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Citizen Science in Europe—Challenges in Conducting Citizen Science Activities in Cooperation of University and Public Libraries

Alisa Martek [ID], Dorja Mučnjak [ID] and Dolores Mumelaš *[ID]

National and University Library in Zagreb, 10000 Zagreb, Croatia
* Correspondence: dmumelas@nsk.hr

Abstract: Citizen science has many definitions but it is commonly known as collaboration between professional scientists and the rest of society. Although there have been cases of its implementation in the past, the term became globally known in 2012. Citizen science activities cover a wide range of academic disciplines and vary widely in what is required of the activity participants in terms of knowledge, time commitment, travel, and the use of technology). For the past ten years, libraries have often introduced citizen science in order to encourage greater interaction between science and society as a form of their services or specially organized activities. The types of libraries that often conduct citizen science are academic, public, and research libraries. Each of these library types has a specific user population; academic libraries have students and scientific and teaching staff; public libraries have the local community; and research libraries have researchers. However, libraries usually carry out CS activities separately, and very rarely in cooperation with other types of libraries. Some collaboration challenges are related to its complexity, the uncertainty regarding research cocreation, and participant retention strategies. Such cooperation is one of the aspects explored by the LIBER project CeOS_SE Project—Citizen-Enhanced Open Science in Southeastern Europe Higher Education Knowledge Hubs. The main goal of the project is to raise awareness of mainstream Open Science and CS practices in Southeastern (SE) Europe. As a project partner, the National and University Library in Zagreb, in cooperation with the University Library of Southern Denmark, conducted a survey that included other European countries in addition to SE Europe to examine and collect good practices of civil engagement in university libraries.

Keywords: CeOS_SE project; citizen science; libraries cooperation; National and University Library in Zagreb; organizational challenges

1. Introduction

As a term, citizen science (hereinafter CS) has many definitions that depend on various factors. Mordechai et. al. stated that CS definitions depend on diverse perceptions, cultural differences, and varied contexts in every world country [1]. In the case of Europe, we can extract the definition from the *Ten Principles of Citizen Science* developed by the European Citizen Science Association, led by the Natural History Museum, London. From these principles, it can be assumed that CS projects include citizens in scientific research who produce new knowledge and have an original scientific outcome where both the scientists and the citizens can benefit [2]. CS has numerous goals such as research, education, and action, imbued with a variety of different individuals, and as such, it has proven to be an excellent opportunity to develop and implement inclusive practices [3].

There are a few CS platforms on the web, but the world's largest platform is SciStarter (scistarter.org, accessed on 14 September 2022). SciStarter was founded in 2011 by Darlene Cavalier, Professor of Practice and Senior Global Futures Scientist at Arizona State University, and it represents an online hub developed to expedite, explore, and popularize CS projects from all around the world. It offers an overview of more than 3000 CS projects,

and brings together people who are interested in science, and offers them various tools and ideas to successfully participate in scientific activities [4]. The platform is significant in education and socialization, but it also encourages the cooperation of various institutions such as libraries, schools, universities, and museums, among others. It has also developed some CS events such as *Citizen Science Month*, which takes place in April [5]. SciStarter has also issued a guide *The Library and Community Guide to Citizen Science for Libraries* so that they can learn more about CS and the integration of such activities into their business, listen to the interests of the local community, connect existing community programs with SciStarter projects, access information sources for conducting CS, etc. [6].

In the USA, there are many examples of CS conducted with the help of all kinds of libraries. In 2015, the Library of Congress launched a crowdsourced transcription program named *By the people* in which all interested individuals from all around the world could participate by making transcripts of historical document (e.g., Wm. Oland Bourne Papers, Branch Rickey Papers, Elizabeth Cady Stanton Papers, Rosa Parks Papers.) [7]. By 1 November 2022, more than 580,000 pages of completed transcriptions have been collected in seven cataloged datasets and more than 32,000 participants have registered accounts [8]. The National Library of Medicine has been conducting a national CS activity since 2018 called the #*CiteNLM Wikipedia Edit-a-thon*. The main goal of this activity is to increase the credibility of Wikipedia content related to medicine and health by adding citations from the National Library of Medicine sources. By spring 2020, more than 300 participants edited more than 500 articles and added 700 references [9]. In 2020, several institutions collaborated in North Carolina's Candid Critters (NCCC) Project including 63 public libraries that helped with distributing camera traps to CS participants in 100 counties in North Carolina, USA. The main aim of this CS activity was to analyze whether large-scale CS camera trapping surveys were useful for gathering wildlife records. The project had a great response, 580 volunteers joined and collected more than 120,000 wildlife records and more than two million photos [10]. A similar activity, but with an emphasis on biodiversity and collective observations of animals and plants, was conducted in 2017 by the San Francisco Public Library. In this way, the aforementioned library supported the San Francisco Biodiversity Policy resolution and gathered citizens to observe and collect data about San Francisco's biodiversity and changes in the environment through the iNaturalist application by the crowdsourcing method [11].

