



# Citizen science in management research: Practical insights from the Volunteer Environment Check (VEC)

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## Abstract

We developed and pilot-tested the Volunteer Environment Check (VEC) to address the dual challenge of (1) resource-constrained civil society organizations needing evidence-based volunteer management practices and (2) academic researchers seeking reciprocal engagement with practitioners. VEC is a tool that employs a citizen science approach to bridge the gap between academic evidence and organizational practices. Collaborating closely with 20 civil society organizations, we designed and administered a survey to volunteers. Moreover, we developed a semi-automated reporting system using Qualtrics and R Quarto, and we organized interactive citizen science workshops to discuss findings in detail with representatives of participating organizations. In this article, we report on our findings from this citizen science pilot project and provide recommendations for practitioners and social science researchers who plan to conduct research in a similar manner. Our main insights can be summarized as follows: participating organizations have been empowered to shift from undirected improvement initiatives toward evidence-informed strategic priorities. Further developing this approach can enable managers to identify which dimensions of volunteer satisfaction require targeted action within their unique organizational contexts. Beyond immediate organizational learning, our pilot study also demonstrates the viability and scalability of citizen science approaches to support the improvement of third-sector management and governance. Finally, critical self-reflection has helped us identify further opportunities for scaling and scope growth in applying a citizen science approach in management studies and in social sciences in general.

## Key words

citizen science, third mission, volunteering, satisfaction, managerial practices, civil society organizations

## Background

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## Executive summary

As the provision of welfare continues to shift from governments to civil society organizations (CSOs), responsibilities and dependencies are also changing. High volunteer turnover and subsequent service shortages affect not only civil society organizations but also the communities they serve. To ensure the continued successful governance of service provision in the third sector, civil society organizations must manage their voluntary workforce professionally to retain enough active volunteers. Otherwise, dissatisfied volunteers will leave the organization [1], [2].

However, during our time in the field, we observed that most volunteer managers use simple satisfaction surveys to evaluate their practices. This approach is often insufficient, as managing volunteer satisfaction is a complex, multidimensional, and context-dependent process [3]. Furthermore, managerial implications and strategic decisions must be carefully considered to avoid unintended negative consequences [4].

Civil society organizations with limited resources often face challenges in obtaining evidence-based insights into the quality of the volunteer management practices they employ. To address this and to assist academic researchers seeking to engage volunteers in organizational networks, we developed and piloted the Volunteer Environment Check (VEC). The VEC is a survey-based maturity assessment tool, including both preparatory and interpretive analytic workshop sessions, that enables nonprofit organizations to evaluate the environment in which their volunteer workforce operates. The workshops involve both volunteers and volunteer managers and adopt a participatory citizen science approach, which serves the dual purpose of making research practically relevant while also yielding rich qualitative and quantitative data for scientific research.

In this article, we report on this pilot study with three main objectives:

**Objective 1:** Clarify our content and approach for others to build on in their own practice-research collaborations.

**Objective 2:** Provide a detailed description of the underlying assumptions of the VEC, which supports further practitioner and scientific debates. In turn, this can also improve future versions of this citizen science assessment tool.

**Objective 3:** Derive learning points (for ourselves and others) for future citizen science projects in management and the social sciences.

From earlier participatory research and interactions with many civil society stakeholders, we developed, in combination with key-contact practitioners, a survey tool measuring volunteers' assessments of (1) managerial practices in organizations and (2) volunteer satisfaction, both with a multidimensional measurement structure. The data obtained from this citizen science crowdsourcing were summarized and visualized in organization-specific reports using a Quarto-based semi-automated script in R (quarto.org).

After data collection and report dissemination, we conducted interactive workshops with all key contact people to discuss feedback reports interactively in a structured manner, enabling civil society managers to translate the benchmark results into actionable priorities. The goal of these workshops was for participants to clarify and update their understanding of their volunteer contexts and derive potential management actions to improve their environment. Due to the interactive workshop design, a strong focus was maintained on mutual learning among practitioners from different organizations.



