polish context that is based on the national education system. As was mentioned in Chapter 3, regulations with regard to how researchers are

evaluated, imposed by the Ministry of Science and Higher Education, are to some extent unique against the background of the international perspective. There are several similar evaluation systems across Europe, for example, in Denmark or Norway, however, what is not yet clear is the impact of those systems on the transition in scholarly communication in these countries. I would argue that the Polish system has a significant influence on the changes that have occurred in scholarly communication in Poland over the last few years. This was observed during the interviews and is also reflected in the results from the online survey. It is also supported by Whitley's statement that: "variations in the organisation of national research systems influence, then, the ways that the sciences are organised and develop in different countries" (Whitley, 2000, p. 30).

The results of this study show that scholars from both disciplines, regardless of the academic degree, annually publish a similar number of publications. Most scientists submitted three or more than three peer-reviewed items per year. Chemistry is one of those disciplines that are characterised by a relatively high number of articles that appear especially in international journals. These findings match those observed in Long and Schonfeld's report that: "Chemists publish in relatively traditional article formats, and they place a strong premium on publishing in the best regarded journal that will accept their work" (Long & Schonfeld, 2013, p. 12). The second most common form of publication for respondents from the chemistry faculty is a conference paper. This finding suggests how important the role of conference attendance within the chemistry community is.

In economics, the predominant form of publication reported by the respondents is also a journal article. However, economists do not marginalise national journals or publishers, or the domestic university's journals. This stems from the fact that often a greater part of their research concerns Polish perspectives. It would be difficult to publish such studies about Poland in English-language journals. These results differ from, for example, Berkeley's report, where economists put great emphasis on publication in top-flight peer-reviewed journals (Harley et al., 2010). However, this could be explained by the fact that those periodicals are important on the international and more general level, and it is difficult for Polish scholars to publish there. According to data from the university's annual reports, only a few economists publish their papers in international journals (see Chapter 7).

One of the differences between chemistry and economics observed in the study is the tendency to publish monographs more frequently by representatives of economics. This may be explained by the general tradition in the social sciences. According to Lindholm-Romantschuk, "Researchers in the humanities and social sciences do, for instances, exhibit fairly heavy reliance on monographs as opposed to journal articles as a source material, and research findings are often published in monograph form as well as in articles" (Lindholm-Romantschuk, 1998, p. 8). Book chapters and monographs were also chosen more often by economics scholars in this study than by chemists. Interestingly, for American academics: "book-length scholarship is rare" (Harley et al., 2010, p. 317). On the other hand, the study revealed that the chemists still publish a significant number of monographs which is one of the major forms of dissemination of scientific output.

In terms of different types of channels used by scholars, both chemists and economists reported printed/electronic subscription-based journals as the prime channel for publishing. A limitation in the readership, which may be caused by the journals' pay wall, was not considered by the respondents. It is interesting to note that the second most commonly selected option by the chemistry doctoral students for type of dissemination

was open access journals. Across the economics staff members, institutional or disciplinary repositories were also selected.

Access to the latest research is crucial for all scientists. It is known that waiting for a publication in scientific journals sometimes takes a few or several months or even years. One of the forms of opposing these lag times is dissemination of drafts of scientific publications by the researchers themselves. This form of sharing ideas in early inception or reports of finished studies is particularly popular among physicists. Economics also has a long tradition in the publication of working papers. The Berkeley report highlighted that: “Economists are sometimes perceived as more innovative in publication behaviour than scholars in many other social science disciplines because of their reliance on working papers” (Harley et al., 2010, p. 326). Respondents from the investigated university confirmed this trend and most of them are in favour of this form of sharing scientific findings. They reported the RePEc disciplinary repository or the Polish CEON repository as examples of services often used by economists. What is surprising is that nobody from the Economics department mentioned the long lag time that is characteristic of international economics journals. A possible explanation of these findings may be the strong position of Polish journals that have a shorter time period between article submission and publication.

The chemists, on the other hand, represent a rather traditional academic culture that hampers this method of self-archiving scientific output. All of the academic staff and a majority of the PhD students have never used any repository to deposit their pre-print papers (however, some of them reported to use them in relation to their postprints). The respondents did not differ from the global trend, which is presented, for instance, by Velden and Lagoze:

As a result, no ‘preprint culture’ exists in chemistry that assigns value to chemists who publicly disseminate their not-yet-peer-reviewed manuscripts — on the contrary, to disclose information before priority has been established through a formal journal publication seems to be perceived as too risky. (Velden & Lagoze, 2009a, p. 42)

Looking at issues related to copyright and licencing, a striking finding was that they are not a priority for researchers from the two examined fields. There are similarities between attitudes expressed by the chemists and those described by the economists. It seems that only occasionally is this matter taken into consideration by the scholars. Familiarity with Creative Commons licences is rather low, however, the economics scholars seem to be more involved in this issue. In reviewing the literature, my results correspond to some extent with those found in Long and Schonfeld, who highlighted that chemists are usually ill-informed about publishing policies and copyright (Long & Schonfeld, 2013). In addition, the JISC report shows that: “nearly a quarter of social scientists and arts and humanities scholars did not know the copyright position” (Sparks, 2005, p. 49).

A set of different criteria is taken into consideration in terms of choosing journals or another publication channel by scholars. For both disciplines the study found that the high reputation of the journal is one of the most essential features. At the investigated university both chemists and economists put great emphasis on publication records due to the evaluation process as well as habilitation. As researchers they add a significant contribution (for example points) to the final evaluation of the university, which guarantees the category and secures funding (see Chapter 3). My survey’s results are in accordance with those reported by Long and Schonfeld in chemistry (Long & Schonfeld,

2013) and by Harley et al. in economics (Harley et al., 2010). Taken together, both reports suggest that publication in top-tier journals is expected by institutions and is the most desirable in terms of obtaining tenure, promotions or grants.

Additionally, other features commonly taken into consideration among Polish scholars in terms of selecting a journal are the Journal Impact Factor and points awarded by the Ministry of Science and Higher Education. Academic staff as well as PhD students in both of two examined disciplines pay great attention to these factors. Chemists are expected to publish in journals with a high Journal Impact Factor, so that their papers are indexed in the Web of Science database. This is also one of the important assets in scholarly publication behaviour. Less important from the chemists' point of view seem to be indexing in other databases, such as Scopus or Google Scholar. These are treated more as a supplement or as additional information resources.

Quite the opposite situation takes place in the field of economics. For the majority of respondents from this department, indexing in Web of Science also appears to be a crucial factor. However, these findings do not correspond with the low number of publications that are indexed in the Web of Science and are presented in Chapter 6 according to the annual reports. Nevertheless, economists, contrary to chemists, reported that indexing in other databases such as Scopus and Google Scholar are widely recognised. They also do not refrain from publishing in Polish scientific journals that are awarded lower points by the Ministry but have a significant role across the academic community. Repeatedly, the respondents I interviewed expressed concerns regarding the system of collecting Ministry points, i.e. sometimes these points are more important than the actual research process. If this pattern were to continue, it could suggest that scholars need to focus only on publishing papers and refrain from other activities. They are judged by their publication records, number of citations and Hirsch Index. These paramount factors are the first to be evaluated at university and department level.

Another thing that is characteristic of chemistry is that especially PhD students rely heavily on the opinions of their supervisors and the faculty's preferences as regards publishing articles in scientific journals. It may be that junior scholars benefit from the more experienced academics. Dependence on supervisors or faculty opinion is also exhibited among economists at all levels of their careers. Latour and Woolgar stressed that: "the individual strategy is nothing but what the field forces require" (Latour & Woolgar, 1979, p. 211), and my findings also could support the view that individual scholarly behaviour is shaped by the traditions represented by particular disciplines. Nonetheless, this topic has not been thoroughly investigated by me. More information about the role of peers and senior researchers influencing the author's choice would help to establish a more accurate view on this matter.

What I have concluded in the chapter so far is consistent with those of other studies conducted internationally. The American Berkeley case study of the field of economics revealed that: "at research institutions, work that is cited frequently is paramount and, by all accounts, Impact Factors are closely watched in economics" (Harley et al., 2010, p. 323). Furthermore, chemists in the UK seem to also be affected by the reward system that is based on the Journal's Impact Factors and citations measures (Velden & Lagoze, 2009b).

Extra-disciplinary factors that influence all disciplines correspond with those that could be found in Latour and Woolgar's study (Latour & Woolgar, 1979). Credentials that have a strong influence on scholars are mainly publishing papers in the most recognised journals, the number of citations and co-authors.