Vohland et al. divided CS activities in Europe into several geographical regions. They established that in Western and Northern Europe, CS relies on learned associations and is very well-developed. In Central and Eastern Europe, there are not as many CS activities, mostly because of the uneven knowledge management, but a great involvement of volunteers was observed. For Southern Europe and the Balkans, there are even fewer CS activities, mostly because of the economic development of countries, but the activities that are carried out are mostly oriented on sensing and monitoring projects [12]. It should be emphasized that most European CS projects relate to natural and technical sciences, while activities related to social sciences and humanities are rarer [13]. In addition, European policymakers still hesitate to utilize data obtained in CS projects with the goal of decision making. What would improve the credibility of CS data is defining its minimum standards [14].

The fundamental concepts we associate with CS are scientific standards, collaboration, open science, communication, and data management. All of these terms can be related to librarianship, so it is not surprising that libraries are stakeholders in the CS implementation, serving not only as a bridge that connects citizens and science, but also as the main bearers of ideas and initiators of activities in the community in which they operate. Ignat et al. suggested a few roles that libraries could play in conducting CS activities such as establishing skills to employ in CS projects, fabricating a toolkit to design CS library projects, forming collections of data forms and educational resources, bid infrastructure, and advertising a positive mindset toward CS and much more [15].

CS activities in European libraries do exist, but unfortunately there have been few case studies in the literature written and available in the English language. More impor-

tantly, some libraries that have implemented such projects are not familiar with the term "citizen science". For example, University College London and their library developed a participatory project named Transcribe Bentham, with the main goal of engaging the citizens and the wider public in the online transcription of Jeremy Bentham's unstudied manuscripts [16]. They did not call it citizen science, but Ignat et al. recognized it as such because the traits of that project are similar to CS activities. The University of Southern Denmark and their library are actively involved in creating CS activities, and they have projects such as A Healthier Funen, Active Living Area, community-driven journalism, and narrative medicine [16]. The ETH Library from Zurich has a successful CS project for their image archive where citizens had to locate areas, date photographs. and identify people and objects, and in this way, they improved the image archive metadata [17]. The Barcelona Network of Public Libraries organized a CS activity named Science and Citizen Action, which was also characterized as a behavioral experiment where data about the housing market simulation were collected [18]. These are just a few examples of the CS practices in European libraries, and considering the names of the activities and their topics, it is possible to conclude that libraries can organize CS activities related to many types of scientific disciplines.

To ensure networking in the implementation of CS, library organizations have begun to implement projects related to CS at the international level. One of them is the Erasmus+ Program under Cooperation Partnerships in Higher Education project *Citizen-Enhanced Open Science in Southeastern Europe Higher Education Knowledge Hubs* led by LIBER (Ligue des Bibliothèques Européennes de Recherche—Association of European Research Libraries). One of the project's goals is to train and upskill the librarians in Southeastern European countries in the field of OS and CS because such activities are lacking in that part of Europe. The project started on 1 January 2022 with the end date of 1 January 2025 (more information on https://ceosse-project.eu/, accessed on 1 December 2022). The project partners are LIBER (Netherlands), University Library of Southern Denmark (Denmark), University of Torino (Italy), University of Patras (Greece), University of Cyprus (Cyprus), University Library "Svetozar Marković" (Serbia), National and University library in Zagreb (Croatia), and the University of Library Studies and Information Technologies (Bulgaria) [19]. Each project partner is in charge of carrying out a part of the project.

The National and University Library in Zagreb's role is PR2 (project results from project package number two) *Report on implementation of citizen-enhanced open science in various open knowledge hubs in SE Europe*. PR2 facilitates transfer and participation in SE Europe between university libraries (project partners) and public libraries (associated partners) for a social purpose by means of citizen engagement in OS. Therefore, PR2 seeks to trigger and build up the dialog and partnership between the mentioned types of libraries as knowledge and innovation hubs in SE Europe that will be carried out together in CS activities [20]. To create the report, the National and University Library in Zagreb conducted several surveys and a guided interview, and it turned out that there have been few examples of the implementation of CS activities organized through the cooperation of universities and public libraries, which requires the development of a deeper study.

It turns out that there are some barriers to conducting library activities in cooperation between different library types. Although cooperation between several library types has a positive effect on their management, libraries can face various barriers in the joint implementation of services, programs, and activities. Regardless of the fact that it may be a matter of collaboration between different types of libraries, certain barriers are more common than others.

