

Web sources of literature for teachers and researchers: practices and attitudes of Croatian faculty toward legal digital libraries and shadow libraries such as Sci-Hub

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Abstract - In this paper, we have explored the extent to which faculty use different web sources of scientific papers, as well as their practices and attitudes related to availability and use of scientific papers. The questionnaire was sent to employees of the Faculty of Humanities and Social Sciences and the Faculty of Science at University of Zagreb. It was found out that majority of respondents use scientific papers on the web, several times a week. Google Scholar is the most used web portal for finding papers. Also, very popular are Croatian web portals. Pirate web portals (shadow libraries) are the least used, although almost half of respondents use them for various reasons: access to papers is expensive and not available; easy and fast access, etc. Only a small minority of respondents completely or partly agree that they are content with offer of international scientific journals and papers which are available in Croatia through subscription by scientific institutions. Through log analysis method, we also explored which scientific papers are requested in the Sci-Hub pirate web portal by users located in Croatia. Papers from Natural Sciences domain were most requested, while papers from Social Sciences and Humanities domains are not so often requested.

I. INTRODUCTION

Through the subscription of *Ministry of Science and Education*, Croatian faculty has an access to various databases of scientific journals. However, there is a problem with financing of this subscription. Therefore, the access to journals is limited. Availability of scientific journals is also problematic because higher education institutions don't have a lot of financial resources for subscribing to printed or electronic journals [1]. For example, Krajna and Markulin have established that the majority of libraries at the University of Zagreb doesn't have an adequate budget for literature procurement. For many years *Ministry of Science and Education* has co-financed their procurement, but because of the reduction of those financial subventions, libraries had to reduce the number of their journal subscriptions [2]. The additional problem is that between various university libraries there is no coordinated purchase of journals and other literature, there is no agreement about the „library fond development (...), planning and rational budget spending, more comprehensive and faster addressing of user needs, avoiding of unnecessary duplication of information sources“ [2, 35]. Martek believes that the golden year of

subscription to international scientific journals and databases was 2005 when many information sources were available to the academic community. Since then, the budget cuts have had considerable negative impact on the availability of international journals [3]. However, availability of Croatian scientific journals is very good, although it was not always like that. According to a study from the year 2002, among 223 analysed Croatian scientific journals, 120 journals or 54% had a web presence. Among these 120 journals only 21 or 18% were providing full text of papers [4]. According to study from the year 2009, a study conducted on the same sample of 223 journals, 174 journals or 78% had a web presence. Among these 174 journals 61 or 36% were providing full text of papers. An important factor is that 54 of those 61 journals were providing open access to papers [5]. The considerable improvement in Croatian scientific journal availability was made when the Hrčak web portal was launched in 2006. Hrčak is online journals platform which provided to publishers a simple tool for creating online open access versions of their journals. It included 170 open access (OA) journals and had an average of about 10000 unique visits per day in 2009. Approximately 50% of visitors were from Croatia [6]. On 29 January 2017 Hrčak included 430 journals with 165141 papers. From these papers 96.7% were in open access [7]. With Hrčak platform, which is supported by governmental funds, open access movement got a stronghold in Croatia. In the same period when Hrčak was launched, many government scientific agencies in the world have accepted or started to prepare the open access policy (UK, Germany, Austria, China, Canada, France, Sweden, USA...). Many OA archives began their work, as well as important online catalogs of OA archives: *Directory of Open Access Repositories*; *ScientificCommons*; *OpenArchives.eu*. In these catalogs, including the ROAR and OAIster catalogs, the number of registered OA archives increased [8]. An important reason for the rise of OA movement was the unfavorable situation in academic publishing in which an oligopoly of large publishers was formed. For example, five big academic publishers have published more than half of all scientific papers in 2013. The largest academic publishers, such as Elsevier, Springer, Taylor & Francis, Wiley-Blackwell, Wolters, use their large market shares and influence to significantly increase subscription rates for scientific journals and databases. Academic libraries

and government agencies, especially those in financially lagging countries, don't have budgets to pay subscriptions for many of these journals and databases [9]. Even universities in wealthy countries have financial problems to provide journal access for their faculty. Therefore, the scientific community began to protest against this situation as well as trying to find new ways to acquire access to scientific papers. For example, Harvard University faculty advisory council proclaimed that major scientific publishers had made scholarly communication fiscally unsustainable and academically restrictive. Therefore, the university wants its scientists to publish in open access journals [10]. One of the most recent initiatives of protest against excessive subscription prices is canceling of journal subscription of the Elsevier publisher by 60 major German research institutions. This cancellation was made at the end of 2016 and it will be continued until the acceptable subscription price is agreed [11]. Interesting idea is proposed in the analysis made within Max Planck Society in Germany. The authors of this analysis think that whole commercial, academic publishing could be replaced by open access publishing. They have calculated that if the libraries worldwide use entire budgets that they have yearly at their disposal to pay for scientific journal subscriptions, this would be sufficient financial resources to fund the work of OA journals in which all yearly production of scientific papers could be published [12].

