Item number	Title/reference *(academic style) name initials (year) title, publisher, volume, pages*	Name of reviewer
3	Vohland, K., Land-Zandstra, A., Ceccaroni, L., Lemmens, R., Perelló, J., Ponti, M., Samson, R. and Wagenknecht, K., 2021. *The science of citizen science* (p. 529). Springer Nature	Mia Lozanovska, ECO LOGIC

Review of findings / main outcomes

This book makes an attempt to offer a holistic concept of all dimensions of citizen science, firstly with giving a detailed understanding of the concepts, of science, research, and knowledge. The authors strive to provide a complete picture of citizen science, including the always important ethical aspects, as well as its controversial links with commercialisation and social outcomes as well as the application of different definitions.

National Geographic Encyclopedia defines citizen science as the practice of public participation and collaboration in scientific research to increase scientific knowledge. Through citizen science, people share and contribute to data monitoring and collection programs.
But the authors have avoided narrowing the whole concept to a single definition.

Heigl et al., (2019) say that the experiences during the process of developing the criteria motivated working group members to call for a similar process on an international level to strive for an internationally accepted definition of citizen science.

Strasser et al., (2019) state that the disciplinary differentiation of research, together with the establishment of laboratory research in the twentieth century, increased the gap between institutionalised science and other parts of society, including what may be called citizen science.

Kullenberg and Kasperowski (2016) confirm that as a research format, citizen science has evolved over decades – generating knowledge, fostering scientific literacy, and enhancing learning through engagement in all scientific disciplines. Follett and Strezov (2015) continue in this respect, that the natural sciences offer a wide application for citizen science approaches across a range of disciplines

Mahr et al., (2018) state that the setting up of 'self-reflective and multi-perspective citizen science projects might hold the key to finally overcoming old distinctions, not only between "experts" and "laypeople" but also between the "sciences" and "humanities"'.
 In this way, there is potential for citizen social science being practised as both an approach and a bridging concept between the natural and environmental sciences and the social sciences and the humanities.

Citizen science has been defined in previous chapters and elsewhere as voluntary engagement in science (Ceccaroni et al. 2017) and has been primarily undertaken in the environmental domain.
The feature that most distinguishes citizen science from other forms of science is that non-professional scientists are involved in the scientific process. These non-scientists, the 'citizens' in citizen science, can collaborate with scientists in all stages and aspects of the scientific process, but, in most projects, they contribute to data collection and data

analysis. The terminology used to describe participants in citizen science varies across the field, like the definition of citizen science in general (Haklay et al.)

Citizen science is a rapidly growing field, with numerous projects around the world. These are having widespread impacts in diverse areas, such as social media (Bautista-Puig et al. 2019), environmental policy (Turbé et al. 2019), and many scientific fields (Follett and Strezov 2015)

Citizen science platforms for specific scientific topics are those platforms that have been developed with a special focus (e.g. air pollution, water quality, biodiversity, etc.). These platforms are used as a repository for different data types that are used not only by interested individuals but also by scientists and authorities
As mentioned before, platforms can act as catalysts for citizen science in a country by bundling diverse and widespread initiatives and therefore inspiring others to start their own projects. However, to the best of our knowledge, a systematic evaluation of the impact of such platforms has not yet been undertaken.
Guillana (2017) discuss that the main challenge for citizen science platforms lies in their usability and design. They need to work smoothly and look modern.

According to the ECSA (2015), citizen science involves more than just data collection. While the data set is one of the main outcomes when running a citizen science (software) toolkit, this is often not the core focus. Citizen science is based on participatory principles, which not only position the public in a data collection role but also encourage volunteers to join in the quest of solving scientific challenges (Haklay 2013). Taking part in the scientific process stimulates open data access and reproducible and collaborative research, raises public awareness, and generally empowers citizens (Trojan et al. 2019).

Hecker et al., (2018) state that policymakers are a key target audience for citizen science projects that want to contribute to evidence-based policy, but bridging the gap between research and policy is notoriously difficult. One major challenge is bridging the differing values, expectations, and needs of the research system and policymakers. Durham et al. (2014) state that policymakers deal in facts and look for a high degree of certainty whilst scientists (usually) deal in terms of probability and uncertainty.

With a strong tradition of academia in Western societies, the increasing accessibility of digital tools and data, and the growing visibility of citizen scientists, the number of publications on citizen scince increased.

Citizen science opens up many scientific and societal opportunities for Europe as a whole. Citizen science is situated in a discussion between two poles: a certain enlightened tradition of modernity, which relies on science and progress, and the postmodern relativism that questions science itself and which today is reflected in anti-scientific attitudes and pseudoscientific practices. This is a different discussion, but closely related to, that which occurs between the experts (those who know) and the allegedly lay people (who, not infrequently, also know)
Citizen science is already part of the transition towards a different culture, where cooperation is the guiding principle in all shared areas, for example, in governance models, in education, health, culture, and communication.

Technology also plays an important role in the advancement of citizen science as a science. It advances the way data is collected and how it is processed, analysed, and integrated with other data.

Citizen science platforms are also suitable for scientists to collect more data on citizen science and to conduct research on citizen science and for interested citizens to develop, lead, contribute, or participate in citizen science projects.

Quotes / very useful statements

"The engagement of citizens in scientific endeavours and their contributions to scientific knowledge boost learning and personal development. Communities of citizen scientists can learn from each other and jointly strengthen the field by building networks."

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