The scientific field is characterised by Whitley as a “reputational work organisation” which is independent in terms of conducting research and knowledge evaluation. The way in which fields are organised, assisted and maintained differs between them. However, some activities could be similar within, for example, an institution or university. In addition, the implementation of national evaluation systems such as the Polish one, partly are changing the playing field for the independence of the scientific fields. This view is supported by Trowler et al., who stress that:

There is a tendency (...) to see academic practices as operating in a bubble, independent of the network of practices, forces and structures operating around university. In reality higher education systems, universities and individual departments are open, natural systems, not the ivory towers of legend. They are strongly touched by outside forces and are conditioned in what they do, and how, by far more than the internal processes. (Trowler, Saunders, & Bamber, 2012, p. 29)

The Whitley classification of research fields in terms of organisations is used as a frame for this study and allowed me to analyse special features of chemistry and economics in the national, Polish context. According to Whitley, cited by Kirshan: “It is firmly established that there are different national research cultures that largely affect how science and disciplines are practised in different countries” (Krishnan, 2009, p. 22). Even the disciplines appear to be similar to some extent, for example on important issues in scholarly communication behaviour; thus my findings may help to understand why disciplines differ from each other. This view is supported by results obtained during this study and complemented by Whitley’s theory and the disciplinary characteristics provided in Chapter 2. According to Ylijoki: “Disciplines have their own traditions and categories of thought (...). They also have their own social and cultural characteristics: norms, values, beliefs, modes of interaction, lifestyle, pedagogical and ethical codes“ (Ylijoki, 2000, p. 339).

As was explained in Chapter 5, Whitley characterises chemistry as a discipline with low strategic dependency and high degree of functional dependency. This may result, for example, in the scholars’ ability to formalise competence standards and dependence on other scientific works. Chemists work more internationally and this was also observed at the investigated university. Their scholarly publication behaviour is based on sharing ideas in international journals. Low degree of strategic task uncertainty may be observed in the stability and well-organized of research strategies and goals. Chemists organize their research projects clearly and in particular order. Low degree of technical task uncertainty results in stability of and visibility of research outcomes. Outcomes could be seen as more predictable and visible than in the fields with higher degree of technical task uncertainty.

On the other hand, economics is described as having high strategic and low functional dependency. It results, for instance, in an informal evaluation system that may be represented by sharing scientific output at its early stage through the working papers culture. Economics, as well as chemistry has low degree of strategic task uncertainty that results in hierarchically organized field with well-established problems. However, economics’ high technical task uncertainty provides unstable and ambiguous results that may be interpret differently by various groups despite of standardized procedures used during the research process.

8.2 Additional channels for dissemination of scientific output

Engaging in new technology and using less formal initiatives for sharing research is one of the current processes associated with scholarly communication. Researchers' publishing activities are primarily determined by publications, but less formal activities are valuable for their scientific presence. A mix of these practices allows researchers to have a more comprehensive view of other academics' work.

This study illustrated various attitudes towards using informal channels as well as using different channels, particularly institutional repositories, for dissemination of research.

Informal channels

Using informal services to share scientific papers and ideas was in focus for several of the questions asked during the interviews as well as through the online questionnaire. This study set out to investigate if additional channels are being used by researchers from the Chemistry and Economics departments at the surveyed university. The most common informal communication methods are social networks, personal websites, and to some extent - blogs. The latter may be distinguished as more universal, such as Facebook or Twitter, and more "academic" ones such as Research Gate or Academia.edu platforms. As for the question regarding using these types of services, contrary to expectations, even more academic staff than PhD students of chemistry chose this form of communication. I presumed that junior researchers have a less traditional view of using new forms of social tools, but they tend to believe in conventional behaviour regarding publishing practices. Even though the scholars' interest in alternative opportunities was expressed in comments and during the interviews, a majority of the respondents from this field did not use any of the informal channels. According to Velden and Lagoze: "it has been suggested that chemists are more secretive about details of their research in formal and informal communication than scientists in many other disciplines" (Velden & Lagoze, 2009a, p. 55).

On the contrary, academics as well as PhD students of economics used informal channels more often than respondents from chemistry. The survey results highlight that scholars who are open to new forms of disseminating their results often opt for social networks and personal websites. There is also limited interest in scientific blogs, Twitter and Facebook. These findings correspond to some extent with the Berkeley report that shows mixed attitudes among using these alternatives in scholarly work and notes that they may not be credited by the scientific community. However, the report also notes that: "it seems that economics has been more successful than other fields in creating a public face through blogs" (Harley et al., 2010, p. 364) but it is not strongly reflected in my study. In addition, Holmberg and Thelwall's study revealed that economics is a leader among the investigated disciplines in sharing links using Twitter. Most of the links are, however, not about scholarly communication activities but about general economics issues (Holmberg & Thelwall, 2014).

Institutional repositories

One of the largest shifts in scholarly communication is the development of institutional repositories as tools of self-archiving. As was mentioned in Chapter 3, the situation regarding repositories has to be viewed with consideration to the Polish context. The

OpenDOAR lists 85 repositories in Poland¹⁴, but Bednarek-Michalska stresses in her interview with Richard Poynder that:

Many of them [institutional repositories] are digital libraries that also contain current scientific journals and materials. I should point out that the situation in Poland is somewhat specific: when we began building digital content in 2004 we used the Polish software dLibra, which was not designed specifically for scientific information but for any digital object. At that time we were not aware of dedicated repository software solutions like Fedora or DSpace, and we didn't understand how important it is for universities to have their own repositories. (Poynder, 2013)

The final statement of this quotation means that there is ambivalence among people working with digital libraries in Poland. The survey and interviews also reflected that the terms 'digital library' and 'institutional repository' as misunderstood by scholars from the two faculties. The examined university does not have an institutional repository and the university's digital library does not offer an option for self-archiving. This is only a form of publishing scientific and cultural content and shows that the digital library has more of a publisher role and do a level of curation of the material that is not common in institutional repositories. Even PhD dissertations have to be processed by the digital library's manager. However, the response to the question about having an institutional repository gave evidence that over one-third of chemists and nearly one-third of economists in the study think that the university has already set up this kind of tool. Respectively, 40% of chemists and 20% of economists did not know if this service is available at their university. This result is in agreement with findings from the JISC report, where the majority of respondents did not know if their university had an institutional repository (Fry et al., 2009). In addition, Creaser et al. stressed that during their study: "Some focus group participants found the term "repository" confusing—most expressed some difficulty in defining what a repository was and what sort of material it might hold (peer reviewed articles, pre-prints, data, etc.)" (Creaser et al., 2010, p. 153).

When it comes to using institutional repositories the general finding indicates that depositing scholarly papers through this channel is not yet a norm among scholars from the Chemistry and Economics faculties. However, economists are more comfortable than chemists with the idea of self-archiving their preprint articles. This may be explained by the working paper tradition within this community. Some of them indicated the institutional repository as one of the channels to publish their scientific output. The lack of a repository at the university is not an issue. The economists, like their colleagues from, for example, the University of California, use a disciplinary archive such as RePEc or deposit their papers in CEON (the national Polish repository). Most of them are also in favour of initiating such a service at the home university. In addition, it is worth mentioning that in the case of economics, having an institutional repository may create some disadvantages. According to Kingsley, who investigated Australian scholars, "While economists evidently already have a culture of sharing working papers online, the difficulty with them placing material into their institutional repository as well is that any download from that repository will dilute their statistics collated by IDEAS" (Kingsley, 2008, p. 10).

Interestingly, none of the respondents indicated 'lack of time' as a cause for not using such a form of self-archiving, although this was one of the major reasons indicated by other studies. Xia stressed that: "faculty scholars are usually too busy to be distracted from their already heavy load in research and teaching" (Xia, 2008, p. 647).

¹⁴ Data retrieved on 15/06/2014

Among the scholars of chemistry, there was also a rather positive attitude towards the idea of having an institutional repository. However, it is difficult to predict if establishing this kind of tool would increase self-archiving within the two disciplines. At present, the general positive reaction to institutional repositories can be used to develop this service. However, taken together, scientists seem to hold different views on whether an institutional repository needs to be established or not at the home university.

In addition, the results may be explained by using the Whitley's findings that economics has a higher level of task uncertainty than chemistry. This would suggest that economics is a less controlled discipline in relation to the dissemination of scientific output. This could result, for example, in sharing scientific findings at the initial phase through the working papers and using different communication channels. Chemistry, with a lower level of task uncertainty, represents a more restricted and stable scientific environment that publishes knowledge in a more ordered way. In chemistry, both strategic and technical task uncertainty are low that results in very hierarchically structured environment. The well-established framework, work procedures and structures are resist to rapid change. This may result for example in less interest in using new forms of sharing scientific output. Respondents from this faculty confirmed this by pointing out more traditional and well-established forms of publishing as preferred techniques to disseminate their output.

8.3 Awareness and views on open access publishing

One of the foremost goals of this project was to investigate awareness and attitudes towards open access publishing in the two departments. Despite the fact that open access is no longer an emerging trend worldwide, it is still a significant new topic in Poland.

At the end of this chapter I decided to try to make my findings on that item more general by analysing them with the help of Latour and Woolgar's theoretical findings. They stressed that "neither the field nor the individual are independent variables" (Latour & Woolgar, 1979, p. 211), which determined my general approach to the issue. I presumed that some findings about researchers' awareness and views on open access could have been used to present my data without division into chemistry and economics disciplines.

First, the scholars were asked about how familiar they were with the term "open access". General knowledge about this issue is similar across the economics and chemistry disciplines. The respondents usually reported a good understanding of this subject. These findings match those observed, for example, in the EDP report, where combined results from all learned societies gave evidence that over 90 percent of the respondents were familiar with the principles of open access (Rooyen, 2014). In addition, Creaser et al. noted that across Europe, authors, especially from STM science and less from the Social Sciences and Arts and Humanities, were familiar with the idea of open access (Creaser et al., 2010).

