LEGAL AND ETHICAL CITIZENSHIP IN CITIZEN SCIENCE

Ineta Simonaitė

Kaunas University of Technology,
A. Mickevičiaus st. 37, LT-44244 Kaunas, Lithuania

Thomas Andrew Bryer

Kaunas University of Technology,
A. Mickevičiaus st. 37, LT-44244 Kaunas, Lithuania

Abstract. *Citizen science in research is framed as a democratic form of public participation. There is a lack of scientific research in public administration literature that focus on how participation in citizen science is structured through legal and ethical expectations and how it shapes legitimacy. Two main questions are asked in this article: 1) How legal and ethical dimensions of citizenship structure participation in citizen science? and 2) What legitimacy risks emerge when legal protections and ethical expectations are misaligned? Using a conceptual research design based on theory and normative analysis, the article focuses on illustrative selection of interdisciplinary citizen science governance, deliberative democratic theory and normative approaches to citizenship in public administration. An analytical framework is developed that distinguishes legal and ethical citizenship and legitimacy as participatory dimensions. Results show how legal protection can generate procedural compliance, but if ethical expectations are left aside, the risk of participation without influence, moral asymmetry and legitimacy gaps arise.*

Keywords: *citizen science; ethical citizenship; legal citizenship; participation.*
Reikšminiai žodžiai: *piliečių mokslas; etinė pilietybė; teisinė pilietybė; dalyvavimas.*

Introduction

Citizen science has emerged over the past two decades as a significant mode of public participation in scientific research. Projects that involve citizens in data collection, observation, classification, problem definition and analysis are from various scientific fields, including environmental monitoring, biodiversity, astronomy, public health and social sciences. These initiatives are often presented as responses to scientific challenges, as limited research capacity, declining public trust, and growing demands for societal relevance and accountability (Woolley et al, 2016). Citizen science, in academic and political discourse, is often outlined as democratising innovation (Van De Gevel, et al., 2020; Kimura & Kinchy, 2016). By opening scientific processes to non-professional researchers, citizen science reduces distance between science and society, empowers citizens and fosters knowledge production from different backgrounds. Participation can be associated with increased literacy, enhanced civic engagement and strengthened legitimacy of scientific results (Valladares, 2021; Binder, 2021). Therefore, citizen science grows attention from research funders, public institutions, and policymakers that seek to promote open science and responsible research.

However, in existing literature, citizen science is often approached primarily as methodological or instrumental practice (Christine and Thinyane, 2021). In scientific discussions attention is focused on data quality questions, motivation of participants, project's design, and scientific outputs. While these

discussions are important, participation in these discussions are described as technical matter, in order to achieve predetermined research goals, than a civic practise with normative inferences. For this reason, broader question concerning citizenship, responsibility, power and legitimacy often remain implicit or under-theorised. Participation in citizen science is not a neutral act. Citizen scientists participate as members of political communities, who are embedded in legal frameworks and ethical relations. Participation in citizen science involves rights and protections, such as informed consent and data privacy, also, expectations of responsibility, commitment, and contribution to collective goals. At the same time, scientific institutions that organise citizen science projects exercise authority, define the terms of participation, and retain responsibility for research outcomes. These dynamics raise fundamental questions about how citizenship is shaped and experienced in citizen science practices.

This article argues that citizen science should be understood as a site where legal and ethical citizenship is actively performed. Legal citizenship refers to the regulatory and institutional arrangements, that define who, in what conditions and with what protection can participate. In contrast, ethical citizenship, concerns normative expectations that are related to moral agency, responsibility for the public good, inclusion, and recognition. Together, legal and ethical citizenships shape citizen science's quality and participation meaning.

The aim of this article is to develop a conceptual framework for analysing legal and ethical citizenship in citizen science and to clarify how this framework shapes legitimacy in research governance. Two questions were formulated: 1) How do legal and ethical dimensions of citizenship structure participation in citizen science? and 2) What legitimacy risks emerge when legal protections and ethical expectations are misaligned?

The next section presents a theoretical background on citizenship practice and shows deliberative systems in citizen science. Then, the methods section explains how the conceptual framework was developed. The results section presents the framework and summarises misalignments through two analytical tables. In the discussion part, contribution to public administration about legitimacy, accountability and co-production is elaborated.

Theoretical Background and Framework

Citizenship as Practice: From Legal Status to Ethical Engagement

Classical theories of citizenship emphasise legal status, formal rights, and membership in political community (Turner, 1990). Citizenship is defined by a set of entitlements and obligations that are approved by law, such as voting rights, civil liberties, and civic duties (Campbell, 2022).