Looking at studies regarding the cooperation of American schools and public libraries, Fitzgibbons claimed that there were three main problems in creating joint activities: a lack of staff, insufficient resources, and a lack of unique goals. The author offered some collaboration recommendations such as shared goals, the development of a managing process and its evaluation, strong commitment, good communication channels, decent funding, and adequate staffing [21]. Moreover, LaMaster explained that the greatest barriers

to cooperation are the lack of time, lack of professional training and education, lack of common interest in cooperation, and negative feelings about actual past cooperation. As solutions to overcome the mentioned barriers, the author suggested the establishment of informal networks and an improvement in shared ambitions [22]. A similar nuance was indicated in a study by Masterson, who concluded that the biggest barrier in such cooperation was the lack of time. Other more frequent barriers are a lack of money, lack of interest in collaboration, and a lack of support from superiors [23].

Sarjeant-Jenkins and Walker investigated collaboration between Canadian academic and public libraries and showed that the greatest challenge was a lack of time, followed by the lack of resources, finding compromises, and funding problems [24]. A very comprehensive study of higher education and public library partnerships in England was commissioned and published by the Arts Council England. This study recognized the lack of resources, funding, and capacity as the biggest obstacles in creating partnership activities. Other frequent barriers are different organizational priorities and the lack of a clear idea about the potential activities. To overcome these barriers, the study indicated that both types of libraries have to find the right point of contact, good funding, sufficient resources that will back the activity, and to try and identify cooperation as a sustainable way of saving costs [25]. Lauddusaw and Wilhem explored the cooperation between Texas academic and public libraries, where they referred to the low amount of such cooperation. They set a premise that the cause of this was a reluctance to connect on the part of public libraries, and the fixation of academic libraries on research rather than activity development [26].

While many studies have been written about successful collaborations between different types of libraries, there is a lack of studies that indicate the problems that libraries may encounter when organizing joint activities. It is interesting that studies on cooperation between university and public libraries are very rare. It has previously been mentioned that more frequent co-operational problems such as a lack of unique ideas, time, and funding can be the main cause of this. Libraries probably face the same challenges while creating CS activities as well as the lack of knowledge about what CS is and what its benefits are for the library community and the community in general. Proposed solutions such as firm and proper management, identifying a common vision, and the constant reminder that all this is undertaken for the needs of library users can serve as guidelines for libraries to overcome these barriers.

2. Materials and Methods

This study was based on two data collection methods: online surveys and interviews. Both methods were not fundamentally related to the main topic of this research, but to CS activities in cooperation with university and public libraries. However, it was assumed that there were a few joint mentioned activities, so the research also included a section on organizational barriers. The main research questions for this study are as follows:

(1)　What are the challenges of conducting CS activities in cooperation with university and public libraries?
(2)　What are the possible solutions to those challenges?

The online survey was conducted in partnership with the University Library of Southern Denmark, which, as a project partner, was in charge of implementing PR1 (project results from project package number one):". The main goal of the survey was to identify attitudes toward open science and CS as well as good practices and challenges. The survey consisted of several parts: OS engagement, CS engagement, assessment of involvement (typology), projects, policies, and partnerships (OS and CS), skills, competences and potential barriers, cooperation and partnerships, and public libraries. The National and University Library in Zagreb participated in the creation of survey questions to explore the cooperation between university and public libraries related to CS activities. The part of the survey for which the National and University Library in Zagreb was in charge referred to the segment about public libraries. This joint survey was conducted because the target respondents were the same—European universities and higher education libraries. Only a

few European examples of the mentioned activities were found by studying the literature as well as talking to project partners and by searching the web, which was the reason why part of the survey questions were related exclusively to co-operational barriers. In that survey, we tried to study the first research question—what are the challenges of conducting CS activities in cooperation with university and public libraries? This was investigated in the part of the survey regarding cooperation and partnership with a special section on partnerships with public libraries.

The online survey was pretested by project partners to improve its quality. It was created by the SurveyXact tool, launched on 15 March 2022, and was available for completion until 15 May 2022. The survey took approximately 15 min to conclude. Considering that all the project partners dispatched the survey to university libraries in their country and even the geographical region, it is difficult to say how many surveys were sent. The total number of responses was 82. All of the partners sent out at least two reminders to university libraries. After removing the responses that were not valid or incomplete, we retained a total of 56 responses. It can be assumed that such a small response to filling out the survey was due to a lack of knowledge and the lack of interest in CS topics as well as because of the language barrier (the study was in English). Over and above, 52 university libraries responded that they never had CS activities co-organized with a public library, which was 92.8% of the total responses.

In the survey, university libraries could voluntarily write their name and 46 of them chose to do that. At least 18 different European countries participated in the research. If we use the UN geoscheme [27] for European regions, most respondents (34.7%) were from Southern Europe, immediately followed Northern Europe (30.4%). A smaller number of libraries from Eastern Europe (19.5%) and Western Europe (15.2%) participated in the survey.