The staff and PhD students at the faculties expressed a rather positive attitude towards open access; the findings show a gap between perception of open access and publication behaviour. I noticed the lack of open access papers in the scholars' output, with the exception of a few examples, mostly from the Economics department.

Scholars from both faculties identified open access primarily with free access to a publication. While people from the Chemistry faculty knew open access well, the number of publications in open access journals was rather low. The main concerns regarding publishing in this format were financial support and the journal's quality as well as the lack of Impact Factors. Most of the respondents were of the opinion that this kind of

publication does not provide them enough prestige and, what is more important, points from the Ministry of Science and Higher Education. They also indicated that publishing in open access journals is associated with the fear of jeopardising the peer-review process. According to Long and Schonfeld:

Chemists are relatively ambivalent about the issue of open access publishing. Our interviews suggest that most chemists do not experience significant problems accessing the content that they need, and they see little need for their content on the part of the public. Consequently, many of them are either agnostic on the issue of open access to research outputs or have only lukewarm support for it. (Long & Schonfeld, 2013, p. 34)

Among scholars from chemistry, PhD students and academic staff, the opinion that stood out was that it does not matter if the journal is open access or not. The most important feature is the Journal Impact Factor, and this is a crucial circumstance for selecting the periodical. This view is supported by one of the UK scholars in Long and Schonfeld's study who suggested that: "I want my work to be published in the best possible journal with the highest impact factor and [where] its most likely to be cited, and whether it's open access or not, I just don't care, quite frankly" (Long & Schonfeld, 2013, p. 35). This can be understood by drawing on Whitley's ideas of chemistry as a discipline with high functional dependence (see Chapter 5). Chemists rely upon the journal's high reputation and they need to take care to maintain their reputation by publishing in periodicals that are highly regarded by scientists from the same discipline. Whitley commented that: "they [contributions] must be demonstrably useful for others' research if they are to lead to high reputations in that field and so scientists need to show how their results could be incorporated in the work of colleagues when writing papers in highly dependent fields" (Whitley, 2000, p. 88). It is reasonable to assume that articles published in highly regarded journals, with steep competition, can be considered useful for others' research by scientists in the same field.

On the other hand, respondents from the Economics department already have slightly more open access publications than the chemists. A possible explanation for this result may be the fact that some scholars publish their papers in domestic university journals or via non-profit publishers (see Figure 26 and Figure 27), and most of these are in the open access format. Economists also raised concerns about open access journals not being indexed in databases. They reported that because they are evaluated through the lens of the Impact Factor and the Ministry's points, they more often have to publish in traditional journals. Berkeley's report notes that among Economics scholars from their university, "new genres of publication have not made major inroads to date" (Harley et al., 2010, p. 317).

In terms of Gold and Green roads to open access, nearly one-third of the authors from the Chemistry faculty were in favour of the Gold option as they consider it more suitable for their discipline. However, these data must be interpreted with caution, because 57% of respondents indicated that they did not know which model is more appropriate for chemistry. Gold open access was recognised by scholars as the PLoS journals business model that provides free online access, the authors retain copyright and publication charges are paid by the authors or funding body. Due to the fact that chemists know PLoS publications quite well, the question regarding the Article Processing Charge revealed that APC is rather expensive for scholars. The reason for this may have something to do with information that a standard publication fee ranges between \$1350 and \$2900 in PLoS journals (PLoS, 2014). Green open access was preferred instead by a few scholars and

they signalled the positive value of this option, which could be more effective for junior researchers, especially from a financial perspective. Across UK's chemists, support for Gold open access follows the impact of new regulations from "The Finch Report" (see Chapter 2). According to Long and Schonfeld, many chemists "have already started to include funds for open access publication in their budgets for grant applications" (Long & Schonfeld, 2013, p. 34).

The respondents from the Economics faculty also expose slightly more preferences for Gold open access. It is important to bear in mind that exactly half of the surveyed scholars indicated that they do not have an opinion regarding Green and Gold roads in economics. This is somewhat unexpected due to the strong position of working papers across these disciplines. This finding is difficult to explain and further studies that will take this variable into account should be undertaken. In terms of the Article Processing Charge, respondents expressed concerns about its very expensive fees. Taken together, the APC has a rather negative connotation for researchers in both the investigated disciplines. It is possible to hypothesise that Polish scientists are not accustomed to paying for publishing, and that the APC is very expensive for scholars from Polish universities, where is a lack of infrastructures for funding of APCs and a lower price level than for example in the UK.

The combined results from chemistry and economics suggest that scholars agree that Gold open access has more advantages than Green open access. This result may be explained by the fact that was already mentioned in Chapter 7, i.e. that the investigated university does not have an institutional repository and that the number of such repositories in Poland is rather low. Gold open access may be better known to scholars because it is already supported by some Polish journals and publishers. Another possible explanation for this is that scientists would like to have immediate access to peer-reviewed papers and the Green road is often limited by an embargo period. Some publishers do not allow for draft pre-publication and scholars need to wait to deposit their final manuscript after the embargo period. Especially for chemists this may be an issue due to the fast pace of chemical research that often could not be delayed. In addition, researchers may not have enough time and willingness to use Green open access, where part of the work, such as preparing and editing a preprint or postprint, the scholars need to perform by themselves. However, with the small sample size of this study, caution must be applied, as the findings might not be transferable to the whole Polish academic community.

Respondents, despite the fact that they more often preferred the Gold model, highlighted the issue that open access may be rather expensive. Of course this may also be related to the Green model, which is based on a specific infrastructure, but these costs are not usually borne by the researchers directly. Creating and managing a repository is usually at the university level, so high-priced open access is rather more often associated with APC, which is particularly painful for scientists from less wealthy countries. Even though many publishers reduce these fees for developing countries, economic differences are still perceptible. There is also a potentially important consistent in the academics' responses because they also indicated the "Open access reduces subscription fees" statement with an even higher average rate (3.19 to 3.11). However, further research should be done to investigate the economic aspect of open access.

One of the issues that emerged during this study was the lack of knowledge regarding open access mandates and policies as well as data-sharing regulations. Respondents from both faculties usually omitted answering questions regarding these issues. It appears that scholars are under-informed about such regulations which are currently being introduced

around the world. A possible explanation for this may be that generally in Poland there is a lack of open access mandates and policies. According to Bednarek-Michalska, “there has been no progress with regard to OA policies and mandates. In Poland no one wants to force scientists to make their work openly available, so the focus is on voluntarism” (Poynder, 2013). Some of the chemists expressed a positive attitude towards the idea of open access policies and data-sharing mandates, but an overwhelming number of them did not provide any opinion. This result can to some extent be seen in other countries, for example in the UK, where: “There are still a broad range of opinions about the utility of sharing data in chemistry, and the discipline has yet to develop systematised and widely adopted standards for how and when researchers should make their data available” (Long & Schonfeld, 2013, p. 29). Quite an opposite view on this topic is introduced by Morrison, who highlights that: “what seems to excite chemists the most is open sharing of data and molecules, rather than the traditional peer-reviewed journals article” (Morrison, 2009, p. 18). In my study, I did not observe the interest in these matters, however, this needs further investigation.

Most of the economists also reported that they are not aware of this topic. Some of them voiced concern about the financial aspects of such policies that could be supported by the Polish government. However, there is generally less interest in data sharing than among chemists. These findings differ from those supplied by Berkeley’s report, which highlighted this as an emerging trend among economists who have been using, generating and publishing data and datasets more often during the last decade (Harley et al., 2010).

The study found that generally the attitude towards open access is positive. It was recognised that most of the respondents identified open access with accessible and visible features. Notably, statements that all citizens have the right to access peer-reviewed research without any payments were supported by the respondents. Similar results were obtained by Taylor and Francis’s report, where “Publication of research should not be limited by ability to pay” and “All research outputs should be free for everyone to read online” statements were rated very high (Frass et al., 2013). Creaser et al. also reported that for scholars across different disciplines the most important factor of open access publishing is “free access to all” (Creaser et al., 2010). It is therefore likely that nowadays scholars are more open to share their papers with general audiences. Scholars from the investigated university also admitted that open access helped them to build on existing knowledge and had some impact on increasing citations. Positive attitudes towards open access are also observed in the JISC reports which revealed that “Publicly funded research should be open access. Independent researchers should be able to publish without cost” (Rooyen, 2014, p. 60).

Another important finding of this study is the opinion that open access has been seen as “focused on quantity not quality”. Scholars also indicated some agreement with the statement “open access does not provide reliable peer-review process”. The reason for this is not clear, but it may have something to do with the general discussion about open access journals that emerged from studies that have been published or initiated by Nature or Science journals (see Chapter 2). Another possible explanation put forward by the respondents might be that findings from the OA articles, especially preprints, could be stolen and used for commercial purposes. Especially scholars from sensitive fields, such as chemists who deal with drugs research, have some concerns regarding immediate self-archiving. On the other hand, scholars did not to any large extent agree with the statement “Open access is dangerous because it gives rise to academic dishonesty such as plagiarism”. The further study of this topic is also highly recommended.