Citizenship, in this view, is defined by a set of entitlements and obligations codified in law, such as voting rights, civil liberties, and duties toward the state. While this legal conception remains foundational, it offers a limited account of how citizenship is experienced and enacted in everyday life. However, this foundational conception offers limited understanding about how citizenship is experienced and implemented in everyday life. Contemporary political and social theory conceptualises citizenship as a set of practices, instead of only as legal condition. Citizenship can be understood as something what people do and how they act. This practice-based perspective emphasises citizens' engagement with public institutions, collective problems solving, while enhancing participation, responsibility and agency, not only formal status. Normative approaches to citizenship in public administration were influential in articulating this shift. Citizens are not portrayed only as passive users of public services, normative approaches to citizenship in public administration emphasise citizenship as an ethical practice that is grounded in moral agency and responsibility for the whole society. From this perspective, citizenship involves active engagement in shaping public outcomes, reflecting about collective values, and taking responsibility for the consequences (Cooper, 1991). Mentioned conception of ethical citizenship emphasises normative participation aspects. Citizens are considered as moral agents, whose actions contribute to public institutions' legitimacy and

quality. Thus, ethical citizenship involves commitments that legal rules alone cannot capture, for instance, reflexivity, solidarity or collective well-being concerns. Also, it is important that ethical citizenship also means that institutions have responsibilities towards citizens, as they must recognize citizens as capable participants and provide real opportunities to participate in initiatives. This perspective is highly important in order to understand participation in citizen science. When citizens participate in scientific research, they do that not only as legal subjects, who give permission and data, but also it is expected that they act responsibly, following protocols of research, and contribute to goals that are formulated as befit for society, for example, environment protection or improvement of public health. These expectations can resemble an ethical understanding of citizenship, which extends legal requirements.

At the same time, in citizen science ethical citizenship is relational. It is realised through the interaction of citizen scientists, scientists and institutions, through which each of them performs different functions within research governance structures. Scientists and institutions take ethical responsibility for participants, and citizen scientists are expected to contribute with their knowledge, time and effort. For this reason, in order to understand citizen science as ethical citizenship, it is necessary to draw attention to how these relationships are structured and how responsibilities are shared. However, ethical citizenship does not substitute legal citizenship rather it complements it. Legal frameworks prove essential protection and emphasise the boundaries, but they cannot overtake normative quality of civic engagement. The relationship between legal and ethical citizenship in citizen science can help determine if participation is only procedural or it genuinely empowers. As Valentinavičius, et al. note, „democratic resilience is strengthened through practices and habits that reduce the "costs" of participation and increase the likelihood of action. Citizen science projects—if their legal and ethical citizenship conditions ensure genuine inclusion and recognition—can function as such a habit-forming infrastructure" (Valentinavičius, Morkevičius, & Butkevičienė, 2025).

Citizen Science within Deliberative Systems

In order to further conceptualise citizen science as a practice of citizenship, it is useful to include it into the broader framework of deliberative democratic theory. Deliberative approaches to democracy emphasise that legitimacy arise from processes of public reasoning, argumentation and justification, as well as from decision-making procedures or electoral mechanisms (Parkinson, 2003). From this perspective, democratic quality depends on how collective problems are discussed, interpreted and addressed in the society. Deliberation is not limited to parliaments, courts or other formal political institutions (Levy, 2022). Contemporary deliberative theory conceptualises democracy as a system that is composed of multiple interconnected sites where occurs public reasoning (Maia et al, 2023). These sites include civic society organisations, social movements, media, expert forums and everyday interactions. The legitimacy of democratic outcomes depends on how these different elements interact, transmit information, and reflect different perspectives. In this context, citizen science can be understood as a deliberative space. By involving citizen scientists in scientific research, citizen science creates spaces where societal concerns, experiential knowledge and scientific expertise intersect. Citizen science opens parts of the research process to public engagement, instead of viewing science as a closed domain governed by professional experts, and by this links knowledge production with broader public discourse.

Herzog and Lepenies (2022) argue for situating citizen science within deliberative systems, stating that "we suggest situating citizen science within the framework of deliberative systems." This move, shifts attention away from individual projects, as isolated participatory exercises, to their systemic role in science–society relations. From this perspective, the democratic value of citizen science may depend on how it complies with broader public reason and legitimacy, as well as with internal project features. Within deliberative systems theory, three functions are particularly relevant for analysing citizen science: epistemic, ethical, and democratic functions (Herzog and Lepenies, 2022). Epistemically, deliberative systems are connected with the knowledge production, circulation, and contestation. Citizen science can contribute to this function by generating data, identifying new research questions, and integrating local or experiential

knowledge that might otherwise be overlooked. Citizen science can help to solve epistemic "blind spots" and enrich scientific understanding. From ethical perspective, deliberative systems depend on mutual respect, recognition and exchange between participants. These norms can be fostered when there are collaborative relationships between scientists and citizens scientists. It is important to treat citizen scientists with respect and take their contributions seriously; citizen science can contribute to that by supporting ethical forms of citizens' engagement. This can lead to strengthening trust in scientific institutions. From a democratic perspective, in citizen science, where public reasoning is needed in all processes, deliberative systems aim to include diverse voices and perspectives. Thus, citizen science can contribute to democratic inclusion by lowering barriers to participation and enabling citizens to engage with issues that have an impact on their lives. However, inclusion is not always guaranteed. Participation can remain socially limited, and certain forms of knowledge can continue to be privileged over others. These limitations underscore the need to analyse citizen science in terms of the quality of participation.