The part of the survey related to barriers included four questions. The first question was a Likert-type scale to rate the organization of CS activities in cooperation with the public library and included eight claims for scaling: lack of resources (staff, time, institutional funding), bad previous experiences in organizing joint events, lack of experience in co-organizing events, different work culture in higher education and public libraries, administrative barriers, financial barriers, insufficient technical equipment, and lack of knowledge about CS. The other three questions were of the closed-end type and they wanted to find out whether university libraries believe that it is possible to bypass these barriers with good organization and cooperation, whether university libraries are well-connected with their local community, and whether they are considering cooperation with the national library in creating CS activities in the future. All three questions could be answered with "yes" or "no".

As far as the results about the actual CS activities in cooperation with university and public libraries, university libraries from four countries (Serbia, Denmark, Portugal, and Finland) answered that they had conducted such activities. To explore the examples of successful cooperation more deeply, personalized emails were sent to all the librarians who answered positively, asking if they would like to participate. Three of them answered positively, so interviews via Microsoft Teams were conducted. Languages that were used for the interviews were English (in the case of Denmark), Spanish (in the case of Portugal), and Croatian (in the case of Serbia), and the interviews were recorded, transcribed, and translated later. The interviewed librarians were, among other things, asked how they overcame the challenges in co-organizing joint CS activities and how the data for research question number two (What are the possible solutions to those challenges?) were collected. Their proposed solutions were analyzed and compared in order to create guidelines to prevent challenges in cooperation.

3. Results and Discussion

This paper was based on partial results from the above-mentioned survey, that is, only answers regarding cooperation between university libraries and public libraries in

organizing CS activities were considered as well as the barriers they encountered. According to the answers, we distinguished two groups of university libraries: (G1)—university libraries that have not yet cooperated with public libraries in organizing citizen science activities, and (G2)—university libraries that have thus far cooperated with public libraries in organizing citizen science activities.

There are 56 university libraries in the first group (G1) and there are only four university libraries in the second group (G2). This number alone indicates that cooperation between university and public libraries is not common and that there are certain barriers.

3.1. First Group (G1)

The first group (G1) had to answer four questions related to the cooperation between university and public libraries in organizing CS activities (reference Supplementary Materials).

The first question (On a scale of 1–5, in which 1 means 'strongly agree' and 5 'completely disagree', how would you rate the organization of citizen science activities in cooperation with your library?) was rated using a Likert scale (1—strongly agree; 5—completely disagree) of the following statements:

1. Lack of resources (staff, time, institutional funding);
2. Bad previous experiences in organizing joint events;
3. Lack of experience in co-organizing events;
4. Different work cultures in university and public libraries;
5. Administrative barriers;
6. Financial barriers;
7. Insufficient technical equipment;
8. Lack of knowledge about citizen science.

For the first statement "lack of resources (staff, time, institutional funding)", the majority of libraries said that it was the biggest obstacle. In contrast, only six libraries agreed with the second statement, "bad previous experiences in organizing joint events". Almost 50% of libraries expressed no opinion here. The results led to the conclusion that the collaboration had not yet occurred or it had but had gone well. For the third statement "lack of experience in co-organizing events", the distribution of answers was almost symmetrical. Almost half of the libraries agreed with the fourth statement "different work culture in university and public libraries". It can be said that there was an attitude that there was a difference in business between the two types of libraries, but that a certain number of libraries considered this to be an obstacle and did not engage in cooperation. Answers to the following three statements "administrative barriers", "financial barriers", and "insufficient technical equipment" confirm the first statement of "lack of resources". It is evident that libraries feel that they lack the resources to initiate CS activities. The last statement (*lack of knowledge about citizen science*) showed that libraries were aware that they did not have enough knowledge about the term CS itself.