The factors that motivate publishing put forward in Latour and Woolgar's study, point to an intimate relationship between the publication of scientific papers and scientific prestige. During this study it was observed that for some scientists it is not possible to gain recognition through the publication of scientific articles in open access journals, mainly due to the lack of a Journal Impact Factor. It is interesting, however, that many researchers indicated the open access model as one that increases the possibility of obtaining citations, which is also one of the credentials to achieve scientific recognition. Therefore, a further study about what aspects of open access could be linked with credibility needs to be performed.

8.4 Further research

This study has brought up many questions that need further investigation. First, it would be interesting to compare more scientific disciplines based on the same factors. A cross-disciplinary study could help to establish a greater degree of accuracy in this matter. The two most important limitations of this study lie in the fact that it was conducted at only one university in Poland and that the response rate was rather low. A future study should engage more than one university to expand the scale of comparison and to try to describe the scholarly communication activities of the entire Polish scientific community across different disciplines. This would present more factors as well as some of the obstacles standing in the way of successful interactions between academic fields.

During the interviews and in the online surveys, respondents indicated the importance of supervisors in terms of choosing channels to disseminate their scientific output. A better understanding about peers or even the faculty's or department's role in the scholars' publishing activities would be strongly recommended. This kind of study would be a significant contribution to the results already obtained here.

The influence of institutional repositories and their role in scholarly communication activities could not be investigated in detail due to the lack of such an infrastructure. At the moment the situation is similar at many universities in Poland. However, while repositories do emerge, further research needs to be undertaken to examine their influence and usage by scientists to publish their scientific achievements.

Even though general awareness of open access issues is rather high within the two disciplines, is not entirely clear why some voices raised the view that open access is not a synonym of quality. There are many Polish open access advocates who strongly recommend this kind of publication model. The reasons for the view of open access publications as being of lower quality can be very interesting in the light of the discussion in other countries and require a separate study that would include a more comprehensive examination of open access publishing in Poland. In addition, the different aspects of open access and their possible implications connected with increasing or decreasing credibility among scholars should be undertaken.

Lastly, even if there is an emerging discussion worldwide about open data, this was not reflected by the respondents of this study. In addition, open access mandates and policies also have not been recognized by Polish scholars. A further study with more focus on open access policies and mandates, as well as open data is therefore suggested.

8.5 Conclusions

The purpose of the current study was to show several important areas in which preferences and scholarly publishing activities vary or are similar in both disciplines. In addition, major features and forms of scholarly communication activities for chemistry and economics were identified and awareness of the open access publishing model was investigated.

First, one of the more significant findings to emerge in this study is that both disciplines, i.e. chemistry and economics, have very similar motives that specify the scientists' publishing activities. According to Whitley (2000), chemistry and economics both have a high level of mutual dependency. This may be associated with an increase in competitiveness inside each of the disciplines, which results in more formal scientific communication. To be more precise and speaking on a more general level, scholarly communication activities are dominated by the publishing of scientific papers in top-tier journals with a high impact factor. Citation patterns also are getting more important and noticeable. Even though this is what the researchers talk about as being priorities, they also seem to publish in many other types of channels such as monographs, working papers or conferences proceedings.

However, publication activities have a significant impact on researchers' gaining recognition and prestige as well as grants, a habilitation or, by receiving Ministry points, increasing funding for the home institution. The study has shown that respondents from both disciplines confirmed this characteristic. Researchers have been under great pressure in terms of collecting points by publishing their scientific output. This factor along with other factors such as scientific achievements, scholarships, quality of infrastructure, the number of students from abroad and etc., are truly important for the university because of the evaluation process, which then establishes categories of individual universities. These categories are then reflected by the amount of funding, number of students, the subsidy for statutory research, and the possibility of applying for EU funds and prestige that is measured, for example, by different rankings on the national and international level. Fewer students mean fewer subsidies from the Ministry, and therefore less money to maintain scientific departments. On the individual level, a researcher's reputation could also be manifested by Ministry points and a Journal's Impact Factor. This reputation could be gained across department, faculty, university and scientific field. This means for example that recognized scientists could easier form a research teams and projects; famous departments or faculties attract best students and etc.

Second, the general characteristics of chemistry and economics in Poland are quite similar to those in other studies. This strengthens my grounds for assuming that on the basic level, such as which forms of publishing or the working paper traditions are preferred, these two disciplines in Poland are much the same as in other countries.

In terms of the supplementary forms for the dissemination of research output that are used within the fields of chemistry and economics in Poland, increasing interest in personal websites has been noted by me across economics. This is quite interesting discovery because this form of publication is not easy to maintain. It is also time-consuming and needs special technical skills. The examined university does not provide the infrastructure for a personal website for its staff so they have to create them by themselves. In addition, representatives of Economics faculty are more likely to use other channels, such as an institutional repository or academic social networks, to share their scientific findings than chemists, which leads me to the conclusion that chemists are more reluctant to use other forms of publication. Economists work often is of greater interest to groups outside of the discipline and this factor, along with the working paper traditions, may explain to why economists are more open to other forms of publication. According to Whitley (2000),

fields with high degree of task uncertainty such as economics can be characterized by less controlled publishing patterns than in the fields with low degree of task uncertainty. This is also reflected in the results of my study, where respondents from Economics faculty seem to be more likely to use different publishing channels than chemists.

Turning now to the awareness of open access, respondents from chemistry and economics presented a similar knowledge of several issues related to OA publishing. Interestingly, both groups indicated the Gold model as more preferable to their discipline which, in terms of economics and the working paper tradition, is rather unexpected. However, good knowledge of this topic is not reflected in the quantity of publications in open access journals or is not noticeable in any other activities associated with the movement. Scientists are rather cautious in terms of deciding whether to publish in this model in the future. Representatives of both disciplines seem to be more observers than scientists actively engaged in the open access debate. The lack of a university or government mandate does not improve the situation. However, my findings show that most of the respondents are in favour of an open access model.

In summary, these results suggest that on when it comes to what motivates the choice of publishing outlet, I can find many similarities between the disciplines, such as getting Ministry points, prestige, being cited and being indexed in the Web of Science database. In the way these goals are achieved (forms, dissemination channels) I can claim that chemistry and economics differ to some extent. For example respondents from the Economic faculty more often use social networks to disseminate their scientific output and chemists rarely than economists publish in the domestic journals. These findings enhance the understanding of the role of intra-disciplinary factors noticed in publishing traditions in both disciplines and the influence of the extra-disciplinary factors that have already shaped scholarly communication activities in Poland.

REFERENCES

- Al-Aufi, A. S., & Lor, P. J. (2012). Development of Arabic library and information science: An analysis utilizing Whitley's theory of the intellectual and social organization of sciences. *Journal of Documentation*, 68(4), 460–491. doi:10.1108/00220411211239066
- Allen, J. (2005). *Interdisciplinary differences in attitudes towards deposit in institutional repositories*. Manchester: Metropolitan University.
- American Chemical Society. (2014). *About CAS*. Retrieved May 15, 2014, from <https://www.cas.org/>
- Association of Research Libraries. (2014). *Scholarly communication*. Retrieved May 12, 2014, from http://www.arl.org/focus-areas/scholarly-communication#.U2nd5vl_sYM
- Åström, F. (2008). Formalizing a discipline: The institutionalization of library and information science research in the Nordic countries. *Journal of Documentation*, 64(5), 721–737. doi:10.1108/00220410810899736
- Azar, O. H. (2004). Rejections and the importance of first response times. *International Journal of Social Economics*, 31(3), 259–274. doi:10.1108/03068290410518247
- Baker, D. B., Tate, F. A., & Rowlett, R. J. (1971). Changing patterns in the international communication of chemical research and technology. *Journal of Chemical Documentation*, 11(2), 90–98. doi:10.1021/c160041a009
- Baptista, A. A., & Ferreira, M. (2007). Tea for two: Bringing informal communication to repositories. *D-Lib Magazine*, 13(5/6). Retrieved May 16, 2014, from <http://www.dlib.org/dlib/may07/baptista/05baptista.html>
- Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415). doi:10.1038/489179a
- Becher, T. (1994). The significance of disciplinary differences. *Studies in Higher Education*, 19(2), 151–161. doi:10.1080/03075079412331382007
- Bailey, Charles W., J. (2011). Scholarly Electronic Publishing Bibliography. *Digital Scholarship*. Retrieved May 14, 2014, from <http://www.digital-scholarship.org/sepb/sepb.html>
- Bednarek-Michalska, B., & Grodecka, K. (2011). Open Access - Otwarta Nauka. Retrieved January 05, 2013, from <http://otwartanauka.cel.agh.edu.pl/course/view.php?id=2>
- Bethesda Statement on Open Access Publishing. (2003). *Bethesda Statement on Open Access Publishing*. Retrieved May 14, 2014, from <http://legacy.earlham.edu/~peters/fos/bethesda.htm#definition>

