Journal publishing in digital era: STM scientific journals in Croatia

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Abstract. *This paper presents findings from the research of 87 journals in the fields of science, technology and medicine in Croatia. Journal publishing is a very demanding job and journal editors and editorial teams are facing many challenges such as insufficient financial support to the journal, low quality of article manuscripts, badly formatted article manuscripts, lack of help to the editor, etc. while doing their job. Journal editorial teams are doing their best to overcome these problems in order to facilitate transformation of scientific journals from paper based to electronic versions and to participate actively in scientific communication paradigm shift.*

Keywords. Scientific communication, journal publishing, STM journals, Croatia

1 Introduction

Writing and publishing scientific articles are two important activities in a career of every scientist: "Best practice for academics is to write key research contributions as scholarly articles for submission to relevant journals and conferences" [10]. Today, more than ever, it is an imperative for every scientist to publish articles in scientific journals in order to get recognition for his/her work, earn his/her academic promotion and to attract new funds for new research. For Correia and Teixeira [2], "Publication of articles in scientific journals became the prime indicator of professional standing for researchers and the organizations that employed them.". Scientific journals are still the most important media for dissemination of scientific information: "Publishing an important paper in a leading journal is much more likely to reach the widest possible audience and to bring honour to all involved." [6]. For Chang [1], "Academic journals disseminate information to the community and provide quality control, a trusted archive, and author recognition." Journals are very versatile media regarding the content they publish: "Journals publish research articles, field or laboratory work notes, and book reviews; use in-house editorial or outside peer reviews; cater to scholars in a specific field or discipline; and may be considered by the academic practitioners concerned as top-, middle-, or low-ranking outlets for their scholarly products." [20]. Scientific knowledge is cumulative, and scientific journals contribute to the corpus of that knowledge by publishing results of scientific research: "Scientists publish their research findings and review others' research results in academic journals for maximal effect on present and future research." [1]. In his article on changing faces of academic publishing, Lundin [14] emphasized that publishing results of research in form of articles in international scientific journals has become the most important activity in life of researchers, since they spend a great deal of their time on preparation of manuscripts targeted at particular journal audiences. As a result, scientific journals are important for academic community as they allow academics to publish results of their research and to be informed about the most recent developments in their discipline and sub-discipline [11]. In fields of science, technology and medicine where fast publishing is of great importance for recognition of discoveries, journals have been chosen as the primary channel for publishing and dissemination of results of scientific research. In her article on scholarly books, Dalton [4] also suggested the

primacy of the journal article in sciences: "(…) the primacy of the article in the sciences and the primacy of the book in the humanities, with the social sciences falling somewhere in between, are well established."

Because of their importance for science, technology and medicine, journals still remain in focus of scientists, publishers, libraries and other key players interested in dissemination of scientific knowledge. Scientific journals are burdened by many problems. To investigate problems journal editorial teams encounter at their work and influence of these problems on basic aspects of scientific journals management in the fields of science, technology and medicine in Croatia, a research was initiated. This paper will present results of that research.

2. Challenges in journal publishing

Publishing of a scientific journal is a complex and demanding task. Journal publishers, editors and editorial teams face many challenges while doing their job despite the overall technological advancement that helps them to overcome some of the challenges frequently encountered in this type of activity. Some of these challenges are: insufficient number of reviewers, reviewers who do not submit their reviews on time, authors who submit low quality article manuscripts, authors who submit article manuscripts badly formatted, insufficient financial support to journal operation, insufficient number of members of the editorial team, editor in chief is overloaded with obligations outside the journal, lack of volunteers who would help the editor, high cost of journal printing etc. This part of the paper will analyze selected problems that occur in journal publishing and that influence their quality.

Scientists are interested in publishing their articles in top-tier journals. To become a top-tier journal, a journal must employ top scholars as referees and as members of the editorial team, and by publishing the work of top authors [7]. Despite the increase in number of scientists worldwide who want to publish their work in top-tier journals, the number of such journals has remained the same as the number of top journals twenty years ago [15], making the task of article publishing even more difficult to scientists, especially to young scientists. Their career depends on the choice of journals for publication of their work. To continue their career, they must publish their articles in high profile journals because "(…) higher value is given to those which are published in internationally known journals." [12]. According to Miller and Harris [17], scientists select journal to which they will send their article manuscripts based on "(…) the type of papers typically published in each journal, the journal's aims and scope, and the scientific reputation of the editorial team and the editor."; " (…) relative qualities of the journal, the efficiency of the expected review process, and the estimated likelihood of acceptance by each journal.", and, finally, based on "(…) the prestige of the journal, the efficiency and fairness of the review process, the timeliness of publication, and the cost to the author.".

