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Article abstract

Citizen Science (CS) is an approach to scientific work and part of the Open Science movement. This study aims to analyse the perception of the librarians about their participation in the aBEIRAr project, which is a CS partnership for the valorisation of the territory developed in the Intermunicipal Network of Libraries of Beiras and Serra da Estrela (RIBBSE) in Portugal. The methodology comprised a literature review, and the case study includes an interview and a survey. Of the results obtained, the following stand out: the libraries are the driving forces behind the aBEIRAr project; they choose the themes, organise and dynamize the activities in their local communities, and establish various partnerships with the mediation of the project's scientific coordination; the level of satisfaction of the librarians in this project is very satisfactory; in the libraries, after carrying out the aBEIRAr project, the number of participants in other face-to-face activities and the interaction on their social network profiles increased; librarians consider that CS can bring to public libraries and their users participative scientific knowledge. The data provides valuable insights into the possibilities and challenges associated with executing CS projects in collaboration with public libraries. These findings contribute to the ongoing discussion about the role of libraries as essential community centers.

Data on Librarians' Perceptions of Participation in a Citizen Science Project in a Network of Public Libraries

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Citizen Science (CS) is an approach to scientific work and part of the Open Science movement. This study aims to analyze the perception of the librarians about their participation in the aBEIRAr project, which is a CS partnership for the valorization of the territory developed in the Intermunicipal Network of Libraries of Beiras and Serra da Estrela (RIBBSE) in Portugal. The methodology comprised a literature review, and the case study included an interview and a survey. Of the results obtained, the following stand out: the libraries are the driving forces behind the aBEIRAr project; they choose the themes, organize and dynamize the activities in their local communities, and establish various partnerships with the mediation of the project's scientific coordination; the level of satisfaction of the librarians in this project is very satisfactory; in the libraries the number of participants in other face-to-face activities and the interaction on their social network profiles increased after the implementation of the aBEIRAr project; librarians believe that CS can bring participatory scientific knowledge to public libraries and their users. The data provide valuable insights into the opportunities and challenges of running CS projects in collaboration with public libraries. These findings contribute to the ongoing discussion about the role of libraries as essential community centres.

Keywords: Citizen Science, Public Libraries, Intermunicipal Library Network of Beiras and Serra da Estrela, aBEIRAr Project

Introduction

Citizen Science (CS) is a flexible concept that can be adopted and applied in a variety of situations and disciplines and represents a range of historical approaches and practices of public participation in scientific research. As a result, there are a wide variety of activities that fall under the umbrella of CS, as can be seen in ECSA's Citizen Science Characteristics (Haklay 2020). A good starting point for planning a CS initiative is ECSA's 10 Citizen Science Principles (ECSA 2015). CS is an approach to scientific work and part of the Open Science movement (European Citizen Science Association 2015). It refers to the participation of individuals in scientific research activities, in which they actively contribute to science through their intellectual effort, their knowledge or their tools and resources (Wehn et al. 2020; Alonso-Arévalo and Quinde-Cordero, 2022). Public libraries are challenged by changes in society, the rise of open science, and more transparent and novel forms of democratic knowledge production. However, there is potential for public libraries to be leaders and innovators in the field of CS.

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In Portugal, the aBEIRAr project is a CS partnership for the valorization of the territory that was born in 2021 from the intersection of common objectives between the Intermunicipal Network of Libraries of Beiras and Serra da Estrela (RIBBSE), the Open Science Platform of the Municipality of Figueira de Castelo Rodrigo, the UNESCO World Geopark Estrela and the University of Beira Interior. The project's mission is to "increase citizens' involvement and participation in science, promote dialogue between scientists and citizens and stimulate the community's interest in building knowledge and valuing the territory" (CIMBSE, 2021).

RIBBSE was created in 2017 and aims to "promote knowledge, foster intercultural dialogue and promote citizenship through the acquisition of reading skills in an inland region where reading habits and cultural infrastructures are very scarce" (CIMBSE, 2022). This network is formed by fifteen public libraries and two university libraries, namely: Almeida Municipal Library, Belmonte Municipal Library, Celorico da Beira Municipal Library, Covilhã Municipal Library, Figueira de Castelo Rodrigo Municipal Library, Fornos de Algodres Municipal Library, Eugénio de Andrade Municipal Library - Fundão, Vergílio Ferreira Municipal Library - Gouveia, Eduardo Lourenço Municipal Library - Guarda, Manteigas Municipal Library, Mêda Municipal Library, Pinhel Municipal Library, Sabugal Municipal Library, Seia Municipal Library, Trancoso Municipal Library, University of

Beira Interior Library, Guarda Polytechnic Institute Library.