Analyzing the responses, the conclusion was made that a large number of responses were undecided (neither agree nor disagree) with regard to certain questions as 30–45% of university libraries checked that option, that is, they did not have an expressed opinion. These data indicate that this research has its limitations (i.e., that at least a third of libraries do not have any opinions about barriers or about overcoming these barriers (Figure 1)).
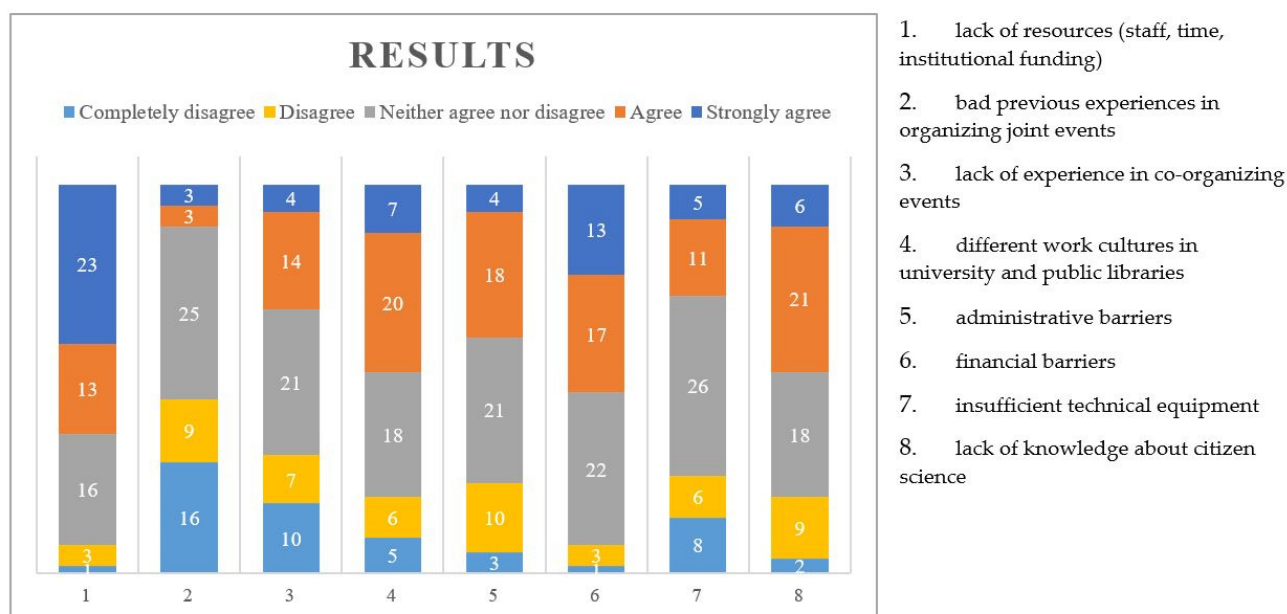
1.   lack of resources (staff, time, institutional funding)

2.   bad previous experiences in organizing joint events

3.   lack of experience in co-organizing events

4.   different work cultures in university and public libraries

5.   administrative barriers

6.   financial barriers

7.   insufficient technical equipment

8.   lack of knowledge about citizen science

Figure 1. Results.

The analysis of the data led to the conclusion that university libraries see the lack of resources (staff, time, institutional funding) and financial barriers as the biggest obstacle in cooperation with public libraries in organizing CS activities, which is in line with the aforementioned previous research on the co-organization of joint activities of various types of libraries. Previous bad experiences in co-organizing joint activities were rated as the smallest obstacle, which was not the case in previous research (Figure 2).
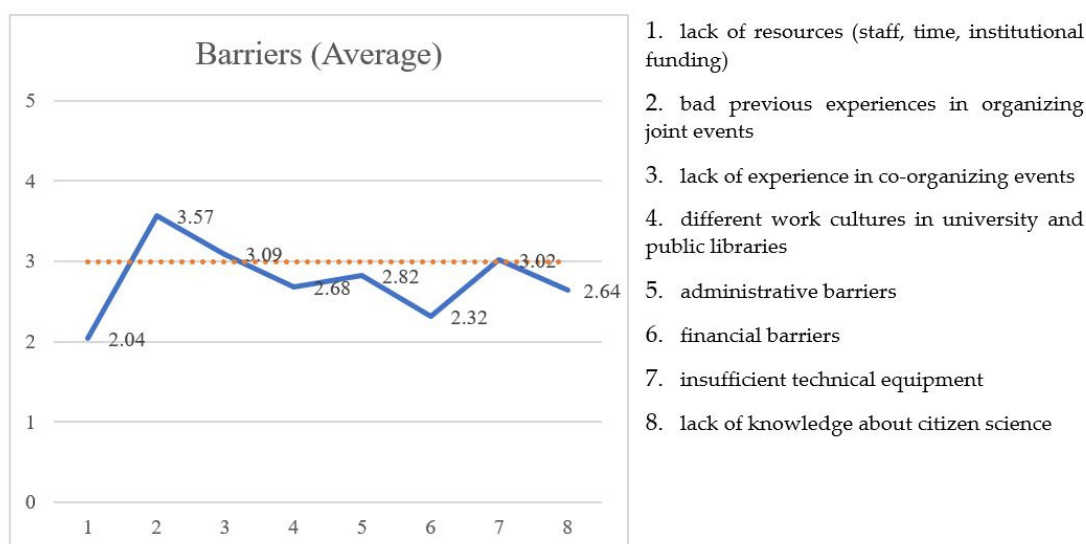

1. lack of resources (staff, time, institutional funding)

2. bad previous experiences in organizing joint events

3. lack of experience in co-organizing events

4. different work cultures in university and public libraries

5. administrative barriers

6. financial barriers

7. insufficient technical equipment

8. lack of knowledge about citizen science

Figure 2. Average score (1 strongly agree; 5 completely disagree).