- Biello, D. (2007, January 26). Open Access to Science Under Attack. *Scientific American*. Retrieved May 08, 2014, from <http://www.scientificamerican.com/article/open-access-to-science-un/>
- Billings, M (2008). Changing scholarly communications and the role of the institutional repository in the digital landscape. *Research on Institutional Repositories: Articles and Presentations* (2008). Retrieved May 16, 2014, from <http://digitalcommons.bepress.com/repository-research/42>
- Björk, B.-C. (2012). The hybrid model for open access publication of scholarly articles: A failed experiment? *Journal of the American Society for Information Science and Technology*, 63(8), 1496–1504. doi: 10.1002/asi.22709
- Björk, B.-C., Laakso, M., Welling, P. & Paetau, P.. (2014). Anatomy of green Open Access, *Journal of the Association for Information Science and Technology*, 65(November 2013), 237–250. doi: 10.1002/asi.22963
- Björk, B.-C., & Solomon, D. (2012). Open access versus subscription journals: A comparison of scientific impact. *BMC Medicine*, 10(1), 73. doi:10.1186/1741-7015-10-73
- Bohannon, J. (2013). Who's afraid of peer review? *Science*, 342(October), 60–65.
- Borgman, C. L. (1999). What are digital libraries? Competing visions. *Information Processing & Management*, 35, 227–243.
- Borgman, C. L. (2007). *Scholarship in the digital age: Information, infrastructure, and the Internet*. Cambridge, Massachusetts: The MIT Press.
- Bryman, A. (2012). *Social Research Methods*. Oxford: Oxford University Press..
- Budapest Open Access Initiative. (2002). *Budapest Open Access Initiative*. Retrieved May 13, 2014, from <http://www.budapestopenaccessinitiative.org/>
- Candela, L., Castelli, D., Ioannidis, Y., Koutrika, G., Pagano, P., Ross, S., ... Thanos, C. (2007). Setting the foundations of digital libraries: The DELOS manifesto. *D-Lib Magazine*, 13(3/4). Retrieved from <http://www.dlib.org/dlib/march07/castelli/03castelli.html>
- Chowdhury, G. G., & Chowdhury, S. (2003). *Introduction to digital libraries*. London: Facet Publishing.
- Chowdhury, G. G., & Foo, S. (Eds.). (2012). *Digital libraries and information access: Research perspectives*. Chicago: Neal-Schuman Publishers.
- Clarke, M. (2010). Reducing the peer-reviewer's burden. Nature.com blog. Retrieved May 11, 2014, from <http://blogs.nature.com/peer-to-peer>
- Coalition for Open Education. (2013). *About Coalition for Open Education*. Retrieved May 16, 2014, from <http://koed.org/pl/o-koalicji/>

- Crane, D. (1972). *Invisible Colleges; Diffusion of Knowledge in Scientific Communities*. Chicago: University of Chicago Press.
- Creaser, C., Fry, J., Greenwood, H., Oppenheim, C., Proberts, S., Spezi, V., & White, S. (2010). Authors' awareness and attitudes toward Open Access repositories. *New Review of Academic Librarianship*, 16(sup1), 145–161. doi:10.1080/13614533.2010.518851
- Creswell, J. W. (2008). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications, Inc.
- Cronin, B. (2003). Scholarly communication and epistemic cultures. *New Review of Academic Librarianship*, 9(1), 1–24. doi:10.1080/13614530410001692004
- Dallmeier-Tiessen, S., Goerner, B., Darby, R., Hyppoelae, J., Igo-Kemenes, P., Kahn, D., Lambert, S., Lengenfelder, A., Leonard, C., ... van der Stelt, W. (2010). *Study of Open Access publishing (SOAP)*. Retrieved May 16, 2014, from <http://edoc.mpg.de/478647>
- Dawson, M., & Rascoff, M. (2006). *Scholarly communications in the Economics discipline. A report commissioned by JSTOR*. Retrieved May 16, 2014, from <http://www.sr.ithaka.org/sites/default/files/reports/4.7.1.pdf>
- Devakos, R. (2006). Towards user responsive institutional repositories: a case study. *Library Hi Tech*, 24(2), 173–182. doi:10.1108/07378830610669556
- Ellison, G. (2002). The Slowdown of the Economics Publishing Process. *Journal of Political Economy*, 110(5), 947–993. doi:10.1086/341868
- Emmeche, C. (2011). The organization of biosemiotics and some challenges for academic inquiry. In T. Thellefsen, B. Sørensen, & P. Cobley (Eds.), *From First to Third via Cybersemiotics. A Festschrift honoring professor Søren Brier on the occasion of his 60th birthday*. (pp. 349-375). Copenhagen: SL Forlagene.
- European Commission (2012). Towards better access to scientific information: Boosting the benefits of public investments in research. Retrieved May 18, 2014, from http://ec.europa.eu/research/science-society/document_library/pdf_06/era-communication-towards-better-access-to-scientific-information_en.pdf
- Eysenbach, G. (2006). Citation advantage of open access articles. *PLoS Biology*, 4(5), e157. doi:10.1371/journal.pbio.0040157
- Frass, W., Cross, J., & Gardner, V. (2013). *Open Access Survey: Exploring the views of Taylor & Francis and Routledge authors* (p. 47). Retrieved May 16, 2014, from <http://www.tandf.co.uk/journals/pdf/open-access-survey-march2013.pdf>
- Frandsen, T. F. (2009). *Scholarly communication changing: The implications of open access*. Retrieved May 15, 2014, from <http://www.nordbib.net>
- Fry, J. (2006). Scholarly research and information practices: A domain analytic approach. *Information Processing & Management*, 42(1), 299–316. doi:10.1016/j.ipm.2004.09.004

- Fry, J. (2013). Considerations in adopting a “disciplinary” analysis of scholarly communication and information behaviours. In *ASIS&T European Workshop 2013: Proceedings of the Second Association for Information Science and Technology ASIS&T European Workshop*. Åbo/Turku, Finland. Retrieved June 18, 2014, from <http://www.abo.fi/sitebuilder/media/29327/aew2013proceedings.pdf>
- Fry, J., Oppenheim, C., Creaser, C., Johnson, W., Summers, M., Lisu, S. W., ... Cerlim, D. H. (2009). *Communicating knowledge: How and why UK researchers publish and disseminate their findings. Supporting paper 2: Report of focus groups findings*. Retrieved May 12, 2014, from http://www.jisc.ac.uk/media/documents/publications/communicatingknowledge_focugroupreport.pdf
- Fry, J., & Talja, S. (2004). The cultural shaping of scholarly communication: Explaining e-journal use within and across academic fields. *Proceedings of the American Society for Information Science and Technology*, 41(1), 20–30. doi: 10.1002/meet.1450410103
- Fry, J., & Talja, S. (2007). The intellectual and social organization of academic fields and the shaping of digital resources. *Journal of Information Science*, 33(2), 115–133. doi:10.1177/0165551506068153
- Gable, G. G. (2008). The information systems academic discipline in Australia. *Communications of the Association for Information Systems*, 21(1), 2. Retrieved May 14, 2014, from goo.gl/rc8K1G
- Ganicz, T. (2010). Domena publiczna. *Wikimedia Polska*. Retrieved January 05, 2013, from <http://koed.org.pl/wp-content/uploads/2012/01/DOMENA-PUBLICZNA.pdf>
- Gargouri, Y., Hajjem, C., Larivière, V., Gingras, Y., Carr, L., Brody, T., & Harnad, S. (2010). Self-selected or mandated, open access increases citation impact for higher quality research. *PloS One*, 5(10), e13636. doi:10.1371/journal.pone.0013636
- Garson, L. R. (2004). Communicating original research in chemistry and related sciences. *Accounts of Chemical Research*, 37(3), 141–8. doi:10.1021/ar0300017
- Garvey, W., & Griffith, B. (1972). Communication and information processing within scientific disciplines: Empirical findings for psychology. *Information Storage and Retrieval*. 8(3), 123-136. doi: 10.1016/0020-0271(72)90041-1
- Geuna, A., & Martin, B. R. (2003). University research evaluation and funding: An international comparison. *Minerva*, 41(4), 277–304. doi:10.1023/B:MINE.0000005155.70870.bd
- Harjuniemi, M.-L. (2012). *Open access survey: The results access and institutional repositories Summary* (p. 18). Retrieved May 16, 2014, from https://jyx.jyu.fi/dspace/bitstream/handle/123456789/37729/OA-Survey_Results.pdf?sequence=1