This study aims to analyze the perceptions of information professionals/librarians about participating in a CS project. Specifically, we aim to answer the following research questions: RQ1: What are librarians' views on organizing and/or running aBEIRAr activities? RQ2: What is the perceived impact of the aBEIRAr project on RIBBSE libraries?

Literature review

Nowadays, libraries are much more than collections of books. They are increasingly information systems and services (Gomes and Fernández Marcial, 2019) aimed at the citizens of their community. "The public library, which is frequented by most groups in the community, could be a point of departure for developing low-intensive meeting places that civil society needs" (Aabø, Audunson and Vårheim, 2010, p. 17).

Public libraries can "be understood as a space for meeting, debate and collective research, a community hub where the role of professionals evolves towards a more active function" (CCCBLAB, 2019). These libraries face some challenges related to changing practices, services and user behaviour. The digital world is testing the role and social value of the public library within society. "As libraries struggle to keep pace with the changing societal landscape, they are incorporating emerging practices such as citizen science (CS) into the services they offer in order to reinforce the idea of public libraries as spaces for gathering, meeting, and collaboration, within the context of shared community and shared learning resources" (Cigarini et al., 2021, p. 1).

A review of the literature on CS in public libraries shows that this is still an under-researched topic in the field of Information Science (Gomes, 2020). Despite this, Librarianship has had successes in partnership with CS (Santos 2021). However, public libraries are increasingly adopting CS. Practical guides and handbooks are available to support library staff, researchers, and the public in organizing and participating in CS projects (Hansen, 2021). Research also suggests that public libraries' embrace of CS can help attract new users, increase social cohesion, and improve perceptions of a library's social value (Cigarini et al., 2021). O'Duinn (2014) explores the intersection of CS and public libraries, shedding light on how librarians engage with citizen scientists and contribute to scientific endeavours within their communities. "Libraries and librarians already offer aid to the citizen scientist, not only by giving access to research for the consumer of science but also by providing training in basic computer skills and access to the Internet for data collectors and analyzers. However, as libraries begin to open hacker or maker spaces in their institutions, they create opportunities to engage with the third form of citizen scientist, the creator" (O'Duinn 2014, p. 15). CS creates opportunities for collaboration between libraries and community organizations, using their resources to increase engagement in open scientific research. "Since libraries constitute infrastructure that is central for Open Science, their embracing of CS might contribute to facilitating the transition to more open knowledge (Cigarini et al., 2021, p. 1). Many libraries already participate in programmes or projects in this field, but for many others, CS is still unknown.

Libraries can collaborate with other organizations in a number of ways to promote and facilitate CS initiatives. Key strategies include partnerships and joint activities, links with scientists and experts, use of online platforms, training and support. Public libraries are local information and knowledge centres that "can embrace CS practices and indeed may offer leadership in the promotion and implementation of CS initiatives" in their communities (Cigarini et al., 2021, p. 6). Naturally, there are challenges, especially "related to the complexity of collaboration, uncertainty regarding research co-creation, and participant retention strategies" (Cigarini et al., 2021, p. 1).

Some studies and resources provide insights into the integration of CS in public libraries. "Public Libraries Embrace Citizen Science: strengths and Challenges" presents a collaborative exploration of whether public libraries can become hubs for citizen science that align with CS principles and provide valuable opportunities for the public to contribute to meaningful research (Cigarini et al. 2021). A study of citizen perceptions and support for public libraries is discussed in "Citizen Science at Public Libraries: Data on Librarians and Users' Perceptions of Participating in a Citizen Science Project in Catalunya, Spain", shedding light on attitudes, motivations, and perceptions of skills in relation to CS participation (Cigarini et al. 2022). This was a mixed method, mixed population study conducted in several phases. The first phase involved training 30 librarians on how to run a CS project. The second phase involved a project led by the trained librarians, with the participation of library users. The data provided information on librarians' and users' perceptions (attitudes, motivations, self-efficacy and intentions) of participating and remaining engaged in CS. This study showed that CS projects can be successfully implemented in public libraries.