Editors and editorial teams often find themselves under the pressure to respond to the authors' demand to publish their articles and, at the same time, to maintain quality of the journal. Quality control in form of a peer review of the article manuscripts submitted to the journal is still one of the most controversial yet necessary procedures in scientific journal publishing because journal editors often receive typescripts from established authors "(…) that are, frankly, untidy, inaccurate, and not in the correct format, as well as failing to follow the instructions for authors." [5].

The results of the peer review process can determine the future of a scientist's career and influence other important decisions in scientific community. Scott [19] sees peer review as "(…) the main form of decision-making around: who receives money to do which science; who gets the opportunity to publish in the scientific literature; and which individual scientists are selected and promoted within research institutions.". Peer review has often been criticized for being unfair, slow, unhelpful, conservative, and expensive. Editors in scientific journals spend significant amount of time on finding reviewers who are willing to participate in a journal's quality control process and who are able to finish their peer review professionally and on time. In situation in which journal editors are able to find scientists who are willing to participate in the peer review process, they also face problems such as: untimely response from peer reviewers, unprofessionally written review, bad communication with the reviewers, receiving requests for a payment for services rendered by reviewers etc. It is not uncommon for the article

authors to protest upon receiving the article manuscript review which can sometimes be devastating for their career. Authors sometimes receive harsh and even offensive reviews which lead them to a decision to give up on revising the reviewed article manuscript or they give up on sending their reviewed or rejected article manuscript to another journal. Martin [16] warns, that "(…) talented individuals have been lost to research because of damaging reports from referees.". Fischer [8] also noticed that "(…) manuscript reviews are not done well (e.g., tardy, sarcastic, brutally critical, vague or unhelpful).". In their article on article publishing in top journals, Macdonald and Kam [15] have also looked at the peer review very unsympathetically; they claim that the top journal editors "(…) invite legions of academics to submit papers in order to keep up their rejection rate (another, though lesser, indicator of a top journal), desk-reject the majority, and then fast-track a few favored papers.". In spite of problems noticed during the peer review process in scientific journals, science has no other regulatory mechanism which would filter out low quality article submission from the high quality submissions. Therefore, journal editors must balance between scientists' need to publish their articles and quality control which guarantees that journal would be taken seriously in scientific community.

To become successful, a journal must have a good editorial team led by a strong editor. "The editor of a peer-reviewed journal should ensure that his or her publication is a fair, open-minded, and receptive outlet for quality research." [8]. Good editor should achieve: "(…) prompt acknowledgment of submissions; detailed feedback on how the review process works; reviews that are timely (within three months), constructive, fair and impartial, confidential, thorough, and diplomatic; and editor involvement as 'blind-partner' (vs. 'gatekeeper')." [4]. Bad editorial work or failures in the transfer of the editorial control [18] to the editorial team are important reasons why journals loose their good reputation or just die. Old and new journals always seek esteemed individuals who are willing to take the place of the journal editor. Miller and Harris [17] highlighted reasons for making decision to become an editor: "(…) the subject area, prestige, and potential of a journal must be appealing to the editor; (…) the editor must be comfortable with the circulation of the journal and the impact that it has on the scientific community; (…) the editor must have the support of the publisher – not only in financial terms but for editorial support, promotion of the journal, quality and timeliness of publication, and willingness to be innovative to improve the quality of the journal." When speaking about financial support, journal must be well funded to survive. This is especially difficult in times of crisis, when journal budgets are cut and when journals sometimes can not count even on usual sources of financial aid. In the transition from print to electronic versions of journals, publishers can save money by discontinuing the print version of the journal to save some money.

Personal participation of editors in the process of journal management and publishing helps them and all other individuals who are involved in this process to learn a lot about the publishing process about topics in the scientific field(s) covered by the journal. Regier [18] confirms such an idea: "(…) journal production teaches not only skills but knowledge of a field.". Today, editors are overwhelmed with different obligations outside the journal which they manage, and it has become difficult for them to dedicate a significant amount of time to journal management. In such cases, a journal must have good editorial team which would help the editor.