The second question read: Do you believe that it is possible to bypass these barriers with good organization and cooperation? Only six libraries out of 56 answered negatively, that is, it is evident that the majority of university libraries believe that with certain investments, these obstacles could be overcome.

The third question was: Do you think your library is well-connected with your local community? Twenty-seven libraries answered negatively, and twenty-nine libraries answered positively.

The fourth question read: Are you considering cooperation with a public library in conducting citizen science activities in the future? Twenty-three libraries answered negatively, and thirty-three answered positively.

The analysis of the last two questions led to the conclusion that there was a slight difference in the responses of libraries that were thinking about cooperation with national libraries and those not thinking about cooperation. It shows that university libraries that did not think about cooperation with public libraries answered seven out of eight options from the first question closer to the mean value (3), that is, they had a less pronounced attitude. Only for one option (*bad previous experiences in organizing joint events*) did they express greater agreement than the other group (i.e., libraries that are considering cooperation with public libraries in organizing citizen science activities) (Figure 3)
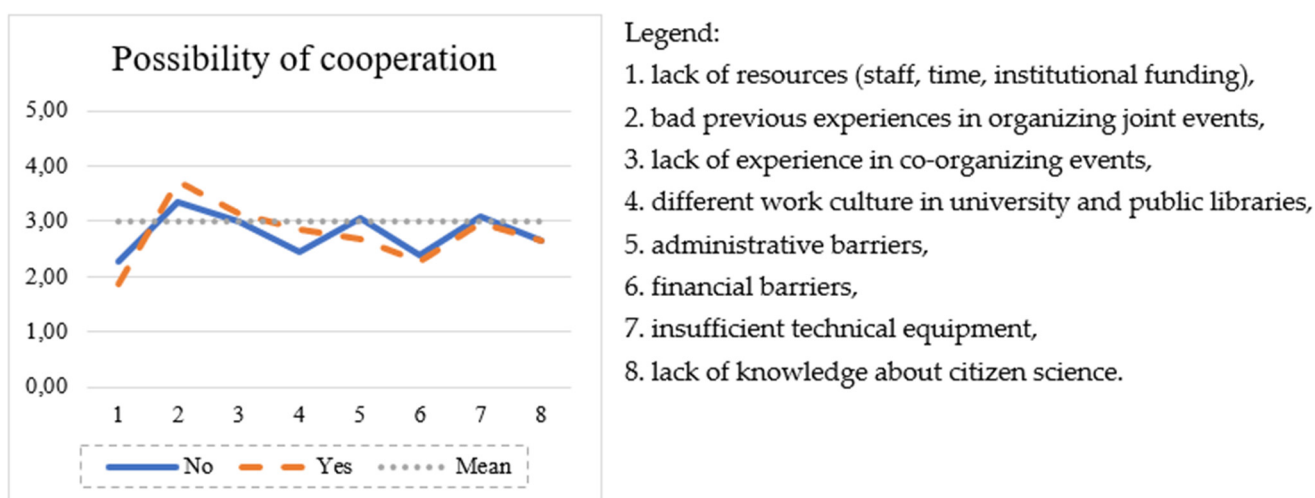

Figure 3. Possibility of cooperation.

In conclusion, libraries from group G1 did not have a strong opinion about cooperation between universities and public libraries in organizing CS activities. However, the lack of resources (staff, time, institutional funding) and financial barriers were cited as some of the more important obstacles. It was assumed that for this reason, university libraries did not even decide to establish cooperation with public libraries. This conclusion is in line with previous research that stated that the lack of resources was the most common obstacle in organizing or co-organizing CS activities.

3.2. Second Group (G2)

The second group (G2) included only four university libraries that have so far cooperated with public libraries in the organization of CS activities (reference Supplementary Materials). One library was in Finland, another from Denmark (D1), the third from Portugal (P1), and the fourth from Serbia (S1). In response to the question from the sent questionnaire that referred to their collaboration with public libraries (*Please evaluate the Citizen Science collaboration between your library and the public library*), they rated the following statements using a Likert scale (1—strongly agree; 5—completely disagree):

1. It was easy to organize citizen science activities in collaboration with the public library;
2. The implementation of citizen science activities in collaboration with the public library was successful;
3. Participants in citizen science activities were satisfied with the activity/activities;
4. We plan to organize more citizen science activities together in the future.

The mean values of the responses were taken for analysis as follows:

1. The mean value for the first statement was 2.00;
2. The mean value for the second statement was 1.75;

3. The mean value for the first statement was 2.25;
4. The mean value for the first statement was 1.75.

The obtained results showed that the libraries evaluated the cooperation with the public libraries relatively positively.