Furthermore, "Citizen Science Skilling for Library Staff, Researchers, and the Public" provides a practical guide to help those organizing and participating in CS projects to ensure that projects are well set up, communicate effectively, and manage data efficiently (Hansen, 2021). These resources highlight the potential for public libraries to embrace CS. However, there is still much work to be done to incorporate CS into the practices and functions of public libraries (Cigarini et al., 2021).

Methods

The methodology comprised a literature review, and the case study (Yin, 2003; Coutinho, 2015; Stake, 2020) included

an interview and a survey. The interview was conducted with the scientific coordinator of the aBEIRAr project, and the survey with the librarians (Pimentel, 2023). The interview included an eight-question script on the organization and participation of the RIBBSE libraries in the aBEIRAr project (Pimentel, 2023). The literature review found no survey model that could be used in a similar study. Therefore, a data collection instrument was developed to obtain the perceptions of the librarians in charge of each of the public libraries that are members of the RIBBSE about their participation in the organization and/or promotion of aBEIRAr activities. This survey was designed to answer the following research questions: How do librarians perceive their participation in the aBEIRAr CS project? What is the librarians' opinion of the organization and/or promotion of the project's activities? How is the impact of the CS project on library services perceived? What are the opportunities and barriers to the implementation of CS in public libraries?

Survey design and data collection

The survey was developed through Google Forms. It was structured in five stages – Design the Survey Process, Develop Questions, Test & Train, Collect Data, and Analyze data (Thayer-Hart et al., 2010). Subsequently, tests were carried out with 2 librarians to adjust and correct any faults in the formulation and/or interpretation of the questions.

In terms of content, the survey included closed and semi-open questions and consisted of 12 questions, divided into four groups: I - Identification of the aBEIRAr activity in which each library participated and the library's location; II - Information professionals' perspective on organizing/promoting aBEIRAr activity(ies); III - Perception of the impact of the aBEIRAr project on RIBBSE public libraries; IV - Characterisation of respondents. Some questions of group III were based on Cigarini et al. (2021) and adapted.

An email notification was sent to public librarians, inviting them to participate in the online survey. Data collection took place between April and May 2023, and fifteen responses were received, one from each of the RIBBSE libraries. The percentage of valid responses is 100%.

Results

Interview

The interview with the scientific coordinator of the aBEIRAr project has allowed the project to be properly characterized. In general terms, between 2021 and 2023, around 800 participants, including citizens, scientists, arts and culture professionals, and local associations, were involved with aBEIRAr activities. From the interview, it was possible to understand that this project brings together scientists and citizens to monitor and valorize the territory of 15 municipalities in the territory of Beiras and Serra da Estrela, located in the

Centre Region of Portugal. These municipalities occupy a territorial area of 6,305 km2, corresponding to 22% of the territory of the Centre Region, and have about 236,023 inhabitants (CIMBSE, 2021). The information professionals/librarians organized all aBEIRAr activities by choosing the themes, organizing and promoting the activities in their local communities and establishing various partnerships through the project's scientific coordination. To carry out the activities, co-creation events took place with the participation of the 15 libraries.

The municipalities supported the activities in 2021; in 2022-2023, the Intermunicipal Community of Beiras and Serra da Estrela (CIMBSE) financed them.

In the aBEIRAr 2021 edition, the themes of the activities were "Water", "Sky", and "Rock" so that the participants could discover the natural heritage with a different view of the cosmos, the landscape and the geological history of the territory. The aBEIRAr 2022-2023 edition corresponds to the second cycle of the project, which brings together the empirical or ancient knowledge that people have built up over time with the scientific knowledge that is currently being created in the area of research, innovation and entrepreneurship.

Survey

We received 15 responses (n=15) corresponding to the fifteen RIBBSE libraries previously appointed. Regarding the level of education of the librarians surveyed: Bachelor's degree (40% - 6 answers), Master's degree (26.7% - 4 answers), Postgraduate degree (26.7% - 4 responses) and Secondary education (6.6% - 1 answer response). Regarding the professional category, most respondents are Library and Documentation Senior Technicians (12 respondents); there is also 1 Technical assistant, 1 team leader and 1 Head of the Historical, Cultural and Documentary Heritage Department.