Introduction of the internet into the process of scientific publishing and dissemination of scientific information has created a new set of problems for journal owners and journal editors. Kingsley [13] warned "The traditional journal with set names, volumes and issues, and its attendant problems of lengthy delays for article publication, high subscription costs and questionable archiving practices is unlikely to continue in a new scholarly communication system." Cutter [3] informed about disappearance of the traditional journal structure: "Today academic journals are often disaggregated into separate pieces in many databases and on many Web sites—that is, individual issues are broken up into chunks of material, in which the coherence of a particular issue (whether guest-edited or not) may be lost, and sometimes (even) the journal's actual identity is obscured." Publishers have managed to maintain the interest for their journals by disaggregating journals, and by offering access to journal articles as separate units available for

download. This situation has also brought them additional revenue since readers now access selected articles for which they can pay separately and do no need to pay subscription for the whole journal.

Long term preservation and availability of journal content is another major concern for journals and their publishers. Digital repositories are possible solution to that problem. Digital repositories can store different file formats and types of content in order to preserve the intellectual product created by the scientists. Repositories should secure long term preservation and curation so as to ensure that data generated today can survive the changes of technology and can be accessed in the future [21]. Preservation is not only related to data produced by scientific research but it is also related to old (i.e. existing) and new journal articles, which are still the most important media in scientific publishing. Scientific journals are read over a long period of time, and older articles may not be available electronically. When journals become available exclusively in electronic format, they are rarely made available retrospectively. The danger is that, in the future, older articles will be ignored because they are not available electronically.

To overcome these frequently written about problems, journal editors and editorial teams use different organizational techniques and employ information and communication technology in cases in which it would bring evident benefit to the journal management and publishing process.

3 Research

To find out more about the existing problems in journals and their influence on journal management and publishing in the field of science, technology and medicine in Croatia, a research was initiated. The purpose of this research was to identify possible changes the internet and information and communication technology have on journal publishing process in these scientific fields in Croatia. The aim of the research was to collect data from the editorial teams of the scientific journals in the fields of science, technology and medicine in Croatia listed at the Portal of scientific journals of Croatia "Hrčak" ["Hamster"]. The total of 87 journals published in the field of science, technology and medicine in Croatia was selected. A Web questionnaire with 17 closed type questions was selected as a research method used to collect data about aspects of work of editorial teams in these journals. An e-mail invitation to participate in research was sent to e-mail addresses of 87 journals on February 11 2011. Four messages returned as undelivered (reasons: Recipient address rejected: User unknown and can't create user output file). The second call for participation was sent by e-mail on February 18th 2011. The survey was closed on March 8th 2011 after 58 sets of answers were collected (response rate of 66.66 %.).

4 Findings and discussion

Publication of results of scientific research is an important and a difficult job both for scientists as authors and editors and editorial teams in scientific and professional journals. This part of the article will present results from the research of 87 journals in fields of science, technology and medicine in Croatia. Due to the space restrictions, only part of the results will be presented in this section of the paper.

Indicate format types in which articles in your journal are published. (N=58)

Although digital technology offers many advantages over the print technology in terms of ease of publication and distribution of results of scholarly research, 53 journals (91.4%) in this research publish their publications both in printed and electronic format. Three journals (5.3%) are published only in electronic format, while 2 journals (3.4%) are published only in printed format. These results indicate the existence of dual nature of journals. Journals still hold on to the print as this is the established practice that is still important for the process of academic advancement at many universities worldwide. At the same time, publishers took advantage of the internet for distribution of the output of the scientific research. Electronic journals will probably gradually replace printed journals, but until then, we will be witnesses of journals existing in print and in electronic format (digitally born journals are excluded since they never existed in printed form).

If your journal offers access to its content in electronic format, what type of access is offered to readers?(N=58)

By publishing journal articles on the Portal of scientific journals of Croatia "Hrčak" ["Hamster"], journal editorial teams contribute to the quantity of open access material available to scientists and other interested readers. Most journals in this research, 52 of them (89.7%) offer access to the journal content without any limitations, 2 of them (3.4%) have some other limitations in place ("adherence to the copyright, citing resources is mandatory" and "only abstracts are available"). Each of the following limitations was chosen by 1 journal (1.7%): access with some limitations: login and password are required; access with some limitations: filtering of IP address; access with some limitations: access to full-text requires paying a fee and journal does not publish papers in electronic format. Judging from these results, most journals have decided to offer access to article content without any limitations thus increasing visibility of the journal on the internet. At the same time, some journals have successfully managed to decrease their printing expenses.