Besides legal ways to access scientific papers, there is another way for faculty to access scientific papers. It is through pirate web portals which are called shadow libraries: „piratical text collections which have now amassed electronic copies of millions of copyrighted works and provide access to them usually free of charge to anyone around the globe“ [13, 75]. One of the largest shadow libraries is the Sci-Hub, which contains more than 50 million papers. Bohannon wrote that Sci-Hub was created in 2011 by Alexandra Elbakyan, who was then 22-year-old graduate student of neuroscience in Kazakhstan. According to the server log analysis of 28 million documents which were requested from the Sci-Hub in the period from September 2015 to March 2016, it was established that this shadow library has users in the whole world, that it has users from developing and most developed countries. At the end of February 2016, Sci-Hub received 200000 paper requests per day! Also, Bohannon found out that a quarter of the Sci-Hub paper requests were made by users from 34 wealthy countries that are members of the Organization for Economic Co-operation and Development [14]. Users from wealthy countries probably have solid legal access to the same papers but their motivation for using a Sci-Hub may be speed and convenience in accessing papers as well as the comprehensiveness of its database. An online survey of attitudes toward the Sci-Hub was made by *Science* journal. Based on nearly 11000 responses, here are some of the interesting insights: Nearly 60% of respondents used Sci-Hub; 88% think that it is not wrong to download pirated papers. This opinion is held even by respondents who have never used Sci-Hub or those who are older than 51; For more than 50% of respondents primary reason for using a Sci-Hub is lack of access to journals, for about 17% it is a simple convenience and for 23% respondents

the primary reason for using a Sci-Hub is dissatisfaction with the large profits of publishers [15]. In one paper Sci-Hub usage data for Latin America was analysed. It was established that in Argentina Sci-Hub downloads represent 13.3% of downloaded papers in relation to the legal downloads made through scientific databases subscribed by scientific institutions of that country. The Sci-Hub use is considerably lower in Mexico – only 2.3% of downloaded papers in relation to the legal downloads [16]. Bodó emphasized that users from Central and Eastern European countries are among the biggest per capita users of shadow libraries. According to this author, shadow libraries are a crucial resource in the modernization of these countries [17].

II. RESEARCH

The research goal of this study was to explore the extent to which faculty use different web sources of scientific papers, as well as their practices and attitudes related to availability and use of scientific papers. In order to reach these insights, online survey was used. The information about this survey was sent in December 2016 to employees with teaching responsibilities at the *Faculty of Humanities and Social Sciences* [18], as well as at the *Faculty of Science at University of Zagreb* [19]. The survey was completed by 147 respondents who work in different domains of knowledge, primarily in Natural Sciences, Social Sciences and Humanities. Additionally, we used the log analysis method to explore which scientific papers are used in the Sci-Hub by users located in Croatia. Insights from this part of the research were compared with insights from the aforementioned survey of faculty practices and attitudes. The Sci-Hub is one of the largest shadow or pirate libraries found on the Internet. Data about the use of this library from 1 September 2015 to 29 February 2016, is publicly available on web in Sci-Hub server logs [20]. To protect the privacy of Sci-Hub users, no identifying internet protocol (IP) of users was published. Regarding the user location, only countries and approximate places of residents were published (nearest city or village) [14]. We analysed which papers from Sci-Hub were used in February 2016 by users located in Croatia. Two variables were used in the analysis: paper scientific domain and date of publishing.

III. FINDINGS

A. Survey of Croatian faculty practices and attitudes

The majority of respondents are female (60.5%). Also, the majority of respondents are 30 to 39 years old (39.5%), although there are more than 20% of respondents who are 40 to 49 years old, as well as those who are 50 to 59 years old. This means that the survey was filled up by faculty of various ages. The survey was filled up by approximately similar number of respondents from both higher education institutions. Most of survey respondents are working in domains of Natural Sciences (41.5%), Social Sciences (24.5%) and Humanities (23.8%). There is a small number of respondents from the domains of Technical Sciences (2%) and Interdisciplinary Sciences (5.4%).