All the librarians identified the municipality where their public library is located and the respective aBEIRAr project activity in which they participated and promoted it.

In response to the open-ended question "What are the main benefits of the participation of your local library in the aBEIRAr initiative?", the answers were quite diverse: "Participation of the library in the surrounding community. Raising people's awareness that a library is not just about books, their care and storage"; "It's a RIBBSE project, the organisation must be maintained in the libraries. The activity exceeded our expectations, as it was planned for 25 participants and 14 guests, and there was more interest from the community than just those who registered"; "Promoting the work of the library network and bringing science closer to the people"; "Working in "; "Activity in partnership with other libraries. Knowledge and valorization of our territory"; "Learning scientific knowledge vs. empirical knowledge. Bringing the population closer to their territory"; "Added value because it made it possible to organize an event that was different from

the usual and to bring citizens closer to science"; "Extending and providing more knowledge about the cultural heritage of the territory"; "The proximity of the library and the actors involved in the activities to the local population."

Regarding the level of satisfaction with the aBEIRAr activity(ies) promoted and/or organized by librarians (Figure 1), most respondents said they are very satisfied (73.3% - 11 responses) and satisfied (26.7% - 4 responses).
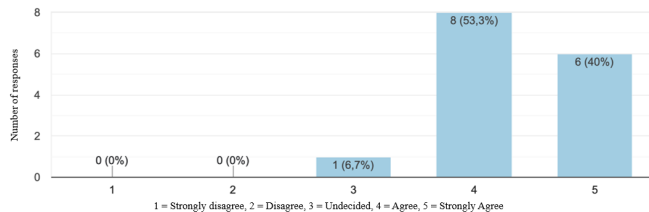
Figure 1

Level of satisfaction
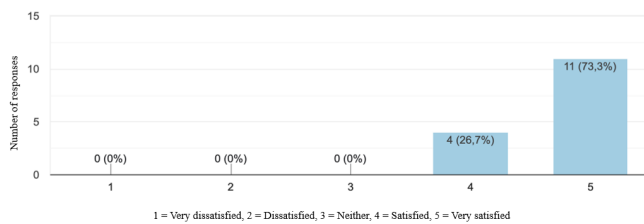
On the question, "Do you consider that the activities of the aBEIRAr project have had a positive impact on the services provided by RIBBSE libraries?" (Figure 2), most respondents agreed (93.3% - 14 responses).

Figure 2

Positive impact of aBEIRAr activities on libraries

The services provided by public libraries that have the greatest impact after aBEIRAr activities are (multiple choice question – Figure 3): an increase in the number of participants in other activities organized by the library (66.7% - 10 responses), an increase in interaction with the library on social networks (53.3% - 8 responses), an increase in the number of readers registered at the library (13.3% - 2 responses) and an increase in the number of readers visiting the library in person (13.3% - 2 responses).

Figure 3

Services provided by libraries with the greatest impact following aBEIRAr activities
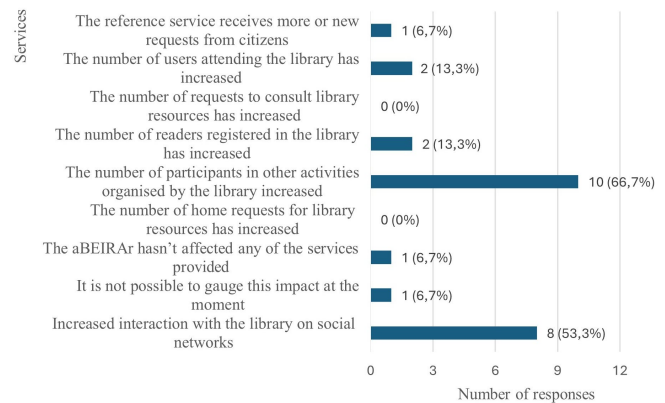
In response to the multiple-choice question, "What do you think CS can bring to public libraries and their users?" the most selected options were: "Knowledge about cultural heritage" (80% - 12 responses); "Scientific knowledge in the community" (73.3% - 11 responses); "Positive attitudes towards science" (66.7% - 10 responses) and "New knowledge about the local environment" (66.7% - 10 responses).