- Harley, D., Krzys Acord, S., Earl-Novell, S., Lawrence, S. C., & King, J. (2010). *Assessing the future landscape of scholarly communication: An exploration of faculty values and needs in seven discipline*. Retrieved May 16, 2014, from <http://escholarship.org/uc/item/15x7385g>
- Harnad, S. (2003). Open Access archivangelism. Defining OA: The Green/Gold and Immediate/Delayed distinction. Retrieved May 14, 2014, from <http://openaccess.eprints.org/index.php?/archives/1086-Defining-OA-The-GreenGold-and-ImmediateDelayed-Distinction.html>
- Harnad, S. (2007, May 28). There is no “Platinum” road to OA. Message posted to <http://users.ecs.soton.ac.uk/harnad/Hypermail/Amsci/6442.html>
- Harnad, S. (2011). Open access to research: Changing researcher behavior through university and funder mandates. *JeDEM - eJournal of eDemocracy and Open Government*, 3(1), 33–41. Retrieved May 14, 2014, from <http://eprints.soton.ac.uk/272401/>
- Harnad, S., & Brody, T. (2004). Comparing the impact of Open Access (OA) vs. Non-OA articles in the same journals. *D-Lib Magazine*, 10(6). Retrieved May 14, 2014, from <http://eprints.soton.ac.uk/260207/1/06harnad.html>
- Holmberg, K., & Thelwall, T. (2014). Disciplinary differences in Twitter scholarly communication. *Scientometrics*, 98(1). doi: 10.1007/s11192-014-1229-3
- Houghton, J., Rasmussen, B., Oppenheim, C., Morris, A., Greenwood, H., Summers, M., & Gourlay, A. (2009). *Exploring the costs and benefits. Economic implications of alternative scholarly publishing models*. Retrieved April 28, 2014, from <http://www.jisc.ac.uk/publications/reports/2009/economicpublishingmodelsfinalreport.aspx>
- Hurd, J. M. (2000). The transformation of scientific communication: A model for 2020. *Journal of the American Society for Information Science*, 51(14), 1279–1283. doi:10.1002/1097-4571(2000)9999:9999<::AID-ASI1044>3.0.CO;2-1
- Jenkins, C., Proberts, S., Oppenheim, C., & Hubbard, B. (2007). RoMEO Studies 8: self-archiving: The logic behind the colour-coding used in the Copyright Knowledge Bank. *Program: Electronic Library and Information Systems*, 41(2), 124–133. doi:10.1108/00330330710742908
- Joint Information Systems Committee. (2010). *Digital Repositories InfoKit*. Joint Information Systems Committee. Retrieved April 28, 2014, from <http://tools.jiscinfonet.ac.uk/downloads/repositories/digital-repositories.pdf>
- Kaufer, D. S., & Carley, K. M. (1993). *Communication at a distance: The influence of print on sociocultural organization and change*. Routledge.
- Kingsley, D. (2008). Repositories, research and reporting: the conflict between institutional and disciplinary needs. *Paper presented at the VALA Conference*. Melbourne, Australia. Retrieved May 16, 2014, from

https://digitalcollections.anu.edu.au/bitstream/1885/46096/3/117_Kingsley_Final.pdf

- Kjellberg, S. (2010). I am a blogging researcher: Motivations for blogging in a scholarly context. *First Monday*, 15(8). Retrieved June 20, 2014, from <http://firstmonday.org/ojs/index.php/fm/article/view/2962/2580>
- Kling, R., & McKim, G. (2000). Not just a matter of time: Field differences and the shaping of electronic media in supporting scientific communication. *Journal of the American Society for Information Science* 51(14), 1306–1316.
- Kling, R., & Callahan, E. (2003). Dynamics of scholarly communication electronic journals, the Internet, and scholarly communication. *Annual Review of Information Science and Technology*, 37(1), 127–177. doi: 10.1002/aris.1440370105
- Kriegeskorte, N. (2012). Open evaluation: A vision for entirely transparent post-publication peer review and rating for science. *Frontiers in Computational Neuroscience*, 6, 1–18. doi:10.3389/fncom.2012.00079
- Krishnan, A. (2009). *What are academic disciplines? Some observations on the Disciplinarily vs. Interdisciplinary debate*. Working papers. Retrieved June 15, 2014, from http://www.forschungsnetzwerk.at/downloadpub/what_are_academic_disciplines2009.pdf
- Krzemińska, A. (2012). Public access to copyrighted materials in light of the act on copyright and related rights in Poland: Possibilities and difficulties. Retrieved June 15, 2014, from [rom http://www.nuk.uni-lj.si/dokumenti/2012/seedi/2_2_LUBLANA_SEEDI.pdf](http://www.nuk.uni-lj.si/dokumenti/2012/seedi/2_2_LUBLANA_SEEDI.pdf)
- Kutchma, I., & Nikisch, J. A. (2010). Polityka otwartego dostępu w Europie i Stanach Zjednoczonych. In *II Międzynarodowa Konferencja Open Access w Polsce. V Konferencja EBIB Internet w bibliotekach*. Retrieved May 15, 2014, from <http://www.ebib.info/publikacje/matkonf/mat21/kuchma.php>
- Lahiri, D. (2006). The case for group review. *Nature*. Retrieved May 11, 2014, from <http://www.nature.com/nature/peerreview/debate/nature05033.html>. doi: 10.1038/nature05033
- Latour, B., & Woolgar, S. (1979). *Laboratory life*. Beverly Hills: Sage Publications.
- Lercher, A. (2008). A survey of attitudes about digital repositories among faculty at Louisiana State University at Baton Rouge. *The Journal of Academic Librarianship*, 34(5), 408–415. doi:10.1016/j.acalib.2008.06.008
- Lindholm-Romantschuk, Y. (1998). *Scholarly book reviewing in the Social Sciences and Humanities: The flow of ideas within and among disciplines (Google eBook)*. Greenwood Publishing Group.
- Liu, L. G. (2014). Economics of scholarly publishing: Exploring the causes of subscription price variations of scholarly journals in business subject-specific areas. *The Library Quarterly*, 81(2), 211–232.

- Long, M. P., & Schonfeld, R. C. (2013). *Supporting the changing research practices of chemists*. Retrieved December 16, 2013, from <http://www.sr.ithaka.org/sites/default/files/reports/Supporting-the-Changing-Research-Practices-of-Chemists-FINAL.pdf>
- Mabe, M. A. (2009). Scholarly publishing. *European Review*, 17(01), 1–21. doi:10.1017/S1062798709000532
- Marchionini, G. (1998). Research and development on digital libraries. In *Encyclopedia of Information and Library Science* (Vol. 63, pp. 259–279). New York: Marcel Dekker.
- Max Planck Society. (2003). *Berlin Declaration on Open Access to knowledge in the Sciences and Humanities*. Retrieved January 05, 2013, from <http://oa.mpg.de/lang/en-uk/berlin-prozess/berliner-erklarung/>
- Mccullough, B. D. (2009). Open Access economics journals and the market for reproducible economic research. *Economic Analysis & Policy*, 39(1), 117–126.
- Merton, R. K. (1973). *The sociology of science: Theoretical and empirical investigations*. Chicago: University of Chicago Press.
- Ministry of Science and Higher Education. (2014). *Scientific research*. Retrieved July 03, 2014, from <http://www.nauka.gov.pl/en/committee-for-evaluation-of-scientific-units/>
- Morgan, C., Campbell, B., & Teleen, T. (2012). The role of the academic journal publisher and Open Access publishing models. *International Studies Perspectives*, 13(3), 228–234. doi:10.1111/j.1528-3585.2012.00495.x
- Morrison, H. (2009). *Scholarly communications for librarians*. Witney, Oxford: Chandos Publishing.
- Morrison, H. (2012a). Creative Commons and Open Access Critique series. *The Imaginary Journal of Poetic Economics Blog*. Retrieved July 19, 2014, from <http://poeticeconomics.blogspot.ca/2012/10/critique-of-cc-by-series.html>
- Morrison, H. (2012b). *Freedom for scholarship in the internet age*. Retrieved December 12, 2013, from <http://summit.sfu.ca/item/12537>
- Morrison, H. (2012c). Thank you, open access movement! *The Imaginary Journal of Poetic Economics Blog*. Retrieved July 19, 2014, from <http://poeticeconomics.blogspot.fi/2012/10/thank-you-open-access-movement.html>
- Morrison, H. (2014). Dramatic growth of Open Access June 30, 2014. *The Imaginary Journal of Poetic Economics Blog*. Retrieved July 19, 2014, from <http://poeticeconomics.blogspot.ca/2014/07/dramatic-growth-of-open-access-june-30.html>

- Mounce, R. (2011). A survey of “Open Access” publisher licenses. Retrieved December 16, 2012, from <https://sites.google.com/site/rossmounce/misc/a-survey-of-open-access-publisher-licenses>
- Mukherjee, B. (2010). *Scholarly communication in LIS: The impact of Open Access journals and e-journals on a changing scenario*. Chandos Publishing.
- Niezgódka, M. (2012). *Wdrożenie i promocja otwartego dostępu do treści naukowych i edukacyjnych. Praktyki światowe a specyfikacja polska. Przewidywane koszty, narzędzia, zalety i wady*. Warszawa. Retrieved May 16, 2014 from http://www.nowyebib.info/images/stories/wiadomosci_2/2012_styczen/oa_icm.pdf
- OAPEN-UK. (2012). *OAPEN-UK HSS researcher survey results*. Retrieved May 16, 2014, from <http://www.slideshare.net/OAPENUK/oapenuk-hss-researcher-survey-results>
- OECD. (2004). Science, technology and innovation for the 21st century. *Meeting of the OECD Committee for Scientific and Technological Policy at Ministerial Level, 29-30 January 2004 - Final Communiqué*. Retrieved May 16, 2014, from <http://www.oecd.org/science/sci-tech/sciencetechnologyandinnovationforthe21stcenturymeetingoftheoecdcommitteeforscientificandtechnologicalpolicyatministeriallevel29-30january2004-finalcommunique.htm>
- Open Knowledge Foundation. (2013). *Open economics*. Retrieved May 12, 2014, from <http://blog.okfn.org/2013/08/30/open-economics-the-story-so-far/>
- Oppenheim, C. (2008). Electronic scholarly publishing and open access. *Journal of Information Science*, 34(4), 577–590. doi:10.1177/0165551508092268
- Palmer, C. L., & Cragin, M. H. (2009). Scholarship and disciplinary practices. *Annual Review of Information Science and Technology*, 42(1), 163–212. doi:10.1002/aris.2008.1440420112
- Pekala, M. (2013). *Private fair use: Strengthening Polish copyright. Protection of online works by looking to U.S. copyright law*. Retrieved from http://works.bepress.com/michal_pekala/2
- PLOS. (2014). *Publication fees*. Retrieved May 16, 2014, from <http://www.plos.org/publications/publication-fees/>
- Polish Academy of Sciences (2012). *Polish code of ethics for scientists*. Retrieved April 22, 2014, from http://www.instytucja.pan.pl/images/stories/pliki/Komisja_ds_Etyki_Nauce/dokumenty/Kodeks_etyki_pracownika_naukowego_31.12._2012.pdf
- Poynder, R. (2004). Ten years after. *Info Today*. 21(9), 1-5. Retrieved May 16, 2014 from <http://elibrary.ru/item.asp?id=8410188>
- Poynder, R. (2013). Open Access in Poland: Interview with Bożena Bednarek-Michalska. Open and Shut? Retrieved May 16, 2014 from <http://poynder.blogspot.com/2013/04/open-access-in-poland-interview-with.html>