One of most important concerns in deliberative systems theory is dissociating risk, situations in which deliberative sites fail to connect with one another. In the context of science-society relations, this risk establishes when scientific knowledge production becomes disconnected from public concerns or when participatory initiatives fail to influence broader discourse or decision-making. Citizen science is often presented as a medicine to such dissociating by creating interaction channels between science and society. However, Herzog and Lepenies (2022) caution against overly optimistic assumptions about the democratic claims of citizen science. They argue that citizen science can contribute to deliberative systems only if citizens are recognized as legitimate participants in deliberation. This requires more than inviting citizens to contribute data. It involves acknowledging citizens' capacity to engage in reasoning about research goals, values, and implications. As they note, "citizens need to be treated as equal partners in deliberation, which implies that their role cannot be only to deliver data points" (Herzog and Lepenies, 2022). This insight is important in order to understand citizen science as a citizenship practice. When participation is limited to narrowly defined tasks, citizens' contributions can support scientific outputs without necessarily strengthening democratic legitimacy. In such cases, citizen science risks to become a procedural add-on to conventional research, instead of a meaningful site of civic engagement. Citizen science's engagement into deliberative systems bring normative conditions which participation can contribute to democratic legitimacy.

Citizen Science and Civic Agency

Understanding citizen science as a component of deliberative systems draws attention to civic agency. Civic agency refers to individuals' ability to act as citizens while solving collective problems, influencing public thinking and contributing to shared results. In contrast to formal political engagement, which often includes voting and representation, civic agency can be implemented during different practices, including engagement in knowledge creation. Citizen science provides exceptional context for civic activity. By engaging in scientific activities, citizens contribute to how problems are defined and interpreted. Even if citizens are not involved in formal decision-making, their contribution can expand the knowledge base, on which actions are based. Such agency indirectly operates though epistemic and normative channels. From the deliberative perspective, civic agency in citizen science underlies citizens ability to contribute to public reasoning. By sharing observations, knowledge of place or personal experiences, citizen scientists can challenge prevailing understandings of problems and present alternative perspectives. For instance, in environmental citizen science, local observations can draw attention to problems, which are not recognised by official monitoring systems (Fraisl, 2022). In social research, citizens real life experience can complicate or contest expert assumptions, as they provide valuable knowledge. However, civic agency in citizen science projects depends on a project's structure and management. When participants are restricted to follow strongly standardised tasks, civic agency possibilities are limited. They can contribute with their work or provide data, but they miss the opportunity to contribute to create research questions, interpret outcomes, or engage in other activities. These kinds of limitations bring risk that civic agency

will be lowered to the technical contribution just to collect data.

Ethical conception of citizenship emphasize that civic agency is related to responsibility (Gottlieb and Robinson, 2006). Citizenship, as an ethical practice, involves freedom to act, along with the responsibility for collective and self-action (Cooper, 2006). By applying it to citizen science, this means, that civic agency should compose conditions to reflexively engage in research aims and other important decisions, not only in data collection. At the same time, an expectation of responsibility must match the opportunities for influence. The risk may arise if citizens are asked to act responsible while denying them freedom of action. Ethical citizenship requires balance between responsibility and empowerment, where citizens are recognized as capable to take responsibility and make decisions. Therefore, citizen science brings ambiguous feelings in terms of civic agency. On one hand, it gives new opportunities to citizens to engage in research and contribute to public knowledge. On the other hand, citizen science often acts within institutional structures, which limit citizens influence over research outputs. This tension emphasise how important it is to analyse citizen science as a site where civic agency is embedded, constrained and negotiated.

Understanding of civic agency in citizen science also emphasises the relevance of institutional reflexivity. Institutions that organise citizen science projects play an important role in shaping conditions, which agency can be exercised. Decisions related to project goals, data ownership or feedback, may suggest if participation is a primary instrument, or it actually supports ethical citizenship. From a normative perspective, fostering civic agency in citizen science requires institutions to reflect on their own roles and responsibilities within deliberative systems.