Additionally, due to the citizen science approach, we as researchers could also collect practitioners’ interpretations of the data in a structured way, which led to the formulation of new theoretical propositions. Hence, with the interactive workshops, this citizen science project aimed to move beyond mere data collection by citizen-researchers but involved citizen scientists in detailed interpretations of results, as well as in the formulation of theoretical propositions on how their management actions can lead to substantial improvements for volunteers.

### Three problems, one solution

Citizen science still holds untapped potential [5]. As scholars focusing on organizational challenges in the third sector, we encountered three issues that could benefit from applying citizen science methodology, further unlocking its unrealized potential:

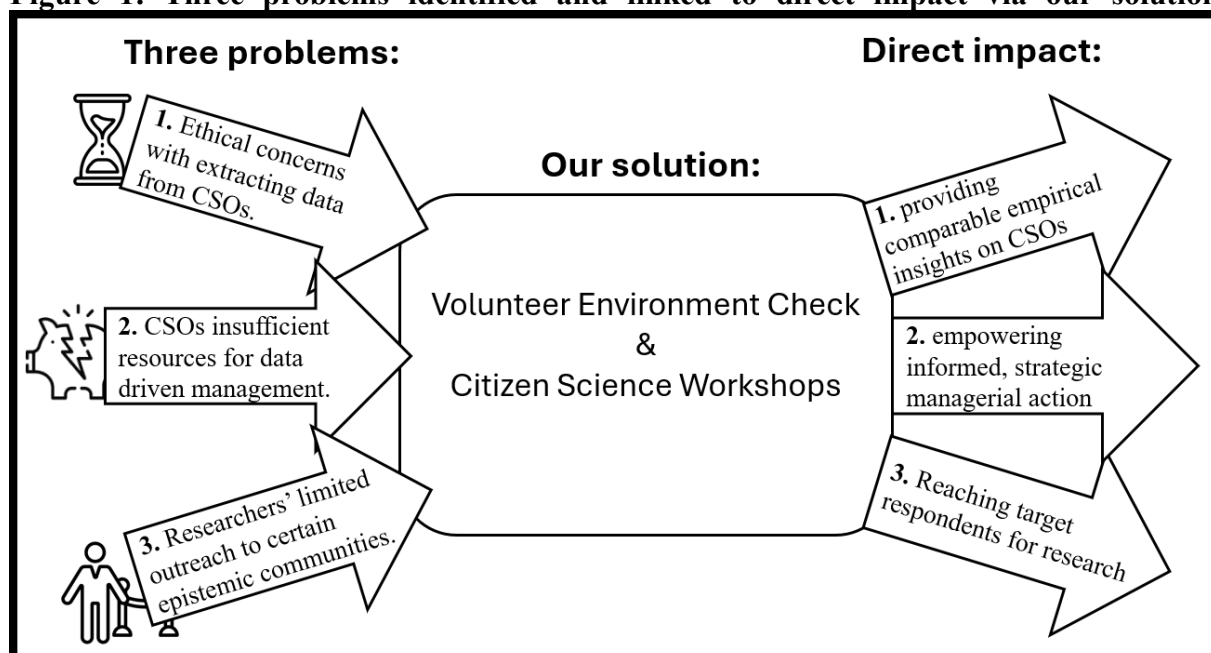
**Problem 1:** Ethical concerns about overly regular extraction of data from civil society organizations for ivory-tower research purposes.

**Problem 2:** Civil society organizations lack resources for impactful data-driven management.

**Problem 3:** Researchers’ limited outreach to certain communities.

These problems pertain to how researchers collect data and from whom. The VEC project was developed to alleviate the burden on volunteer management in civil society organizations arising from many volunteers paired with too little time—a constant issue in most service-providing civil society organizations. With volunteers providing services to beneficiaries, time spent answering surveys or participating in interviews might prevent them from addressing beneficiaries’ needs, weakening their organization’s mission achievement. Therefore, participation in data collections should bring value to them and the environment in which they volunteer.