In Table I we see that majority of respondents download and read scientific papers on the web, several times a week (42.2%). When we add to this group the respondents who daily use scientific papers on the web, it is evident that there is a huge share of respondents who are very active in using web for finding and reading scientific papers. Respondents who use scientific papers on the web, several times a month are also not infrequent users (25.2%).

TABLE I. FREQUENCY OF DOWNLOADING AND READING SCIENTIFIC PAPERS ON THE WEB

Frequency	%	N
Daily	25.9%	38
Not daily, but several times a week	42.2%	62
Not every week, but several times a month	25.2%	37
Not every month, but several times a year	5.4%	8

In Table II we see that there is about 25 to 30% of respondents who never ask anyone to send them scientific papers from international journals (grade 1). About 30% of respondents almost never ask anyone to send them these papers (grade 2). Also, there are about 10% of respondents who very often ask paper authors or non-authors to send them these papers (grade 5). About 10% of respondents often ask for papers (grade 4). Respondents who are working in Natural Sciences will more often ask other people to send them papers and respondents who are working in Social Sciences are least prone to ask for papers. Also, there is a notable difference between male and female respondents with regard to asking for papers. In relation to male respondents, female respondents are about twice more often asking for papers (grades 5 and 4).

TABLE II. ASKING SOMEBODY FOR SCIENTIFIC PAPERS

Estimate on a scale from 1 to 5 to what extent do you access scientific papers from international journals so that you ask somebody to send them to you through the Internet (1 = never; 5 = very often; n. r. = no response)

Senders	1	2	3	4	5	n. r.
Paper authors	27.2%	29.9%	17%	8.2%	12.9%	4.8%
Persons in Croatia	29.3%	29.9%	15%	10.9%	8.8%	6.1%
Persons abroad	24.5%	27.9%	17.7%	12.2%	12.2%	5.4%

In Table III we see that most popular web portal for accessing scientific papers is Google Scholar. There are about 30% of respondents who very often use Google Scholar (grade 5) and about 10% of respondents who often use that portal (grade 4). Interesting fact is that female respondents are considerably more frequent users – about 40% of them very often use Google Scholar and about 20% of male respondents very often use that portal (grade 5). Also, popular web portals are at the *Faculty of Humanities and Social Sciences* (FHSS cat. / FHSS DB.). Its library catalog and database list are used very often for accessing scientific papers by about 25% of respondents and often by about 8% of respondents. Other web portals are less used, although there are about 15% of respondents

who very often or often use DOAJ (Directory of open access journals) and NUL portal (National and university library portal). We also asked respondents to write the names of other web portals that they use. Following portals were mentioned most frequently: Research Gate (22 respondents), Science Direct (14 respondents), Hrčak (13), Academia.edu (12), Web of Science (12), Scopus (8), PubMed (7), arXiv.org (6), EBSCO (4), Google (4).

TABLE III. ACCESSING SCIENTIFIC PAPERS THROUGH WEB PORTALS

Estimate on a scale from 1 to 5 to what extent do you access scientific papers through the specific web portal (1 = never; 5 = very often; n. r. = no resp.)

Web portal	1	2	3	4	5	n. r.
Google Scholar	17%	17.7%	15.7%	11.6%	32%	6.1%
DOAJ	44.9%	18.4%	10.2%	8.2%	6.8%	11.6%
OpenAIRE	68.7%	12.2%	3.4%	0.7%	1.4%	13.6%
NUL Portal	48.3%	12.2%	15.7%	6.8%	9.5%	7.5%
PERO	66%	8.8%	11.6%	4.1%	0.7%	8.8%
FHSS cat.	48.3%	3.4%	8.2%	8.2%	25.9%	7.5%
FHSS DB	46.3%	4.8%	4.8%	8.1%	27.2%	8.8%

In Table IV we see how often respondents access papers by using two large shadow libraries or pirate web portals. The Sci-Hub is used very often by about 18% of respondents (grade 5) and it is used often by about 7% of respondents (grade 4). Library Genesis is used very often by about 12% of respondents and it is used often by about 5% of respondents. About 50% of respondents have never used Sci-Hub and about 65% of respondents have never used Library Genesis. It seems that these portals are predominantly used pirate web portals. Namely, we asked respondents to write the names of the other pirate web portals they use and only four respondents indicated other portals: Bookza, booksc.org, Uz-translations, Bookfi.