Figure 4

Benefits that CS can bring to public libraries
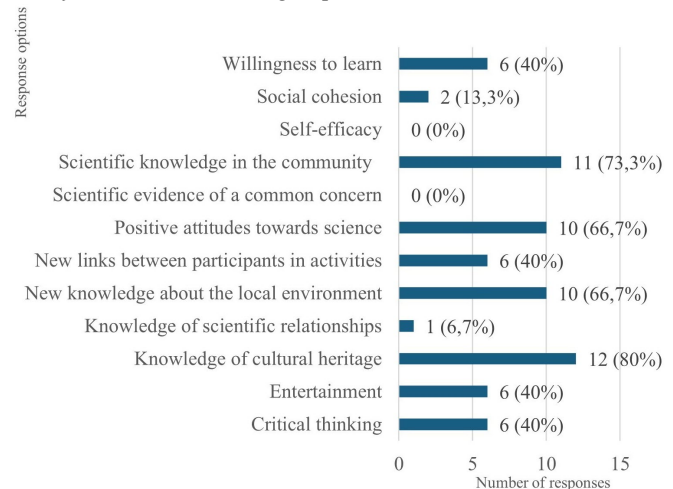
In response to the multiple-choice question "In your view, to what extent can CS be an activity within the library that encourages more active user participation?", the following responses were received: "through workshops" (66.7% - 10 responses); "through co-creation" (53.3% - 8 responses); "through educational workshops" (40% - 6 answers); "through experimentation in maker spaces" (26.7% - 4 answers) and "I have no opinion on the matter" (6.7% - 1 response). In response to the open-ended question, "What

opportunities could there be in introducing CS in public libraries?", the answers were: "Dealing with new topics in other geographical areas of our municipality"; "Allowing libraries to attract new audiences"; "Scientific knowledge is often associated with university or academic knowledge and the introduction of this type of activity proves that science is within everyone's reach, i.e. scientists and the local population are an integral part of the overall knowledge of the area"; "The individual contribution of citizens with their knowledge"; "More active participation of users"; "The fact that people want to acquire knowledge in a more relaxed way"; "Encouraging citizenship, critical thinking and informed decision-making"; "Carrying out cultural activities related to scientific knowledge"; "Valuing the environmental heritage and, through it, introducing science as a learning, integration and awareness factor"; "Involving the community in education for citizen science"; "Access to scientific knowledge."

Regarding the possible obstacles to the introduction of CS in public libraries (open question), librarians mention: "The lack of institutional support"; "The population doesn't understand the lack of scientific endeavour because they don't have access to the research carried out in the different fields that exist in the country"; "It is up to libraries to demystify that academic knowledge can't be understood and learnt by everyone. The fact that we used our territory as a "campus" for experimentation breaks down any barriers that may exist between the inhabitants and the scientists"; "There is still a long way to go. Academia must also make an effort to go into the field and make science accessible to everyone"; "Lack of proactivity and involvement on the part of the community and lack of resources and technical means"; "Lack of sensitivity to these issues on the part of our users"; "Ageing population"; "Failure to adapt the discourse of researchers to ordinary citizens"; "Lack of audience"; "People's distance from environmental problems"; "Lack of material and human resources; Lack of knowledge; Poor community involvement."

Discussion

This study represents an empirical contribution to the developing debate around the role that CS may play in reimagining public libraries as community hubs to adapt them to the changing societal landscape (Ignat et al. 2018).

The study also explored whether a co-created CS project can be successfully implemented in public libraries. According to the librarians who participate in the aBEIRAr activities, co-created CS activities strengthen social bonds among the participants, increase knowledge of the environment, and improve perceptions of the library's social value.

The activities organized by public libraries are increasingly important for their communities. If, on the one hand, libraries must adapt and innovate to attract users, on the other, organizing activities in the surrounding community boosts their

social, economic and cultural contribution. For example, at the activity held in Almeida, which was attended by the participant researcher, it was noted that there were young people signed up; young people also need these activities just as the village of Almeida, a depopulated area, needs these activities to involve young people and boost its dynamism.