Ethical Citizenship, Epistemic Justice, and Inclusion

In citizen science, ethical citizenship cannot be fully understood without addressing questions of epistemic justice and inclusion. Even in citizen science, often described as an inclusive and democratising practice, participation can often reflect social inequalities (Lewenstein, 2022). Education, socioeconomic status, time availability, digital access, and cultural capital are factors that can shape who is able to participate in the project and whose contribution are considered as valuable. From an ethical citizenship perspective, inclusion is a matter of recognition and influence (Masood et al., 2024). Ethical citizenship requires that citizens would be acknowledged as moral and epistemic agents, whose perspectives deserve consideration. When participation is formally open, but also limited, citizen science risks exclusion models while under the guise of inclusion. Herzog and Lepenies (2022) emphasise that citizen science must address specific forms of epistemic injustice addition to general inclusivity. They argue that "citizen science needs to be attentive to general questions about inclusivity, but also specific questions about epistemic injustice or epistemic oppression" (Herzog and Lepenies, 2022). Epistemic injustice occurs when individuals or groups are mistreated because of their abilities, for instance, when their stories are systematically devalued or when interpretative systems does not match their experience. In citizen science, epistemic injustice can take multiple forms. Local or experiential knowledge may be interpreted as worse than expert knowledge, even if they are creating critical insights. Citizens' knowledge and contribution can be used instrumentally to support predefined research agendas without being acknowledged as meaningful knowledge production. In certain cases, citizens can be asked to participate only symbolically, while decisions about research design, interpretation and dissemination remain by institutions' control (Hoppe, 2011). From an ethical citizenship perspective, these kinds of arrangements are problematic because they undermine citizens' moral agency. Ethical citizenship includes more than participation, as it requires participation to be meaningful and that citizens may have an influence on the results.

Normative approaches to citizenship in public administration emphasise that ethical citizenship is relational and context-dependant. It involves responsibilities on both sides – citizens are expected to engage responsibly, while institutions are expected to create conditions for fair and respectful participation (Cooper, 2006). When applied to citizen science, this perspective emphasises the importance of institutional reflexivity in addressing epistemic injustice. Inclusion in citizen science leads to questions about represen-

tation and voice. Even when participation is broad, certain perspectives can dominate deliberation due to differences in self-confidence, communication skills or knowledge of scientific discourse. Thus, ethical citizenship requires to make attention to how participation is structured and encouraged. Without thinking about these facilities, citizen science may lose its ethical and democratic aspirations.

Legal Citizenship in Citizen Science

Even when ethical citizenship emphasises normative commitments and moral agency, participation in citizen science is fundamentally shaped by legal frameworks. Legal citizenship refers to rights, protection and responsibilities that are defined by laws, regulations and institutional policies (Nouri et al, 2024). These frameworks establish official conditions under which citizens can participate in scientific research and determines researchers and institutions' responsibility. Citizen science projects are often performed by existing research governance regimes, including ethical review process, informed consent requirements, data protection regulations, and liability frameworks (Groot and Abma, 2022). These regimes are created to protect participants and ensure accountability, reflecting main principals of research ethics and legal responsibility. For this reason, in citizen science legal citizenship is closely related to broader research governance systems. Legal protection plays an important role in establishing opportunity to participate. Informed consent's requirements ensure that citizens would be aware of how their data will be used and what risks participation may entail. Regulations of data protection safeguard personal information and limit misuse. Ethical review processes aim to minimise harm and ensure that research meets established standards. These mechanisms form legal background of participatory research.

However, legal frameworks of citizens science are often inherited from research models that conceptualise participants as research subjects. Even in projects, where collaboration or co-creation is emphasised, legal responsibility typically remains as institution's duty. Researchers and organisations retain authority over research design, data ownership and dissemination, while citizens' roles are formally limited. For this reason, legal citizenship in citizen science often is procedural. Participation is formalised through consent forms, governance protocols and compliance mechanisms that prioritise protection and accountability but offers limited possibilities to meaningful participation and decision-making. This creates tension between democratic rhetoric of participation and reality of legal scientific research. From a citizenship perspective, this tension makes important normative questions. Legal citizenship ensures participants' protection, but not necessarily empowers as civic agents. On the other hand, ethical citizenship, emphasises agency, responsibility and recognition. When legal frameworks do not take into account these ethical aspects, participation risks to become symbolic, not substantive. Legal citizenship in citizen science also involves asymmetries of responsibility. Even institutions bear legal responsibility for research conduct, citizens are often expected to follow ethical norms and contribute responsibly to collective goals. This kind responsibility's distribution reflects boarder patterns in public administration, where citizens are encouraged to actively participate in public problem-solving initiatives, without any changes in legal authority. Normative citizenship theories warn about such imbalance. Citizenship as an ethical practice should not be reduced to individual responsibility if institutional accountability is absent (Cooper, 2006). In citizen science context, this suggests, that legal frameworks should be critically examined taking into consideration ethical commitments to participate and empower.