TABLE IV. ACCESSING PAPERS USING PIRATE WEB PORTALS

Estimate on a scale from 1 to 5 to what extent do you access scientific papers from international journals using the following pirate web portals (1 = never; 5 = very often; n. r. = no response)

Web portal	1	2	3	4	5	n. r.
Sci-Hub	49%	10.2%	6.1%	6.8%	17.7%	10.2%
Libr. Genesis	65.3%	8.2%	6.1%	5.4%	11.6%	3.4%

In Table V we see that there are almost half of respondents who download and read scientific papers using the pirate web portals (46.3%). There are about 10% of respondents who daily or several times a week use these portals. About 15% of respondents use pirate web portals several times a month and about 18% of respondents use these portals several times a year. With regard to gender, there are about 15% of male respondents who use daily or several times a week these portals. About 40% of male respondents never use them. There are only about 10% of female respondents who use daily or several times a week these portals. About 50% of female respondents never use them. Respondents were also asked about reasons for using pirate portals. Following reasons were mentioned most frequently: papers are not available in any other way (28 respondents); legal papers are expensive (14); easy access (10); papers are available so

why not to use them (8); fast access (8); Ministry or scientific institution doesn't pay subscription (7); it's a matter of principle: science should be available to all (5); relevancy and huge quantity of papers (5). Additionally, we asked respondents who don't use pirate web portals, about their reasons. Following reasons were mentioned most frequently: non-awareness about the existence of pirate web portals (11 respondents); availability of papers through legal web portals (11); it's an illegal activity / respect for the legal rights of authors (8); there is no need to use pirate web portals (7); colleagues are sending me papers (4).

TABLE V. FREQUENCY OF DOWNLOADING AND READING SCIEN. PAPERS USING THE PIRATE WEB PORTALS

Frequency	%	N
Daily	3.4%	5
Not daily, but several times a week	8.2%	12
Not every week, but several times a month	15.7%	23
Not every month, but several times a year	18.4%	27
Never	46.3%	68
No response	8.2%	12

In Table VI we see frequency of web portals use. It was established that legal international web portals are mostly used: about 60% of respondents use these portals very often or often (grades 5 and 4). They are followed by Croatian web portals which are very often and often used by about 35% of respondents. Pirate web portals are the least used with about 25% of respondents who very often and often use these portals. It is interesting that respondents from Humanities domain are most often using pirate web portals – about 40% of them said that they are using them very often or often. About 20% of respondents from Natural Sciences and Social Sciences domains said that they are using pirate web portals very often or often.

TABLE VI. FREQUENCY OF WEB PORTALS USAGE

Estimate on a scale from 1 to 5 how often do you use the following three types of web portals to find scientific papers (1= never; 5 = very often; n. r. = no response)

Web portals	1	2	3	4	5	n. r.
Croatian	34%	20.4%	9.5%	10.2%	23.8%	2%
International	10.9%	12.2%	15%	12.9%	46.3%	2.7%
Pirate	46.9%	15.7%	5.4%	9.5%	14.3%	8.2%

In Table VII are statements for which we wanted to get opinions from users of pirate web portals. Regarding the Statement 1 we found out that about 45% of respondents completely or partly agree that it's OK that scientists read and download scientific papers using pirate web portals if they don't have access to these papers in no other way (grades 5 and 4). This interesting finding indicates that despite the fact that it is not legal, almost half of respondents have a positive attitude to using pirate web portals in case there is no other way to access literature. Regarding the Statement 2 we found out that about 37% of respondents completely and partly agree that papers which they read and download using pirate

web portals are usually not available in any other way. Regarding the Statement 3 we found out that about 20% of respondents completely or partly agree that they use pirate web portals because it's a fast and simple way to access scientific papers.

TABLE VII. EXTENT OF AGREEMENT WITH STATEMENTS

If you read and download scientific papers using pirate web portals, estimate on a scale from 1 to 5 to what extent do you agree with the following statements (1 = completely disagree; 5 = completely agree; n. r. = no response)

Statements	1	2	3	4	5	n. r.
Statement 1	It's OK that scientists read and download scientific papers using pirate web portals if they don't have access to these papers in no other way					
	6.1%	4.1%	7.5%	8.8%	37.4%	36.1%
Statement 2	Scientific papers which I read and download using pirate web portals are usually not available in any other way					
	6.1%	2%	9.5%	8.8%	27.9%	45.6%
Statement 3	I use pirate web portals because it's a fast and simple way to access scientific papers, in relation to legal, non-pirate web portals					
	19.1%	9.5%	6.8%	4.1%	15.7%	44.9%

In Table VIII are statements for which we wanted to get opinions from respondents, regardless if they use pirate portals.