- Pritchard, A. (1969). Statistical bibliography or bibliometrics. *Journal of Documentation*, 25(4), 348–349. Retrieved June 12, 2014, from <http://ci.nii.ac.jp/naid/10016754266/>
- Redfield, R. (2013). *Survey results: What should be done about CC-BY reuse?* *RRResearch*. Retrieved July 19, 2014, from <http://rrresearch.fieldofscience.com/2013/08/survey-results-what-should-be-done.html>
- Research Papers in Economics. (2013). *About Research Papers in Economics*. Retrieved April 12, 2014, from <http://repec.org/>
- Roos, A. (2012). Activity theory as a theoretical framework in the study of information practices in molecular medicine. *Information Research*, 17(3). Retrieved May 12, 2014, from <http://informationr.net/ir/17-3/paper526.html#.UmQXivlHDUV>
- Rooyen, C. Van. (2014). Learned Society attitudes towards Open Access. Retrieved May 16, 2014 from http://www.edp-open.org/images/stories/doc/EDP_Society_Survey_May_2014_FINAL.pdf
- Royal Society of Chemistry. (2014). *Chemical Sciences Article Repository*. Retrieved May 16, 2014, from <http://www.rsc.org/chemical-sciences-repository/articles/>
- Saberi, M. K., & Abedi, H. (2012). Accessibility and decay of web citations in five open access ISI journals. *Internet Research*, 22(2), 234–247. doi:10.1108/10662241211214584
- Schmidt, B., & Kuchma, I. (2012). *Implementing Open Access Mandates in Europe*. Göttingen University Press.
- Shih, T.-H., & Fan, X. (2008). Comparing response rates from web and mail surveys: A meta-analysis. *Field Methods*, 20(3), 249–271. doi:10.1177/1525822X08317085
- Siewicz, K. (2010). Prawo autorskie i wolne licencje. Retrieved May 16, 2014, from <http://koed.org.pl/wp-content/uploads/2012/01/PRAWO-AUTORSKIE.pdf>
- Siewicz, K. (2012). *Otwarty dostęp do publikacji naukowych. Kwestie prawne*. Wydawnictwa Uniwersytetu Warszawskiego. Retrieved May 16, 2014, from <http://depot.ceon.pl/handle/123456789/335>
- Siler, K. (2005). The social and intellectual organization and construction of economics. *Post-Autistic Economics Review*, (30). Retrieved May 16, 2014, from <http://www.paecon.net/PAERreview/issue22/Siler22.htm>
- Søndergaard, T. F., Andersen, J., & Hjørland, B. (2003). Documents and the communication of scientific and scholarly information: Revising and updating the UNISIST model. *Journal of Documentation*, 59(3), 278–320. doi:10.1108/00220410310472509
- Sparks, S. (2005). *JISC disciplinary differences report*. Retrieved June 12, 2014, from <http://www.jisc.ac.uk/media/documents/themes/infoenvironment/disciplinarydifferencesneeds.pdf>

- Suber, P. (2002). Open access to the scientific journal literature. *1*(1), 3. *Journal of Biology*. Retrieved from <http://www.biomedcentral.com/1475-4924/1/3>
- Suber, P. (2004). SPARC Newsletter. *Praising progress, preserving precision*, (77). Retrieved July 7, 2014, from <http://legacy.earlham.edu/~peters/fos/newsletter/09-02-04.htm#progress>
- Suber, P. (2012a). *Open Access*. Cambridge, Massachusetts: The MIT Press.
- Suber, P. (2012b). *Open Access overview (definition, introduction)*. Retrieved December 09, 2013, from <http://www.earlham.edu/~peters/fos/overview.htm>
- Szprot, J. (2012). Otwieranie nauki w Polsce. In *III International Conference Open Access in Poland "Open learning and education."* Bydgoszcz, Poland. Retrieved October 19, 2014, from http://www.nowyebib.info/images/stories/Mat_konferencyjne/22/konf_oa_szprot_pl_.pdf
- Thorin, S. E. (2006). Global changes in scholarly communication. In *eLearning and Digital Publishing* (Vol. 33, pp. 221–240). Springer.
- Trager, R. (2007). Chemistry's open access dilemma. *Chemistry World*. 8(12). Retrieved May 15, 2014, from <http://www.rsc.org/chemistryworld/issues/2007/december/chemistrysopenaccessdilemma.asp>
- Trowler, P., Saunders, M., & Bamber, V. (Eds.). (2012). *Tribes and territories in the 21st century: Rethinking the significance of disciplines in higher education* (Kindle edi.), Routledge.
- The Association of College and Research Libraries. (2014). Principles and strategies for the reform of scholarly communication. Retrieved May 16, 2014, from <http://www.ala.org/acrl/publications/whitepapers/principlesstrategies>
- United Nations Educational, Scientific and Cultural Organization, & International Council of Scientific Unions. (1971). *Study report on the feasibility of a world science information system*. Paris. Retrieved May 15, 2014, from <http://unesdoc.unesco.org/images/0006/000648/064862eo.pdf>
- University of California. (2005). *American Chemical Society expresses Opposition to NIH's PubChem*. Retrieved April 30, 2014, from <http://osc.universityofcalifornia.edu/2005/05/american-chemical-society-calls-on-congress-to-shut-down-nih-pubchem/>
- Velden, T., & Lagoze, C. (2009a). Communicating chemistry. *Nature Chemistry*, *1*(9), 673–8. doi:10.1038/nchem.448
- Velden, T., & Lagoze, C. (2009b). *The value of new scientific communication models for chemistry*. Retrieved December 16, 2013, from <http://ecommons.library.cornell.edu/handle/1813/14150>

- Watson, C., Donovan, J., & Bluh, P. (2009). Institutional repositories: Essential infrastructure for scholarship in the digital age. *Research on Institutional Repositories: Articles and Presentations* (2009). Retrieved May 16, 2014, from <http://digitalcommons.bepress.com/repository-research/61>
- Whitley, R. (2000). *The intellectual and social organization of the sciences* (2nd ed). Oxford: Oxford University Press.
- Wiley Publisher. (2013). *Wiley's 2013 Open Access author survey*. Retrieved May 16, 2014, from <http://www.slideshare.net/WileyScienceNewsroom/wileys-2013-open-access-author-survey>
- Wilson, T. (2007, April 19). Budapest Open Access Initiative: BOAI Forum Archive. Re: [BOAI] Independent open-access Canadian medical journal launches. Message posted to <http://threader.ecs.soton.ac.uk/lists/boaiforum/1078.html>
- Wilson, T. (2010). Open access - again. *Information Research - ideas and debate*. Retrieved May 16, 2014, from <http://info-research.blogspot.com/2010/06/open-access-again.html#comment-form>
- Xia, J. (2007). Assessment of Self-archiving in institutional repositories: Across disciplines. *The Journal of Academic Librarianship*, 33(6), 647–654. doi:10.1016/j.acalib.2007.09.020
- Xia, J. (2008). A comparison of subject and institutional repositories in self-archiving practices. *The Journal of Academic Librarianship*, 34(6), 489–495. doi:10.1016/j.acalib.2008.09.016
- Ylijoki, O. (2000). Disciplinary cultures and the moral order of studying: A case-study of four Finnish university departments. *Higher Education*, 39, 339–362.