**Figure 1: Three problems identified and linked to direct impact via our solution**





**Problem 1:** First, if researchers collect data from such environments, the question becomes: whose interests are served by the data collection? Is it genuinely providing empirical insights that directly or indirectly increase organizations' impact, and is this increase sufficient to justify redirecting volunteers' precious time [6], [7]? Or is the data collection primarily serving decision-makers to map the third sector with the goal of legitimizing further transfers of responsibilities away from public agencies [8]? Perhaps the data mainly benefits researchers under pressure *to publish or perish* [9], [10].

Thus, based on these questions (Problem 1), third-sector researchers should ensure that the resources invested by civil society organizations in their research directly enhance organizational capacity to improve service provision, rather than detracting from it.

**Problem 2:** Second, closely connected to the limited availability of volunteers [11], most volunteer managers lack the capacity to collect empirical data beyond self-administered and overly simple satisfaction questionnaires. This may be due to a lack of advanced data science skills and/or financial constraints limiting the ability to outsource to commercial partners. Consequently, many intricate facets of volunteer perceptions remain hidden from organizational leaders. This lack of empirical insight can leave managerial action undirected or based primarily on informal conversations, which may be biased due to over- or under-representation (e.g., availability biases). At best, undirected action is less effective compared to informed strategic decisions; at worst, it runs counter to volunteers' needs [12], decreases motivation, increases turnover, and could even harm organizational performance instead of supporting it.

Thus, based on the need for advanced empirical insights to inform managerial action (Problem 2), volunteer managers need cost-effective ways to obtain precise empirical insights into their voluntary workforces. With the right research support, this is possible thanks to the rapid expansion of information technology and changes to third-sector research [13].

**Problem 3:** Third, even though data is ubiquitous in the age of information technology, collecting the right data from the right group of people remains a challenge for social scientists. Not all communities can be reached with equal ease, and not all are invited to participate in knowledge production. This can lead to over- or under-representation (epistemic injustice) [14], [15]. Volunteer managers, who act as gatekeepers for reaching volunteers *en masse*, have repeatedly informed us that most volunteer workforces (especially in large civil society organizations) are regularly targeted by researchers' data collections, while seldom receiving concrete learnings in return.

Hence, given the competition for collecting data from volunteers in civil society organizations (Problem 3), the VEC project aims to be a valuable choice for practitioners due to mutual gains. It offers them a voice in the research process while simultaneously providing detailed feedback reports on their voluntary workforce. In other words, the VEC project strives for real reciprocity between civil society organizations and researchers, capitalizing on synergies and spillover effects.

## Introduction to citizen science

Citizen science is a participatory research method that invites nonprofessional scientists to collaborate in research processes. Classical examples primarily originate from the natural or life sciences and include documenting plant species, cataloging birds, measuring tree density, or stargazing. These activities attract laypeople to participate in the research process, often by



collecting or coding raw data. In some areas of the social sciences, citizen science is rarely applied. Based on a handful of citizen science projects in the social sciences, it has been suggested that such projects need to be designed in a way that non-scientists contribute beyond data collection, aiding in preparatory design, analysis, and interpretation [16], [17].

For this project, we chose to involve volunteers and volunteer managers from civil society organizations in the role of citizen scientists. On the one hand, they participated in workshops prior to the survey launch to understand the research design and engage the target population within their organization. Specifically, they were instrumental in fine-tuning our approach to suit their needs and their organizational and institutional environments, and in deciding which organizational subunits of volunteers to survey. Furthermore, the content of the survey was developed based on interviews with volunteers and volunteer managers and updated through the researchers' abductive reasoning, in close exchange with practitioners. On the other hand, they also participated in workshops after the crowdsourcing phase to interpret results and derive learning points in an interactive manner.

### **Content of the VEC survey tool**

Volunteers' overall commitment to an organization is influenced by various types of satisfaction, each impacting their dedication differently. While certain satisfaction dimensions relate to basic volunteer needs and can be managed with a standardized approach, other dimensions may lead volunteers to reduce their efforts or leave the organization. Depending on the dimension in question, personalized strategies may be required to significantly enhance commitment. Therefore, organizations must implement a comprehensive range of volunteer management practices that address all dimensions of volunteer satisfaction simultaneously [3].