TABLE VIII. EXTENT OF AGREEMENT WITH STATEMENTS

Estimate on a scale from 1 to 5 to what extent do you agree with the following statements (1 = completely disagree; 5 = completely agree; n. r. = no response)

Statements	1	2	3	4	5	n. r.
Statement 1	I know very well how to use computers and internet					
	0.7%	1.4%	11.6%	23.8%	61.9%	0.7%
Statement 2	It's OK to use the internet to share for free the scientific papers of which you are author					
	1.4%	2.7%	6.8%	11.6%	74.8%	2.7%
Statement 3	It's OK to use the internet to share for free the scientific papers of which you are not an author					
	23.8%	15.7%	19.7%	8.2%	25.9%	6.8%
Statement 4	I'm contented with offer of international scientific journals and papers which are available in Croatia through subscription by scientific institutions					
	29.3%	29.9%	23.8%	9.5%	4.1%	3.4%
Statement 5	Teaching and research in Croatia could be significantly improved if availability of international scientific papers is increased through subscription of the Ministry and other institutions					
	5.4%	1.4%	10.9%	17%	63.3%	2%
Statement 6	Subscriptions for databases with international scientific journals are too expensive					
	1.4%	1.4%	16.3%	12.9%	59.2%	8.8%
Statement 7	All scientific papers should be freely available to all who are interested, without subscription payment to publishers of scientific journals					
	4.1%	3.4%	17.7%	14.3%	57.1%	3.4%

Regarding the Statement 1 and 2 we found out that about 85% of respondents completely or partly agree that they know very well how to use computers and the internet. They also think that it's OK to use the internet to share for free the scientific papers of which they are

authors (grades 5 and 4). However, only about 35% of respondents completely or partly agree that it's OK to use the internet to share for free the scientific papers of which they are not authors (statement 3). Interesting fact is that female respondents are considerably less approving of this activity – about 25% of them completely or partly agree with this statement, in relation to 40% of male respondents. Regarding the Statement 4, we found out that only about 15% of respondents completely or partly agree that they are satisfied with offer of international scientific journals and papers which are available in Croatia through subscription by scientific institutions. Most of them think that teaching and research in Croatia could be significantly improved if availability of international scientific papers is increased through this subscription. About 80% of respondents gave grades 5 and 4 regarding statement 5. About 73% of respondents completely or partly agree that subscriptions for databases with international scientific journals are too expensive (statement 6). There is also very large percentage of respondents who think that all scientific papers should be freely available to all who are interested, without subscription payment to publishers of scientific journals – about 70% of respondents gave grades 5 and 4 regarding statement 7.

B. Scientific domains and publication dates of Sci-Hub papers which are requested by users located in Croatia

We used log analysis method to explore which scientific papers are used in the Sci-Hub, one of the largest shadow libraries, by users located in Croatia. We analysed 886 papers regarding their scientific domains. That is a sample of about 25% of papers requested in February 2016 by users located in Croatia. It was found out that the papers from Natural Sciences domain were most requested (41.8%). Papers from Biomedicine and Healthcare domain are at the second place with 23% of requests, followed by requests for papers in the Biotechnical Sciences domain (12.2%). It is interesting that papers from the Social Sciences domain are not so often requested (10%) and that the papers in Humanities domain are requested in only 2% of cases. Also among less requested papers are those in Technical Sciences (8.7%) and Interdisciplinary Sciences (2.7%). We compared these insights about use of SciHub, with insights from the survey. Analysis of Sci-Hub server log shows considerable differences in frequency of use of papers from different scientific domains. For example, papers from the Natural Sciences domain are by far the most frequently requested papers. In contrast to these findings, survey results indicate that the majority of respondents from domains of Social Sciences, Humanities and Natural Sciences claim that they approximately equally often use the Sci-Hub portal: about 60% of these respondents are not using this portal and about 20% of respondents are very often using it. These survey results are in contrast with findings from server log analysis of Sci-Hub portal where it was found out that the papers from Humanities were requested by only 2%

of users, papers from Social Sciences were requested by about 10% of users and papers from Natural Sciences were requested by about 40% of users.