What are the formats in which you receive article manuscripts from authors? (N=58)

Because of the global availability of e-mail, 47 journals (81%) in this research use this internet service for receiving article manuscripts from authors. 26 journals (44.8%) in this research, receive article manuscripts on optical media (CD or DVD), 16 journals (27.6%) receive article manuscripts on paper, 12 journals (20.7%) accept article manuscripts stored on USB memories, 10 journals (11.2%) still accept magnetic media (floppy disks), and 10 journals (11.2%) use a journal management and publishing system (e.g. Open Journal System) for article manuscript upload. Authors send article manuscripts in formats and on media provided by journals in author guidelines. As the electronic communication becomes increasingly available, authors are given a chance to send their article manuscripts by e-mail, or, in some cases, to upload the article manuscript on the online journal management system. Submission of article manuscripts in electronic format speeds up the initial part of the article management procedure and helps editors in distribution of the submitted article manuscripts to prospective reviewers. Use of e-mail accelerates communication between authors and journals editors, providing the authors with the prompt response from editors about the status of their article manuscript.

According to your estimation, how many months does the article publishing process last, from the moment of receiving a manuscript to the final publication of article?(N=57)

Length of period of article publication is very important to authors because they seek fast recognition for their scientific achievements. In 23 journals (40.4%) most frequent length of article publishing process is six months, in 16 journals (28.1%), articles are published within 3 months, in 8 journals (14%) articles are published within 9 months, and in another 8 journals (14%) articles are published within 12 months. One journal (1.8%) publishes articles in less than a month and also only 1 journal (1.8%) have publication time of more than 12 months. Publication time in STM journals is usually considered to be shorter than in journals in fields of social sciences and humanities. Therefore, publication time between three and six months is fair. It is difficult to establish the optimal length of publication time, because different journals have similar but not identical procedures of article editing, and this activity might last shorter or longer depending on many factors that influence the journal publication procedure in a particular journal.

What category of authors publishes the most frequently in your journal?(N=57)

Twenty one journals (36.8%) in this research receive article manuscripts predominantly from the domestic (Croatian) authors, 19 journals (33.3%) receive article manuscripts from domestic and foreign authors equally and 16 journals (28.1%) receive article manuscripts predominantly from foreign authors. One journal (1.8%) couldn't make the estimation about the ratio of domestic and foreign authors sending article manuscripts to their journal. Since modern science is conducted globally mostly without boundaries, it is expected that international cooperation between authors is natural and that it has become a routine. However, journals publishing only in the local language, in this case, in the Croatian language can sometimes be invisible to the general scientific public. To overcome this barrier, many STM journals in this

research publish articles in the English language, making their journals more visible in the global scientific community and enabling international cooperation between authors.

What problems from the following list do you encounter during process of management of your journal?(multiple answers)

Journal editors and editorial teams encounter different problems during their activities of managing the journal. Most frequently encountered problems indicated in this research were: journal does not receive enough money for normal operation – 40 journals (69%); reviewers do not submit their reviews on time – 30 journals (51.7%); high cost of journal printing – 30 journals (51.7%); editor in chief is overloaded with obligations outside the journal – 23 (39.7%); authors submit badly formatted article manuscripts – 19 (32.8%); insufficient number of members of the editorial team – 15 (25.9%); lack of volunteers who would help the editor – 15 (25.9%); journal does not use a journal management and publishing system – 13 (22.4%); insufficient number of reviewers – 8 (13.8%). Eleven journals (19%) enumerated other problems not offered in this list: domestic authors are not motivated to submit articles to our journal, high mailing costs, the status of the journals is not regulated by the charter of the (academic) institution, foreign scientists refuse to review papers, we were unable to employ new editor, we receiver to few article manuscripts, high costs of exchange of surplus journals with other institutions, all problems are equally present (two journals), editor is overloaded with obligations.

Q10 Are you familiar with open access initiative?(N=58)

Forty six journals (79.3%) in this research are familiar with the open access initiative, while 12 journals (20.7%) are still not familiar with this initiative. Open access initiative is a globally known initiative for openness of scientific information resources and free access to them. This initiative would help 20.7% of journals to become more visible in the global scientific community and make authors of the articles more cited and their articles more downloaded.