By participating in these activities, the community is participating and producing new knowledge, as expressed in point 1 of the 10 principles of CS: " Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding" (ECSA 2015). Increasingly, these CS activities are important and necessary for communities, but especially for those living in the unpopulated countryside where the RIBBSE libraries are located. Furthermore, it was important to understand whether the libraries in the network had taken an active part in aBEIRAr activities and how this participation translates into benefits for library services. We can highlight the project's importance in these inland regions, especially in terms of publicizing the library to different audiences, decentralizing the activities carried out by libraries, creating knowledge in the community, and helping to bring the population closer to their territory.

In general, the professionals' perception of the dynamization and participation in aBEIRAr project was very positive, with 100% satisfaction. In libraries, the number of participants in other activities increased, interaction with library profiles on social networks increased, the number of registered readers increased, and the number of face-to-face users increased due to what they consider to be a positive impact of the aBEIRAr activities they organized.

Regarding implementing CS in libraries and its benefits to its users, most librarians say that it can bring greater knowledge about cultural heritage, as well as new scientific knowledge in communities and positive attitudes towards CS. Regarding the professionals' perspective on future CS activities that promote the more active participation of their users, the majority replied that it would take the form of workshops, i.e. CS can be implemented in library spaces, mostly through co-creation events (Cigarini et al. 2021).

As opportunities, RIBBSE librarians emphasize the importance of the active participation of citizens, as well as their individual contribution with their knowledge, tools or resources to scientific research, which can be made available by the library and the implementation of cultural activities to acquire scientific knowledge in a more relaxed way. This shows that the results corroborate point 6 of the 10 principles of CS: " Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for. However, unlike traditional research approaches, citizen science provides an opportunity for greater public engagement and democratization of science" (ECSA 2015).

Each event in this second aBEIRAr cycle has its own iden-

tity rooted in local knowledge, heritage and culture, and this identity has set the tone for the collaborations and activities that took place. Through the intersection of traditional, empirical, scientific and academic knowledge, the aim was to explore the territory as a living laboratory and publicize research and innovation in a collaboration between science and citizens. All this adds value to the territory and the community, which is realized thanks to the essential role played by the RIBBSE libraries (Pimentel, 2023).

Thus, with the introduction of this type of activity planned, organized, and carried out by public libraries, CS is within everyone's reach, i.e., scientists and the local population, both of whom are integral parts of the construction of knowledge.

Conclusion

While it is always difficult to generalize the librarians' perceptions of participation in a CS project with a small sample population, studies such as this offer some valuable insights for further research as they address an untouched area from a local perspective and report original research.

Developing research on CS in public libraries across different regions is valuable for several reasons, namely: lack of case studies identified in the literature review; allows us to understand how CS practices adapt and thrive within specific settings; insights by examining case studies from various regions help librarians and practitioners enhance their CS programs; understanding the dynamics of CS projects in different regions informs effective strategies that could encourage cross-regional partnerships, knowledge exchange, and joint initiatives. Researching CS in and with public libraries across different regions enriches our understanding, fosters collaboration, and empowers libraries to play a vital role in scientific engagement.

This study does not intend to generalize its results. The exploratory nature of the analysis, the subjective nature of the open-ended questions, and the self-selected sample of librarians reduce the extent to which the findings can be generalized. Nevertheless, the findings might support not only the aBEIRAr project but also others in which public libraries organize and promote CS activities.

Analysing the results obtained, public libraries are central information systems and services in communities in the interior of Portugal, hubs for planning and developing CS projects. The study carried out at RIBBSE confirms the community's interest in CS activities and the potential of libraries to develop CS practices, all of which require training and sensitization of library professionals.

The findings of this study suggest future research directions, such as discussing the conditions required for embedding CS at public libraries or comparing the results to other geographical locations. Practitioners, researchers, stakeholders, or librarians may also use the data to introduce CS at

public libraries within the Open Science movement.

It is concluded that CS can bring more knowledge about cultural heritage and the local environment to public libraries and their target audiences, increase scientific knowledge in the community, and develop positive attitudes towards science. Public libraries are local information and knowledge hubs that provide leadership in promoting CS in their communities.

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