Research Governance and the Legal Construction of the Citizen

In citizen science, legal citizenship is constructed through research governance mechanisms that formalise participation and define different roles of actors. Citizen science research design and implementation is determined by ethical review boards, institutional policies, funding requirements and contractual arrangements. These mechanisms determine such categories as "participant," "data contributor" or "volunteer," each of which has specific legal implications. The legal construction of citizen in citizen science reflects tension between protection and empowerment. In one case, governance mechanisms aim to protect participants from harm and ensure compliance with ethical standards. But also, they often limit

specific citizens' formal authority and reinforce hierarchical relationship between professional research-ers and citizen scientists. This tension is obvious when analysing data ownership and control questions. While citizens can provide data and knowledge, institution usually retain ownership and decision-making authority in case how data is used and disseminated. Legal frameworks rarely grant citizens formal rights to influence these decisions, even when projects emphasise collaboration or co-creation. From the per-spective of ethical citizenship, this formal construct is problematic. Ethical citizenship includes citizens recognition as moral subjects who are capable to make decisions and take responsibility. When legal frameworks position citizens as subject or contributors, they risk to undermine the ethical aspiration of participation. Normative approaches to citizenship in public administration emphasise that formal and ethical citizenship aspects should be coordinated. Legal arrangements, which does not recognise citizens' agency can possibly weaken the legitimacy of participatory practices (Cooper, 1991). In citizen science, legal governance aligning with ethical commitments require institutional reflexivity and innovation in research governance models.

Methods

This article applies a conceptual research design (Jaakkola, 2020) to develop an analytical framework that clarifies how participation in citizen science can be interpreted through legal and ethical citizenship and legitimacy. The framework was constructed through a targeted and purposive selection of interdisci-plinary scholarship across three bodies of literature: (1) citizen science and participation studies, (2) delib-erative democratic theory, and (3) normative approaches to citizenship and legitimacy in public adminis-tration. Sources were identified by combining focused keyword searches in major academic databases and leading journals with backward and forward citation tracking from foundational texts and core authors in each field. Works were included if they (a) theorized the conditions, norms, or design of participation, (b) explicitly addressed legal protections, ethical expectations, or legitimacy criteria, and (c) were widely cited or considered field-shaping contributions. Framework development proceeded iteratively: key con-cepts were extracted from the selected texts, grouped into thematic clusters, and then mapped onto three analytical dimensions (legal protections, ethical expectations, and legitimacy concerns). The boundaries and internal logic of these dimensions were refined by comparing overlapping and competing definitions across the three literatures and by checking the framework against counter-cases (i.e., accounts of par-ticipation that challenged or did not fit initial categorizations). This iterative refinement aimed to ensure conceptual coherence and to strengthen the plausibility of transferring and integrating concepts across disciplinary traditions.

Results: A Framework of Legal and Ethical Citizenship in Citizen Science

The main result of this conceptual research analysis is analytical framework that distinguishes three interconnected aspects, that form participation in citizen science – legal and ethical citizenship and legiti-macy. The system explains how citizen science is structured according to legal protections and institution-al responsibilities (legal citizenship), normative expectations related to agency, inclusion and epistemic justice (ethical citizenship), and perception of processes and results (legitimacy). In table 1 legal and ethical citizenship in citizen science is summarised, taking into account their main logics, governance mechanisms and limitations. In table 2, there is shown typical misalignments between legal and ethical citizenship and how they create risk for citizen science governance and public administration.

Four arguments can be formulated based on this framework that can guide future research and support citizen science in arrangements of governance: 1) Legal compliance does not guarantee civic empow-erment in citizen science; 2) Ethical compliance can be expected from citizen scientists without formal authority; 3) Expert based validation can reproduce epistemic injustice; 4) Legitimacy depends on the alignment of legal protection and ethical practices.

Table 1. *Legal and Ethical Citizenship in Citizen Science (source: authors' own elaboration)*

Dimension	Legal citizenship	Ethical citizenship
Conceptual focus	Formal rights, legal status, and regulatory compliance	Moral agency, responsibility, and ethical engagement
Primary logic	Risk management and accountability	Responsibility for the public good
Role of citizens	Research participants or data contributors	Civic and epistemic agents
Form of participation	Procedural and regulated	Relational and reflexive
Main governance mechanisms	Consent procedures, ethical review, data protection	Recognition, inclusion, reciprocity
Type of legitimacy	Procedural legitimacy	Substantive legitimacy
Main limitation	Limited empowerment	Dependence on institutional support

Table 2. *Key Misalignments Between Legal and Ethical Citizenship in Citizen Science*
(source: authors' own elaboration)

Dimension	Ethical expectation	Legal arrangement	Resulting tension
Participation	Meaningful engagement	Formal consent	Participation without influence
Responsibility	Shared responsibility	Institutional liability	Moral asymmetry
Knowledge	Recognition of lived experience	Expert validation	Epistemic injustice
Accountability	Reflexive governance	Procedural compliance	Legitimacy gap

Implications for Legitimacy and Research Governance

This discussion emphasise how this framework contributes to public administration research. It shows that citizen science should be analysed as a governance arrangement which is shaped by legal and ethical expectations. The framework helps to explain an important tension – citizen science projects can follow legal and ethical procedures, such as, informed consent, ethical review, data protection, but participation still can be seen illegitimate. This can happen because procedural protections do not ensure meaningful participation, acknowledgement and influence. By distinguishing legal and ethical citizenship, the framework explains core risks of citizen science, for instance, participation without influence, moral asymmetry, gaps in legitimacy and so on. This risk is important in public administration discussions about legitimacy, accountability and co-production.