We also analysed 1697 papers regarding their date of publishing. That is a sample of about 50% of papers requested in February 2016 by users located in Croatia. We found out that most recent papers are considerably more often requested. The largest percentage of requested papers is published in the most recent period from 2010 to 2016 (54.9%). After that, the most requested papers are published from 2000 to 2009 (24%) and from 1990 to 1999 (13.2%). There are only 4.7% of requested papers published from 1980 to 1989. There is very small percentage of requested papers published before the year 1979 (3.2%).

IV. CONCLUSION

In this study, we acquired various insights about availability and use of web sources of scientific papers by teaching and research employees of the *Faculty of Humanities and Social Sciences* and *Faculty of Science at University of Zagreb*. Additionally, we explored which scientific papers are requested in the Sci-Hub, one of the largest shadow libraries, by users located in Croatia. Here are some of the main insights from the research.

Respondents are very active in using web for finding and reading scientific papers. The majority of them download and read scientific papers on web, several times a week. About two third of respondents never ask or almost never anyone to send them scientific papers. Respondents who are working in Natural Sciences will more often ask other people to send them papers and respondents who are working in Social sciences are least prone to ask for papers. In relation to male respondents, female respondents are about two times more often asking for papers. Web portals which are used most frequently by respondents for finding papers are legal international web portals such as Google Scholar (indicated by respondents as most used international legal portal). They are followed by Croatian web portals. Shadow libraries or pirate web portals are the least used. Almost half of respondents download and read scientific papers using the pirate web portals, mainly for following reasons: papers are not available in any other way; legal papers are expensive; easy access; papers are available so why not to use them; fast access; Ministry and scientific institutions don't pay database and journal subscriptions; it's a matter of principle – science should be available to all. Pirate web portal Sci-Hub is used very often and often by about one quarter of respondents. The Library Genesis is used slightly less. These portals are the most used pirate web portals among respondents. Almost half of respondents have a positive attitude to using pirate web portals in case there is no other way to access literature. About one third of respondents completely or partly agree that it's OK to use the internet to share for free the scientific papers of which they are not authors. Female respondents are considerably less approving of this activity. A small minority of respondents completely or

partly agree that they are content with offer of international scientific journals and papers which are available in Croatia through subscription by scientific institutions. The vast majority of respondents think that teaching and research in Croatia could be significantly improved if availability of international scientific papers is increased through subscription.

Through log analysis method we explored which scientific papers are requested in the pirate web portal Sci-Hub by users located in Croatia. Papers from Natural Sciences domain were most requested – about 40% of all requests. Papers from Social Sciences domain are not so often requested (10%) and papers in Humanities domain are requested in only 2% of cases. These insights are in contrast with findings from the survey where respondents from all those scientific domains said that they use Sci-Hub with approximately equal frequency.

Findings from this study indicate that many respondents are very active users of legal and pirate web sources of scientific papers. Findings also indicate that there is a major problem with availability of papers from subscription journals and web portals. Although the vast majority of respondents think that the Ministry of Science and Education as well as scientific institutions don't pay enough for these subscriptions, it is evident from the findings that there are other important issues beside payment problems. The majority of respondents thinks that all scientific papers should be freely available to all who are interested, without subscription payment to publishers of scientific journals. Open access journals could help to expand the availability of scientific literature. Croatian web portal *Hrčak* is a great resource of open access papers and proof that it is possible to provide scientific papers without involvement of profit oriented publishers. Also, university faculty has various approaches for acquiring papers which are unavailable through open access and commercial databases. Many of them are exchanging papers and visiting pirate web portals. We also found out that many are using legal web portal *Research Gate* to access papers. It enables authors to upload and give access to their papers even if they have published these papers in journals closed behind subscription paywalls. Use of *Research Gate* and similar participative, scientific web portals by Croatian faculty is an important activity which should be further explored. Other findings from this study should also be further explored to better understand ways of accessing the scientific literature by Croatian faculty. For example, the impact of the differences in gender regarding the use of scientific web sources, could be more thoroughly examined. Also, other scientific institutions could be included in future surveys to compare the activities and attitudes of faculty from various scientific institutions and domains. We hope that findings from this study will enable better understanding of various issues related to practices and attitudes of Croatian faculty toward web sources of literature.

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