The six dimensions of volunteer satisfaction were identified from the literature as well as extensive field research. They encompass various aspects that contribute to a volunteer's overall experience and commitment to an organization:

**(1) Physical context satisfaction** refers to volunteers' satisfaction with the fundamental characteristics of the environment in which they operate, including safety, accessibility, and healthy working conditions. A supportive physical environment is essential for volunteers to feel comfortable and valued. When this satisfaction dimension is not fulfilled, volunteers will leave the organization. Hence, this is a necessary condition for retaining volunteers. From a management perspective, however, this satisfaction dimension can be managed in a standardized manner, meaning that volunteer management actions to fulfill this type of satisfaction are relevant for most or all volunteers in the organization. The subsequent volunteer satisfaction dimensions are ranked based on an increasing need for a more personalized approach to how they should be managed for each volunteer. These dimensions act as motivational factors to boost engagement, in contrast to basic conditions that simply need fulfillment to retain volunteers. In terms of management practices related to this dimension, our VEC survey items (for physical context) measure the provision of essential resources such as transportation, safety, and liability protection, which are crucial for ensuring that volunteers can operate in a secure and supportive environment, ultimately enhancing their willingness to participate [18], [19].

**(2) Task satisfaction** arises from the fulfillment volunteers experience while engaging in their daily responsibilities. This dimension emphasizes the importance of meaningful tasks that



align with volunteers' skills and interests, enhancing their sense of purpose. In terms of management practices related to this dimension, our VEC survey items (for task support) evaluate the clarity of communication regarding responsibilities and the provision of necessary assistance, which are vital for ensuring that volunteers feel confident and competent in their roles, thereby improving the quality of their contributions [20], [21].

**(3) Social satisfaction** is derived from the interactions and relationships formed while volunteering. Engaging with others who share similar values and goals fosters a sense of community and belonging, which can significantly enhance the volunteer experience. In terms of management practices related to this dimension, our VEC survey items (for Socialization) assess the effectiveness of collaboration and relationship-building among volunteers. This is important for reducing conflicts and enhancing overall volunteer satisfaction by fostering a sense of community and belonging [22], [23].

**(4) Recognition satisfaction** occurs when volunteers feel appreciated and acknowledged for their contributions. This recognition can come from fellow volunteers, organizational leaders, or the community, reinforcing their sense of value and motivating continued involvement. In terms of management practices related to this dimension, our VEC survey (for recognition) measures the acknowledgment and celebration of volunteers' efforts and achievements, which is essential for reinforcing their value within the organization and motivating continued engagement and commitment [24].

**(5) Learning satisfaction** is achieved when volunteers have opportunities to develop new skills and gain insights through their experiences. This dimension highlights the importance of personal growth and the acquisition of knowledge, which can lead to increased engagement and commitment. In terms of management practices related to this dimension, our VEC survey items (for learning) focus on opportunities for personal development and skill acquisition provided to volunteers, which are important for enhancing their capabilities and thus satisfaction, ultimately leading to a more effective and committed volunteer workforce [25], [26].

**(6) Aspiration/Empowerment satisfaction** is linked to the anticipation of achieving specific goals or completing projects in the future. When volunteers look forward to upcoming events or milestones, it fosters a sense of excitement and motivation, driving their commitment to the organization. From a volunteer management perspective, fulfilling this type of motivation often requires a highly personalized approach, as aspirations and empowerment can vary significantly among individual volunteers. However, when done well, fulfilling this motivation can lead to a substantial boost in volunteer engagement. In terms of management practices related to this dimension, our VEC survey items (for aspiration/empowerment) gauge the extent to which volunteers are encouraged to contribute ideas and take initiative within the organization, which is crucial for fostering a sense of ownership and motivation, leading to greater innovation and commitment to the organization's goals [27].

Together, these dimensions create a comprehensive framework for understanding and enhancing volunteer satisfaction and commitment. Importantly, dimensions are not only measured separately but also guide efforts to fine-tune managerial practices.