Legal and Ethical Citizenship: Tensions and Asymmetries

Difference between legal and ethical citizenship reveals a set of structural tensions that are particularly visible in citizen science. While legal citizenship emphasises formal rights, protection and compliance with regulatory frameworks, ethical citizenship mostly focuses of agency, responsibility, recognition, and contribution to public good. These aspects are interdependent but not always aligned, and their misalignment can undermine democratic promise of participatory research. One of the main tensions arises because of different legal and ethical citizenship logics. Legal frameworks are closely related with risk management, accountability and participants' protection. Whereas, ethical citizenship is closely related to participation quality, agency distribution and moral relationships between actors. In citizen science, legal compliance

can be achieved without fulfilling ethical expectations of meaningful participation. Citizens can be legally protected in terms of informed consent procedures, data protection measures and ethical review processes, while remaining excluded from influence over research design, interpretation and dissemination. This creates situation, when participation is officially acknowledged, but normatively limited. These kinds of arrangements can be described as "participation without influence", when citizen scientists participate in scientific project, but does not have real impact. Conversely, ethical expectations on citizens may exceed their formal legal status. Citizens are often encouraged to act responsible, to contribute to collective goals, and to engage with research results. However, these ethical requirements rarely are accompanied by corresponding legal authority or decision-making power. Due to this imbalance, there is a risk that there will be a moral burden on citizens, but they will not be recognised as full civic agents witing research governance structures. Normative theories of citizenship in public administration caution against reducing citizenship to individual responsibility in the absence of institutional accountability (Cooper, 1991). Asymmetry occurs when institutions retain legal responsibility for research, but citizens can experience responsibility for the outcomes that are beyond their control, generate frustration and disengagement, particularly when citizens perceive that their contributions are instrumentalized without genuine recognition or impact. This could be prevented if legal and ethical aspects were considered not as separate domains. Aligning legal frameworks with ethical commitments to agency and inclusion is essential for realising the democratic potential of participation.

Legitimacy and the Democratic Promise of Citizen Science

The concept of legitimacy provides a link between legal and ethical citizenship in citizen science. Legitimacy refers to the perceived appropriateness and acceptability of practices, decisions, and outcomes (Suddaby, Bitektine, and Haack, 2017). In the context of citizen science, legitimacy is often appealed to justify participatory approaches as a means of strengthening trust in science and enhancing societal relevance. From a legal perspective, legitimacy is associated with compliance with established rules, procedures, and standards. Ethical review processes, informed consent, and data protection measures contribute to procedural legitimacy by demonstrating that research is conducted responsibly and transparently. However, procedural legitimacy alone is insufficient to secure public trust or democratic credibility. Ethical citizenship contributes to substantive legitimacy by shaping how participation is experienced and evaluated by citizens. When participants feel recognised as competent contributors and perceive that their engagement has meaningful impact, citizen science can enhance trust in scientific institutions. Conversely, when participation is perceived as symbolic or extractive, legitimacy may be undermined despite formal compliance with legal requirements. Deliberative systems theory emphasises that legitimacy emerges from the interaction of multiple sites of public reasoning. Citizen science can contribute to legitimacy when it strengthens connections between scientific knowledge production and public discourse. However, this contribution depends on whether citizen science functions as a genuine deliberative site or remains a peripheral activity disconnected from broader decision-making processes. Trust plays a central role in this dynamic. Trust is not generated automatically through participation or transparency. It develops through sustained interactions characterized by respect, recognition, and reciprocity. Ethical citizenship is therefore essential for the long-term legitimacy of citizen science. Projects that fail to address ethical concerns related to agency, inclusion, and epistemic justice risk eroding trust rather than strengthening it. Recognition is equally important. Recognizing citizens as epistemic and moral agents affirms their status as participants in public reasoning. Such recognition supports democratic legitimacy by acknowledging that knowledge production is not the exclusive domain of experts but a collective endeavour with normative implications. At the same time, expectations regarding the transformative potential of citizen science must remain realistic. Citizen science on its own cannot solve structural inequalities between science and society. Its contribution to legitimacy depends on how it is integrated into broader institutional and political narratives. Thus, ethical citizenship requires systemic reflection on the participation in scientific governance.

Limitations and future research

One of the main limitations of this article is that it is a conceptual analysis, therefore, it does not test the framework in specific citizen science projects and does not aim to cover all citizen science literature. The framework is used for analytical purposes to explain concepts. In the future research it is recommended to apply the framework to different citizen science initiatives and examine how participants perceive procedural and substantive legitimacy in practice.