Does your journal store published articles in one of the existing digital repositories in Croatia?(N=58)

Digital repositories are rather new type of digital information resources which help universities, publishers and authors to store permanently output of the scientific research and make it available upon request. Large quantities of journal volumes published in several decade makes management of journal difficult, especially if there is no other computer and network supported information system for organization of digital content available. Digital repositories available at universities (and elsewhere) contribute to the greater availability of the digital content generally, making issues like high journal subscription fees and unavailability of scientific digital content less severe. Thirty one journals (53.4%) in this research use digital repositories for storing journal content, while 19 journals (32.8%) still do not use digital repositories for such long term article storage. Unfortunately, 8 journals (13.8%) do not know what a digital repository is. Digital repositories are now common in use in the scientific community and at universities worldwide, as they introduce technological solutions for organization of journal articles, books, research data and other content that is product of scientific endeavor. Universities in Croatia are establishing their first digital repositories. One example of a digital repository (relevant for this research) is University of Zagreb Medical School Repository at http://medlib.mef.hr/ which contains published material by members of the Medical School, including peer-reviewed journal articles, published conference papers, books and book chapters and PhD theses. It is expected that the number of digital repositories in Croatia will increase over time. Digital repositories at universities contribute to the prestige of each institution that has developed such a type of a digital archive.

Does your journal use social networks for journal advertising and contact with authors and readers?(N=57)

While the journal Web site is the essential communication channel for communication with authors and readers, social networks are newly created communication means which could attract more authors and readers to journals which use such type of communication. Fifty two journals (91.2%) do not use social networks for journal advertising or contact with the existing

and prospective authors and readers, and only 5 journals (8.8%) use social networks for this purpose. Social networks are already demonstrating their potential for promotion of different products and services outside the scientific community. It is understandable that the scientific journals editorial teams and the editor do not have enough time to explore social networks in depth, but they could profit from journal's presence on most popular social networks, especially if younger generations of users become interested in science.

Q14 Has the use of the internet improved communication between the editorial team in your journal and authors?(N=57)

Fifty three journals (93%) of journals in this research perceive the internet as an information environment which improved communication between the editorial teams and authors, and 4 journals (7%) do not see any improvement in communication by using the internet. The internet has become ubiquitous way of communication for almost all journals in this research. The remaining 7% of journals may have less intense communication with their authors and do not require the internet as main or important communication channel. The internet has definitely sped up the communication with journals and it is only logical that in the future we will witness even more intensive communication of authors (and readers) with journals in new formats and by using new internet services that will emerge.

In your opinion, could use of the journal management and publishing software improve quality of the editing process in your journal?(N=57)

This question is realization of the idea of introduction and implementation of journal management and publishing software in the journal editing process in scientific journals. Answers in this question indicate interest of editorial teams to introduce journal management and publishing software in their daily practice. Fifty one journals (89.5%) agreed with the idea of improvement of the journal editing process by use of the journal management and publishing software, and 6 journals (10.5%) gave the opposite opinion. Use of journal management and publishing software in the journal editing process will most likely help journals to speed up the publishing process and to overcome at least some of the organizational problems that happen due to the inability of the editor and / or the editorial team to spend enough time on particular journal management issues.

5 Conclusion

Journal publishing in Croatia in the fields of science, technology and medicine is undergoing a change from paper based to electronic publishing environment. Journals which participated in this research showed their orientation towards use of the internet for communication with authors resulting in greater speed and better mutual understanding of authors and journal editors and editorial teams. By deciding to publish electronic versions of their journals, publishers also decided to promote unrestricted access their content offering readers to explore scientific achievements of the Croatian and foreign scientists. Most journals readily accept article manuscripts written equally by the Croatian scientists and foreign scientists demonstrating that they are open for cooperation regardless of the nationality of the article contributors. Speedy publication of articles contributes to the accumulated scientific knowledge. Journals in this research publish authors' contributions within the time period of six months which is fair. Journals' orientation towards use of information and communication technology can be confirmed by the frequent use of e-mail for reception of article manuscripts from authors as well as by use of journal management and publishing software, by supporting open access and storing articles in digital repositories etc. Scientific journals in the fields of science, technology and medicine are also important partners in the process of education at universities (in general). Despite successes they have accomplished in the publishing process, journals editors and editorial teams are burdened with financial and organizational problems that call for greater financial and human resources support. Journals that participated in this research encounter problem similar or even identical to problems that could be found in other scientific journals worldwide. Despite the problems, journal editors and editorial teams are continuing their work in order to improve working conditions in their journals and to continue to provide support to the scientific community.

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