APPENDIX A: Interview questions

1. Could you please start by telling me something about yourself? What is your degree level and your career's development? Field of study/specialisation etc.
2. When did you publish your first scientific publication and in which genre?
3. How many scientific publication did you submit last year?
4. Where do you publish your scientific publications?
5. Which factors are the most important for you when you need to make a choice of publication channel?
6. Preprint is the version of the article paper before peer review process. Postprint is the version of the article paper after peer-review process. Do you archive your scientific publications? How?
7. Do you have any preferences regarding the assigning of copyright to publishers?
8. Have you ever refrained from submitting an article to a journal because their copyright policy did not suit your preferences?
9. Are you familiar with Creative Commons Licenses?
10. What kind of CC License do you prefer?
11. Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?
12. Do you know if your University has an Institutional Repository?
13. Do you know why your University does not have an Institutional Repository?
14. If not, do you think it will be useful for scholars to have an Institutional Repository? Why? Why not?
15. Do you know what Open Access means? And what does it mean for you?
16. How would you characterise the situation concerning Open Access in Poland and in your scientific field?
17. There are two main types of Open access: Gold OA (where the publisher makes a paper immediately and freely available for users and Green OA (where scholars publish their output in subscription journals, and archive their papers [preprint or postprints] under special conditions through open repositories or author's personal websites etc.)
What do you think about those "two roads to OA"?
18. Do you know which type of Open access is more popular in your scientific field?
19. Have you ever published in Open access journals?
20. If yes, can you provide title/s?
21. If not, can you explain why? If there were any special factors that influence your decision?
22. Do you intend to publish in Open access journals in the future and why/why not?
23. Is your University promoting or facilitating Open access?
24. Nowadays many universities worldwide introduce Open access mandates. Have you ever heard about those kinds of mandates and what do you think about them?

APPENDIX B: Research survey

Research survey - scholarly communication. This survey concerns different scholarly communication practices in your field.

Page One

If you would like to know the results of the questionnaire, please leave your e-mail address in the comment box below the question.

1) Name of the university*

Comments:

2) *Level of degree**

PHD student

Assistant Professor

Associate Professor

Professor

other

3) Field of research*

4) *Publication history - how many years have passed since you submitted your first scientific publication?*

more than 20 years

11-19 years

5-10 years

between 2-5 years

within 12 months

5) *What is your average number of publications per year?*

more than 3

3

2

1

none

6) *What kind of publications do you submit? (multiple answers possible)*

articles

conferences papers

monographs

book chapter

Other

7) *Via which different types of channels do you usually publish your items ? (multiple answers possible)*

Printed/electronic subscription based journals

Open access journals

Institutional or disciplinary Repository

Personal website

Other

8) *Please indicate where do you usually publish your items? (multiple answers possible)*

International commercial publishers

National commercial publishers

Non- profit publishers

Domestic university journals/publisher

Learned society periodicals

I don't know

Preprint is the version of the paper before peer review process.

9) *Have you ever deposit your **preprint** items in an open repository?*

yes

no

Postprint is the version of the article paper after peer-review process.

10) *Have you ever deposit your **postprint** items in an open repository?*

yes

no

11) *Please indicate relevant factors that influence your choice of publication channel (multiple answers possible).*

high reputation of publication/journal/publisher

Journal's Impact factor

points awarded by Polish Ministry of Science and Higher Education

abstracting and indexing in Web of Science

abstracting and indexing in databases other than Web of Science (for example Google Scholar, Scopus etc.)

abstracting and indexing in polish databases (BazTech, BazHum, BazEkon etc.)

quality of peer-review process

faculty or discipline preferences

no author fees

Open access journals

journal supporting the deposit of preprint/postprint version of the article in an Institutional Repository or other publication channel

Creative Commons licensing

Other

12) *Please state your preference regarding the assigning of copyright to publishers.*

Assign copyright

License copyright

No preferences

I don't know

13) *Have you ever refrained from submitting an article to a journal because their copyright policy did not suit your preferences?*

yes

no

14) Are you aware of Creative Commons Licenses?

yes

no

15) Have you ever used any informal channels for dissemination of your items (such as blogs, personal website, social networking)?

yes

no

16) If yes, please indicate which channels you have used (multiple answers possible) ?

Blog

Personal website

Academic social networks (Research Gate, Academia.edu etc.)

Facebook/Twitter

Other

17) Does your University have an Institutional Repository?

yes (then please answer questions 18 and 19)

no (then please answer question 20)

I don't know

18) If yes, have you ever used it to deposit your publications?

yes

no

19) If yes, what kind of items (preprints, postprints, lectures, thesis etc.) do you deposit (please indicate) ?

20) If no, have you ever used any other repository (disciplinary, national etc.)?

yes: _____

no

21) Do you think that a repository would be needed for your University?

yes

no

22) Why?

23) How well would you describe your awareness of Open access?

Extremely good

Very good

Moderately good

Not very good

Not at all good

24) How many articles have you published in Open access journals?

25) Do you intend to publish in Open access journals in the future and why/why not?

yes: _____

no: _____

I don't know

26) Do you advocate Open Access?

yes

no

27) If yes, how do you do this?

There are two main types of Open access: Gold OA (where the publisher makes a paper immediately and freely available for users) and Green OA (where scholars publish their output in subscription journals and archive their papers [preprint or postprints] under special conditions through Institutional Repositories or author's personal websites etc.)

28) Which model of Open access, Green or Gold, do you think is more suitable for researchers in your field?

Green

Gold

I don't know

29) Why?

30) Is the Article Processing Charge that is necessary in some Open access journals expensive for you?

no

not really

yes

yes, quite

no opinion

31) Have you heard about the Open access mandates introduced in by universities/ institutions worldwide?

yes

no

I don't know

32) How would you view an Open access mandate for publications at your University?

33) How would you view an Open access mandate for data sharing at your University?

5 stars: Strongly agree; **4 stars:** Agree; **3 stars:** Neither agree nor disagree; **2 stars:** Disagree; **1 star:** Strongly disagree.

34) Please respond to the following statements concerning Open access and mark the most adequate answer from the following:

	Stars rating
Open Access makes articles more visible.	<hr/>
Open access makes articles more accessible.	<hr/>
Open Access makes articles more retrievable.	<hr/>
Gold Open Access has more advantages than Green Open Access.	<hr/>
Green Open Access has more advantages than Gold Open Access.	<hr/>
All citizens have the right to access peer-reviewed research without any payments.	<hr/>
Open access helps researchers build on existing knowledge.	<hr/>

Open access is dangerous because it gives rise to academic dishonesty such as plagiarism.	
Open access should be obligatory for all research conducted at public Universities.	
Open access reduces subscription fees.	
Open access increases citations impact.	
Open access is not a road that scientific communication should follow.	
Open access is rather expensive.	
Open access journals do not provide reliable peer-review process.	
Open access is focused on quantity not quality.	

Thank You!

Thank you for taking our survey. Your response is very important for me.

APPENDIX C: A letter of invitation to participate in a research

Dear Sir/Madam

My name is Magdalena Szuflita. I work at the Gdansk University of Technology Library and I am also a postgraduate student at the Swedish School of Library and Information Science at the University of Borås, Sweden. I would like to invite you to take part in my Master's level research project which concerns different scholarly communication practices in your field.

I would greatly appreciate if you would fill out an online survey. The survey should take approximately 20 min to complete.

Enclosed you will find a link to the online survey. Please feel free to include any additional comments you deem necessary or relevant to improving my research process. Your response and time is greatly appreciated.

The data will be handled confidentially and personally information will be limited to the minimum. In the project the name of the university will not be mentioned.

If you would like, the results of the questionnaire might be sent to you by e-mails.

If you have any questions about this research, please feel free to contact me at magdalena.szuflita@pg.gda.pl.

Thank you,

Magdalena Szuflita

APPENDIX D

34. Please respond to the following statements concerning Open access and mark the most adequate answer from the following:

Stars rating

Open Access makes articles more visible.

Average Rank

4.00

Count: 45

Min: 1 / Max: 5

StdDev: 1.12

Open access makes articles more accessible.

Average Rank

4.33

Count: 45

Min: 1 / Max: 5

StdDev: 0.94

Open Access makes articles more retrievable.

Average Rank

3.87

Count: 45

Min: 1 / Max: 5

StdDev: 1.24

Gold Open Access has more advantages than Green Open Access.

Average Rank

3.35

Count: 40

Min: 1 / Max: 5

StdDev: 1.11

Green Open Access has more advantages than Gold Open Access.

Average Rank

2.48

Count: 40

Min: 1 / Max: 5

StdDev: 0.97

All citizens have the right to access peer-reviewed research without any payments.

Average Rank

3.58

Count: 45

Min: 1 / Max: 5

StdDev: 1.26

Open access helps researchers build on existing knowledge.

Average Rank

3.56

Count: 45

Min: 1 / Max: 5

StdDev: 1.27

Open access is dangerous because it gives rise to academic dishonesty such as plagiarism.

Average Rank

2.41

Count: 44

Min: 1 / Max: 5

StdDev: 1.15

Open access should be obligatory for all research conducted at public Universities.

Average Rank

2.43

Count: 44

Min: 1 / Max: 5

StdDev: 1.12

Open access reduces subscription fees.

Average Rank

3.19

Count: 43

Min: 1 / Max: 5

StdDev: 1.15

Open access increases citations impact.

Average Rank

3.78

Count: 45

Min: 1 / Max: 5

StdDev: 1.13

Open access is not a road that scientific communication should follow.

Average Rank

2.05

Count: 44

Min: 1 / Max: 5

StdDev: 1.13

Average Rank

Open access is rather expensive. 3.11

Count: 45
Min: 1 / Max: 5
StdDev: 1.37

Open access journals do not provide reliable peer-review process.

Average Rank

3.09

Count: 43
Min: 1 / Max: 5
StdDev: 1.10

Open access is focused on quantity not quality.

Average Rank

3.07

Count: 44
Min: 1 / Max: 5
StdDev: 1.21