Conclusions

This article argues that citizen science should be understood as a practice of legal and ethical citizenship practice instead of participatory research method. Citizen science is conceptualised as space where citizenship is realisable through regulation frameworks and normative commitments, also, article emphasises importance of participation in scientific research.

Based on deliberative democratic theory and normative approaches to citizenship in public administration, analysis shows that participation in citizen science is shaped by legal protection and ethical expectations. Legal citizenship provides essential protection and accountability, however, it does not empower citizens as civic agents. In contrast, ethical citizenship emphasises responsibility, agency, inclusion and epistemic justice, but in addition to that institutional support is needed.

Three main tensions between legal and ethical citizenship were identified, including asymmetries of responsibility, civic agency's limitations, and inadequacies between participatory rhetoric and governance structures. These tensions have important impacts on legitimacy, for instance, procedural compliance on its own would not secure democratic legitimacy. It is important to recognize citizens as moral and epistemic agents in order to ensure participation quality.

Acknowledgment

Data Availability Statement

The data used to support the findings of this research are available from the corresponding authors upon request.

References

1. Binder, M. (2021). Enhancing Democracy: Can Civic Engagement Foster Political Participation?. Social Science Quarterly, 102(1), 47-68. *https://doi.org/10.1111/ssqu.12882*

2. Campbell, J. (2022). General Citizenship Rights. Yale Law Journal, 132, 611.

3. Chambers, S. (2003). Deliberative democratic theory. Annual review of political science, 6(1), 307-326. *https://doi.org/10.1146/annurev.polisci.6.121901.085538*

4. Christine, D. I., & Thinyane, M. (2021). Citizen science as a data-based practice: A consideration of data justice. Patterns, 2(4). *https://doi.org/10.1016/j.patter.2021.100224*

5. Cooper, T. L. (1991). An ethic of citizenship for public administration.

6. Fraisl, D., Hager, G., Bedessem, B., Gold, M., Hsing, P. Y., Danielsen, F., Hitchcock, C. B., Hullbert, J. M., Piera, J., Spiers, H., Thiel, M. & Haklay, M. (2022). Citizen science in environmental and ecological sciences. Nature reviews methods primers, 2(1), 64. *https://doi.org/10.1038/s43586-022-00144-4*

7. Gottlieb, K., & Robinson, G. (Eds.). (2006). A practical guide for integrating civic responsibility into the curricu-

lum. Amer. Assn. of Community Col.

8.   Groot, B., & Abma, T. (2022). Ethics framework for citizen science and public and patient participation in research. BMC medical ethics, 23(1), 23. *https://doi.org/10.1186/s12910-022-00761-4*

9.   Herzog, L., & Lepenies, R. (2022). Citizen science in deliberative systems: Participation, epistemic injustice, and civic empowerment. Minerva, 60(4), 489-508. *https://doi.org/10.1007/s11024-022-09467-8*

10. Kimura, A. H., & Kinchy, A. (2016). Citizen science: Probing the virtues and contexts of participatory research. Engaging Science, Technology, and Society, 2, 331-361. DOI: *https://doi.org/10.17351/ests2016.99*

11. Hoppe, R. (2011). Institutional constraints and practical problems in deliberative and participatory policy making. Policy & politics, 39(2), 163-186. *https://doi.org/10.1332/030557310X519650*

12. Jaakkola, E. (2020). Designing conceptual articles: four approaches. AMS review, 10(1), 18-26. *https://doi.org/10.1007/s13162-020-00161-0*

13. Levy, R. (2022). Rights and deliberative systems. Journal of Deliberative Democracy, 18(1), pp. 27-37. DOI: https://doi.org/10.16997/jdd.1086 Lewenstein, B. V. (2022). Is citizen science a remedy for inequality?. The ANNALS of the American Academy of Political and Social Science, 700(1), 183-194. *https://doi.org/10.1177/00027162221092697*

14. Maia, R. C., Hauber, G., & Choucair, T. (2023). The deliberative system and inter-connected media in times of uncertainty (pp. 29-43). Cham: Palgrave Macmillan. *https://doi.org/10.1007/978-3-031-23466-8*

15. Masood, A., Ding, D., Agarwal, R., Nijjer, S., & Sasso, P. (2024). Unveiling the nexus: organization inclusion, ethical virtues and organizational citizenship behavior in the hospitality sector. Journal of Knowledge Management, 28(10), 2866-2888. *https://doi.org/10.1108/JKM-11-2023-1057*

16. Nouri, H., Abdinezhad, S., & Shekarbeigi, A. (2024). The Role of Citizen Education and Awareness of Laws, Regulations, and Civil Rights in Observing Civil Rights During the Crime Investigation Process. Interdisciplinary Studies in Society, Law, and Politics, 3(2), 140-157. DOI: *https://doi.org/10.61838/kman.isslp.3.2.17*

