Public perception in Majalengka (Indonesia) toward citizen science concept

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Abstract. Public participation in scientific research, known as Citizen Science (CS), is currently becoming a trend that continues to increase in many countries, including Indonesia. The involvement of citizens in helping scientists to collect, identify, and interpret scientific research data can assist researchers in obtaining more accurate findings. Citizen participation in scientific research in Indonesia remains low. The purpose of this study was to describe and analyze the perceptions of citizens in Majalengka (Indonesia) towards Citizen Science Concept (CSC). This research is a descriptive study with a survey method. Questionnaires and interviews were used to collect research data. A total of 105 respondents were involved in this study. Results showed that 67.1% respondents did not know about the CSC, whereas 65.7% respondents did not have adequate scientific research knowledge. However, 71.4% respondents were interested in being involved in Citizen Science project and has a high motivation to become a citizen scientist. This study is expected to contribute to the development of citizen science programs in higher education level.

Introduction

Citizen participation in scientific research is now a new trend that is growing rapidly in many countries. The involvement of citizens as volunteers to be contributors, collaborators, or full participation in the collection, analysis, and interpretation of research data known as Citizen Science (CS) [1][2]. The concept of CS was first introduced in the early 20th century for amateur science research projects in the fields of ornithology and astronomy, currently the CS has been developed in various disciplines [3]. Citizen Science (CS) itself is defined as the participation of the general citizen (not a science expert) in science research that aims to obtain scientific research data [4]. CS has significant potential in scientific research [5], citizen involvement in science research [6], environmental monitoring and scientific research [7], monitoring of carnivorous animals [8], monitoring of water quality [9], biodiversity monitoring [10] increasing positive
attitudes towards the environment [11], and environmental conservation [12]. The CS refers to citizen participation in scientific research through data collection and reporting [13].

The forms of cooperation and public participation in scientific research are divided into three models, namely: (1) contributive models, namely citizens only play a role in data collection; (2) collaborative models, namely citizens play a role in the analysis and interpretation of data; and (3) co-created, ie residents are actively involved in the design and stages of the research process [13] [13]. Citizen participation in science research has contributed to the development of science and science processes [14] so that data obtained through CS projects can be used to provide information in determining environmental and conservation policies [12]. At present the participants in the CS are not only carried out directly through hands-on activities but also online based on the web and social media [15][16].

The potential of CS to continue to grow and contribute greatly to scientific research is based on several factors, namely (1) extraordinary citizen involvement; (2) cost-effective data collection; (3) technological advancements make promotion and data collection easier; (4) the data obtained can be trusted; (5) the involvement of volunteers in science has a long history; and (6) diversity of approaches to public participation [7]. Citizen participation in scientific research provides various benefits in increasing citizens’ understanding of various scientific and environmental issues and has the role of helping scientists to obtain data [17][18].

The CS gives a very significant role in assisting the work of scientists to collect data [19][20], so that it will be easier for scientists to obtain relevant data. In the Indonesian context, citizen participation in science research has not developed well, as has research relating to CS or CS project implementation is still rarely found in research journals in Indonesia. Some literature on CS development has been done in Indonesia, for example CSC for banana conservation in Bali (Hidayat, unpublished manuscript) and CSC for conservation of Reptiles, Aves and Amphibians [21]. The still low development of CSC in Indonesia is an opportunity to involve citizen participation in Indonesia in science research through the CS project.

Indonesia has enormous potential for research involving citizen participation in it considering the high biodiversity and abundant amount of human resources, as a country with the third largest mega-biodiversity in the world Indonesia has 511 reptile species, 1531 bird species, 270 amphibian species, 3800 plant species, 477 palm species, and 1400 fish species [22]. The high potential of biodiversity research and the lack of a number of scientists in Indonesia is a challenge to present solutions in an effort to collect data, identify, and publish biodiversity in Indonesia through collaborative citizen involvement in scientific research through CS projects.

This study was aimed to describe and to analyze the public perception in Majalengka towards the CS in terms of the conceptions of knowledge, interests, motivations, media, and scientific research skills possessed by the citizens. The results of this study were expected to provide an overview in the design of programs that are suitable for implementation at the higher education level.

Method

This research is a descriptive study that aims to describe the perceptions of citizens in Majalengka towards CS. Data collection techniques used in this study were questionnaires and interviews. The questionnaire was distributed via google form and interviews were conducted directly with structured models. The questionnaire used in this study consisted of 20 items of positive and negative statements that were developed from the evaluation framework of the output of the CS program developed by [23] which included knowledge, skills, interests, motivations, self-confidence, and the role of the media in CS [16], as well as suggestions from the citizens for the development of CS programs in Indonesia. The questionnaire was used to determine people's perceptions regarding knowledge, skills, interests, motivations, self-confidence, the role of the media, and public expectations for the development of the CS program to be carried out. The questionnaire was presented in the form of a four-choice Likert scale,
namely: "Strongly Agree (SA)", "Agree (A)", "Disagree (D)", and "Strongly Disagree (SD)". The interview technique is used to obtain more structured and in-depth information about citizen conceptions towards the CS. Total of respondents were involved in this study consisting of students, students, lecturers, factory workers, freelancers, housewives, and general citizens in Majalengka. The research data obtained were analyzed using descriptive analysis techniques.