However, in order to obtain more precise results, it was decided to invite the aforementioned libraries that stated having conducted citizen science activities and agreed to be contacted for an interview through which the aforementioned cooperation would be explained in detail, and the obstacles encountered in the organization of these activities would be additionally discussed and potential solutions found.

Unfortunately, the library from Finland did not respond to an additional invitation to participate in an in-depth interview to which the other three libraries agreed. All interviews were conducted during June 2022. The interview with the university library from Portugal (P) and the one from Denmark (D) lasted half an hour, and the interview with the library from Serbia (S) lasted an hour.

The results obtained after the conducted interviews confirmed some of the claims of group G1.

One of the most prominent obstacles was the lack of resources (staff, time, financial funding). Namely, even during the collaborations, it was confirmed that there were certain obstacles in the form of lack of time, staff, etc. in the joint organization of such activities:

> **P1:** "There were approximately 10 organizers who donated their personal time and weekends. Cooperation among colleagues was never a problem because in each region in Portugal, there is a library network where all types of libraries cooperate together."

> **P1:** "Another difficulty was to secure people who would be in charge of security because the activity was held in nature. We told everyone to participate at their own risk, but people still came. Ensuring security was complicated."

> **P1:** "And one difficulty is that all of us have other jobs and we all depend on hierarchical orders to be able to advance and it is slightly difficult to reconcile everything, but we will see."

> **D1:** "Then another barrier is mapping of skills at libraries. In addition, to be honest, I think that could be a barrier in research libraries as well, because I can see from my own library that a lot of the skills our staff have are transferable skills that we use in citizen science projects, and I will bet that at many Danish public libraries the same skills are there."

The interviewed libraries confirmed that one of the obstacles was the lack of financial resources. Namely, it is evident that the activities were often carried out through the enthusiasm of the organizers, but the established system requires secured funds:

> **S1:** "We have no finances."

> **S1:** "On the other hand, we do not have any big expenses to organize it, except travel expenses where we go or people who come to us. Serbia is not a very big country, we have an incoherent system, librarians know each other—a lot is based on personal acquaintances. I know a librarian there, this one knows the director there, this one knows the deputy director there, when a project is being made—we will work with them easily, let us take them, these are interested in digitization, these have manuscript materials, these want to learn. Someone knows someone who knows someone. Here in Serbia, things mostly work on the basis of personal acquaintance, and there is no money."

> **D1:** "In Denmark, public libraries have been cut almost 20% in budgets the last few years. [. . .] So, in the public sector in Denmark, and it is also true. For example, in our own library we have to do more for less money."

P1: "The major barrier was the financing of the activity because the support was given by the University of Beira."

Only one of the libraries stated that insufficient IT equipment was an obstacle when organizing these activities, but this obstacle could be compared to the first two.

S1: "Indecent technical equipment. Good IT support is key."

Through interviews, it was proven that the awareness of CS itself was insufficiently expressed in public libraries and that there was certainly room for the development of awareness.

S1: "We did not even understand that what we do is citizen science."

D1: "I think there is a big barrier in knowledge in public libraries: What is citizen science? Why should we do it? Why is it good or potentially good, and why does it live up to the things we should be doing? Therefore, advocacy is a big barrier."

D1: "They are good of all kinds of things. However, they are not aware that they that it fits into citizen science."

P1: "As for prior knowledge in the organization of citizen science activities, only I and my colleague were familiar with open science."

In the same way, the university libraries confirmed that the cooperation was very fruitful and that the public libraries had resources for cooperation on activities, that is, CS projects. Public libraries have better contact with the local community, good connections with the media, and they have special skills...

S1: "We received participants of those activities. Our users are very limited, we do not have that much contact with citizens. Through public libraries, we come into contact with the local community. The National Library knows its users well, the different types of audiences."

D1: "They are good at doing events. They're doing good at communicating. They are good at doing evaluation, they are too good at doing reading groups. They are good of all kinds of things. However, they are not aware that they that it fits into citizen science."

D1: "I think there is an enormous potential not only in research libraries, but also in public libraries. In addition, when I discuss with library management and also the head of the Danish Public Library Association, why, why, why are there public libraries? Well, it is to enhance knowledge society, it is for democratic conversation to happen. It's that we have free and clear knowledge for everybody. It's available for everyone. It's to mitigate fake news. I mean, those are some of the wise for citizen science. It is exactly the same for public libraries."

Ultimately, the surveyed libraries from group G2 offered certain solutions for cooperation between university and public libraries in organizing CS activities. We can explicitly state the following suggestions:

1. Mapping of transferable skills in libraries:

   D1: "Then another barrier is mapping of skills at libraries."

   D1: "I think primarily skills from my own stuff at the research library, they have been fairly trained, they have been on a number of projects. I think their skills will, we always learn something to pick something new up, hmm but we lack the competences that we have at our library for every single employee and make sure that they can live up to that so we don't put people in the wrong position at the wrong product. However, I think something that could easily be worked on is a more systematic skill set for public libraries."