17. Parkinson, J. (2003). Legitimacy problems in deliberative democracy. Political studies, 51(1), 180-196. *https://doi.org/10.1111/1467-9248.00419*

18. Suddaby, R., Bitektine, A., & Haack, P. (2017). Legitimacy. Academy of Management Annals, 11(1), 451-478. *https://doi.org/10.5465/annals.2015.0101*

19. Turner, B. S. (1990). Outline of a Theory of Citizenship. Sociology, 24(2), 189-217. DOI: *https://doi.org/10.1177/0038038590024002002*

20. Van De Gevel, J., van Etten, J., & Deterding, S. (2020). Citizen science breathes new life into participatory agricultural research. A review. Agronomy for Sustainable Development, 40(5), 35. DOI: *https://doi.org/10.1007/s13593-020-00636-1*

21. Valentinavičius, V., Morkevičius, V., & Butkevičienė, E. (2025). Democratic resilience in Lithuania and the EU: Examining the role of civil society and citizen participation. Public Policy and Administration, 24(3), 447-466. *https://doi.org/10.5755/j01.ppaa.24.3.42178*

22. Valladares, L. (2021). Scientific literacy and social transformation: Critical perspectives about science participation and emancipation. Science & Education, 30(3), 557-587. DOI: *https://doi.org/10.1007/s11191-021-00205-2*

23. Woolley, J. P., McGowan, M. L., Teare, H. J., Coathup, V., Fishman, J. R., Settersten Jr, R. A., Sterckx, S., Kaye, J. & Juengst, E. T. (2016). Citizen science or scientific citizenship? Disentangling the uses of public engagement rhetoric in national research initiatives. BMC medical ethics, 17(1), 33. *https://doi.org/10.1186/s12910-016-0117-1*

Ineta Simonaitė, Thomas Andrew Bryer

TEISINIS IR ETINIS PILIETIŠKUMAS PILIEČIŲ MOKSLE

Anotacija. *Piliečių mokslas moksliniuose tyrimuose dažnai pristatomas kaip demokratiška visuomenės dalyvavimo forma. Vis dėlto viešojo administravimo literatūroje trūksta mokslinių tyrimų, kurie analizuotų, kaip dalyvavimas piliečių moksle yra struktūruojamas per teisines ir etines prielaidas bei lūkesčius ir kaip tai formuoja legitimumą. Šiame straipsnyje keliami du pagrindiniai klausimai: 1) kaip teisiniai ir etiniai pilie-*

tiškumo aspektai struktūruoja dalyvavimą piliečių moksle? ir 2) kokios legitimumo rizikos kyla tuomet, kai teisinės apsaugos priemonės ir etiniai lūkesčiai tarpusavyje nesuderinami? Taikant konceptualų tyrimo dizainą, paremtą teorine ir normatyvine analize, straipsnyje remiamasi iliustratyvia tarpdisciplininės literatūros atranka, apimančia piliečių mokslo valdymo tyrimus, deliberatyvios demokratijos teoriją ir normatyvinius pilietiškumo požiūrius viešajame administravime. Straipsnyje sukuriamas analitinis pagrindas, kuris išskiria teisinį pilietiškumą, etinį pilietiškumą ir legitimumą kaip tarpusavyje susijusias dalyvavimo dimensijas. Rezultatai parodo, kad teisinės apsaugos priemonės gali užtikrinti procedūrinį atitikimą, tačiau jei etiniai lūkesčiai lieka nuošalyje, kyla dalyvavimo be įtakos, moralinės asimetrijos ir legitimumo spragų rizika.

———————————————

Ineta Simonaitė, PhD Candidate at the Sociology and a Member of the Center for Social, Transformation, and Governance Studies at the Faculty of Social Sciences, Arts and Humanities, Kaunas University of Technology, Lithuania.
E-mail: *ineta.simonaite@ktu.lt*

Thomas Andrew Bryer, professor and Member of the Center for Social, Transformation, and Governance Studies at Faculty of Social Sciences, Arts and Humanities, Kaunas University of Technology, Lithuania.
E-mail: *thomas.bryer@ktu.lt*

———————————————

Ineta Simonaitė, sociologijos mokslų doktorantė ir Kauno technologijos universiteto Socialinių, humanitarinių mokslų ir menų fakulteto, „Visuomenės, transformacijų ir valdysenos tyrimų centro "narė.
El. paštas: *ineta.simonaite@ktu.lt*

Thomas Andrew Bryer, politikos mokslų daktaras, profesorius, Kauno technologijos Universiteto Socialinių, humanitarinių mokslų ir menų fakulteto, „Visuomenės, transformacijų ir valdysenos tyrimų centro" narys.
El. paštas: *thomas.bryer@ktu.lt*