Result and Discussion

1.1. Description of Participant

A total of 105 respondents filled out questionnaires that was distributed online through google forms. The form began on April 6, May 2, 2019, all data entered completely can be verified. From the data obtained it is known that as many as 30.5% of respondents are male, and 69.5% are women with origin of religious areas such as Majalengka City, Maja, Rajagaluh, Jatiwangi, Palasah and so on. The Distribution of the respondent’s profession can be described as follows.

Figure 1. Distribution of Research Participation

Figure 1 shows that the majority of respondents in this study have a profession as student colleges, others were teachers, lecturers, students, and a small number were freelancers, entrepreneurs, housewives, and others.

1.2. Citizen Science Perceptions and Discussion

The results of the research on the perceptions of citizens in Majalengka developed from the evaluation framework of the program designed [23][24] can be seen in Table 1 below.

Table 1. Recapitulation of Questionnaire Results

| Indicator         | Statements                                      | Respond (in %) |
|-------------------|-------------------------------------------------|----------------|
| Knowledge         | Know the CS terms                               | 15.2           |
|                   |                                                 | 16.2           |
|                   |                                                 | 67.1           |
|                   |                                                 | 1.0            |
|                   | Know the CS concept                             | 1.0            |
|                   |                                                 | 20.0           |
|                   |                                                 | 64.8           |
|                   |                                                 | 14.3           |
|                   | Know how to disseminate CS information to residents | 53.3           |
|                   |                                                 | 45.7           |
|                   |                                                 | 1.0            |
|                   |                                                 | 0.0            |
Table 1 shows the perception of the public in Majalengka towards the CS. The aspects of knowledge traced include the definition, concept, information, role, and practice of the CS. Related to the definition it is known that 67.1% of the public do not know the definition of CS, only 20.0% of the public have understood the conception of the CS. Most of the public knows some other terms related to CS such as science volunteers, hobby communities, and terms similar to CS, namely citizen journalism, but there are still very few who know the terms and concepts of CS. The research conducted by [12] obtained results that were not much different where only 25% of the citizens already knew the CS terms and concepts. According to [25] the familiarity of the CS term is because some publications that use CS data do not use the term. In general, citizens in Majalengka already have information on how to disseminate, role, and practice CS based on the actual examples that the author explained in the beginning of the questionnaire distributed. 24.8% of respondents stated that they have good knowledge of science research, and this can be traced from the profiles of respondents who are diverse including the remaining lecturers and students.
are general citizens so that the profile of research skills possessed by respondents is relatively low. According to [23], in practice CS requires independent skills, so it is normal that not all respondents have skills given the different level of disparity and educational background. 69.5% of respondents have high interest in being a Citizen Scientist, with 48.6% supported by hobbies and 71.4% expressing interest in participating in CS training / workshop activities. The relation of someone to something can be influenced by age. It can be seen from the results of research [12][26] that public interest in CS is more at the age of 20-29 years. As many as 32% of respondents involved in this study were between 20-30 years old so they still have a high interest in being involved in public activities.

53.3% of respondents have a high level of motivation to be involved in CS activities. According to the theory of Self-Determination Theory (SDT) motivation can be divided into two, namely intrinsic and extrinsic motivation [27]. In his research [28] used gamification in CS activities and it was proven that these activities could increase the motivation of participants in the CS project. 69.2% of respondents have high self-confidence to be involved in the CS project. 49.5% of respondents believe that social media has a very large role for CS [29][30][16]. 70.5% of respondents hoped that the CS program developed in Majalengka and Indonesia in general could be accompanied by experts to avoid perceptions of data obtained by citizens and scientists [31] needed to disseminate ideas to the community through NGOs and developing communities.

Conclusion

At the end, the results of the study showed that 67.1% respondents did not know about the CSC, whereas 65.7% respondents did not have adequate scientific research knowledge. However, 71.4% respondents were interested in being involved in Citizen Science project and has a high motivation to become a citizen scientist. The public interest to be a Citizen scientist is very large that is driven by hobbies (48.6%). They have good knowledge in science research (24.8%) and commitment to spread CS ideas in their environment. There needs to be an effort to disseminate information and training to facilitate the role of citizens as contributors, collaborators or co-created in scientific research. There must be massive and structured efforts through social media, education, and various related stakeholders to disseminate and implement CS ideas and projects in an effort to assist Indonesian scientists to collect biodiversity data in Indonesia.

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