2. Strategy and advocacy:

D1: "And then there is a truly interesting component. That is leadership and prioritization. Because you cannot go out to an employee at a public library and say we think you should work on this citizen science project. If it is not a part of their strategy, if they're not trained for it, and if they're not told that they should do it, it is not a voluntary exercise. In addition, you need to be very on point. We are prioritizing this just as we do as lending books out, for example."

D1: "I think there is a big barrier in knowledge in public libraries: What is citizen science? Why should we do it? Why is it good or potentially good, and why does it live up to the things we should be doing? Therefore, advocacy is a big barrier."

3. Collegiality:

S1: "The teams we work in are designed so that the people in those teams get along well. Collegiality is crucial."

D1: "Yes, I would say when we do it, it is excellent. I would wish that we do it a lot more. I would wish that we had public libraries as partners in every single project that we had. Right now it is more on when there is a really good fit. In addition, it is usually by libraries we know very well."

In conclusion, university libraries that cooperated with public libraries in organizing CS activities have a positive attitude about cooperation, although they state that certain obstacles exist, which is stated as a lack of resources and financial barriers, but also a lack of awareness and knowledge about what citizen science is. For even better cooperation, they suggest the mapping of transferable skills to accurately understand the human resources in libraries as they believe that better leadership and prioritizing are needed so that CS activities become the basic activities of the library, and they believe that collegiality is crucial to carry out these activities.

These results show that cooperation between different types of libraries has a positive impact and should be undertaken more. Of course, as previously said, more can be done, but this study showed that different types of libraries bring greater value to the projects.

4. Conclusions

Project *Citizen-Enhanced Open Science in Southeastern Europe Higher Education Knowledge Hubs* is a project led by LIBER (Ligue des Bibliothèques Européennes de Recherche—Association of European Research Libraries). One of the project's goals is to train and upskill librarians in Southeastern European countries in the field of open science and CS because such activities are lacking in that part of Europe.

Although cooperation between several library types has a positive effect on their management, libraries can face various barriers in the joint implementation of services, programs, and activities. Regardless of the fact that it may be a matter of collaboration between different types of libraries, certain barriers are more common than others.

While many studies have been written about successful collaborations between different types of libraries, there is a lack of studies that indicate the problems that libraries may encounter when organizing joint activities. It is interesting that studies on cooperation between universities and public libraries are very rare. Co-operational problems such as a lack of unique ideas, time, and funding can be the main cause. Libraries probably face the same challenges while creating CS activities as well as the lack of knowledge about what CS is and what its benefits are for the library community and the community in general. In the literature, there have been some proposed solutions such as firm and proper management, identifying a common vision, and the constant reminder that all this is carried out for the needs of library users that can serve as guidelines for libraries to overcome these barriers.

This study was based on two data collection methods: an online survey and interviews. Both methods were not fundamentally related to the main topic of overall research but to CS activities conducted with the cooperation of universities and public libraries, however, it was assumed that there are a few mentioned joint activities, so the research also included a section on organizational barriers.

The analysis concluded that a very small number of higher education libraries (four out of 56) have had any cooperation with public libraries in organizing CS activities, thus far. Higher education libraries that have not yet cooperated with public libraries in the organization of CS activities state that their biggest obstacle is the lack of resources. Likewise, they believe that insufficient knowledge of the term CS is an obstacle. Additionally, from the results, it can be read that there is a certain prejudice against cooperation with public libraries, mostly due to the opinion that there is a different work culture.

Libraries that have organized CS activities in cooperation with public libraries confirm that the lack of resources and insufficient knowledge of the concept of CS is the largest obstacle. Furthermore, they state that cooperation with public libraries was very fruitful, precisely because of the different work culture, that is, the different roles of public libraries in society. Different skills, different stakeholders, and different user groups all contribute to better and more successful cooperation.

In conclusion, university libraries that cooperated with public libraries in organizing CS activities have a positive attitude about cooperation, although they state that certain obstacles doo exist. They state that it is a lack of resources and financial barriers, but also a lack of awareness and knowledge about what citizen science is. For even better cooperation, they suggest the mapping of transferable skills to accurately understand the human resources in libraries, as they believe that better leadership and prioritizing are needed so that CS activities become the basic activities of the library, and they believe that collegiality is crucial for carrying out these activities, which is in line with previous solutions that the management should be firmer, that the common vision should be identified, and that all of these are conducted for the needs of library users.

These results indicate that greater cooperation between universities and public libraries in organizing CS activities is necessary precisely because of the different roles of these libraries in society. Raising awareness of the concept of CS and its importance needs to be carried out through advocacy among all stakeholders—librarians, management, the public, and financiers—to reduce all of the mentioned obstacles and increase the reach of both libraries.

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