### **Organization-specific reporting**

From the resulting dataset, we generated feedback reports semi-automatically, presenting results aggregated per organization in an anonymized benchmark. This means that per report

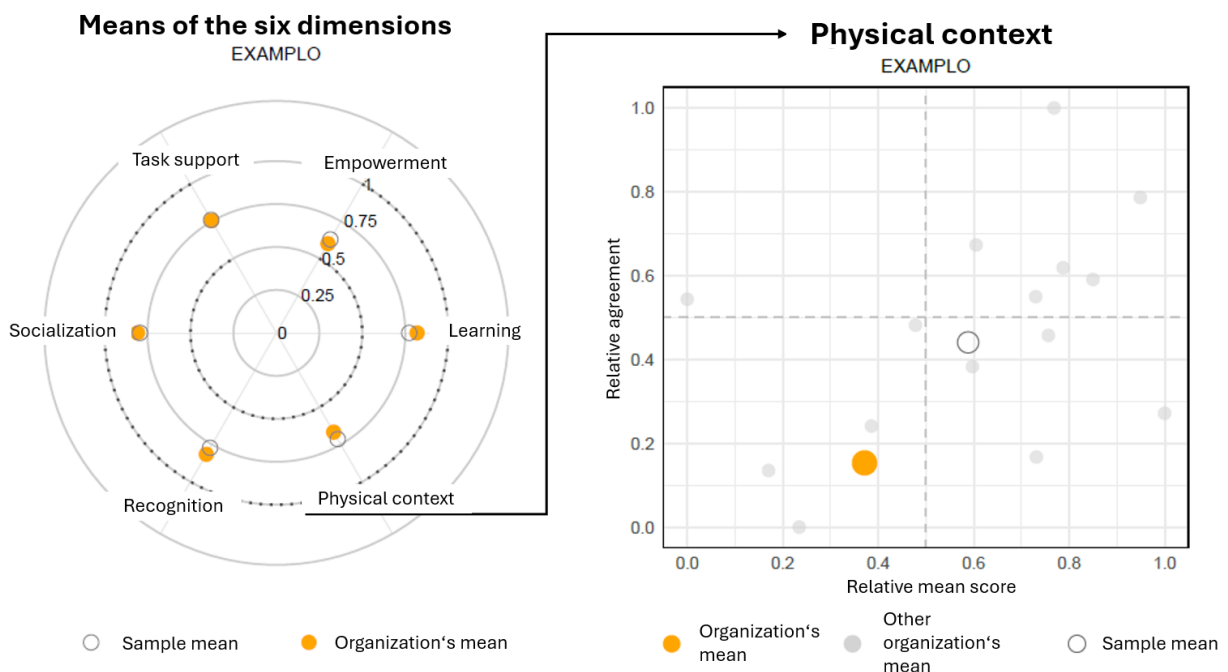


the focal organization is compared with other, anonymized organizations that also participated in the VEC. The VEC reports are anonymous, all-in-one documents that begin with a brief theoretical background on volunteer motives and satisfaction. The questionnaire was designed to measure volunteers' evaluations of the managerial practices applied (see the description of the six dimensions above) within their organizational subunit [3]. For each dimension, four items ask respondents to evaluate managerial practices in terms of how effective they think these are for volunteers in their organization, using a 7-point scale ranging from “not good at all (-3)” to “very good (+3).”

In terms of reporting, for each dimension, the mean score for all volunteers in the organization was calculated. These scores per dimension were subsequently standardized (0–1; with 0.5 representing the cut-off value between positive and negative practice evaluation) and presented in the VEC reports in a radial diagram comparing organizational scores across the six dimensions with the overall sample mean (see Figure 2, left side).

Additionally, we plotted each dimension's standardized mean score against its relative internal agreement (e.g., for physical context, see Figure 2, right side) [4]. Relative agreement was calculated by taking the dimension's standardized variance and subtracting it from 1. This resulted in a plot in which the horizontal axis indicates the dimension's mean score and the vertical axis indicates the dimension's relative agreement within an organization, thereby providing a more detailed and representative view of the findings. These findings were then plotted against an aggregated anonymous benchmark (i.e., showing, in an anonymous way, other organizations with sufficient respondents).

**Figure 2: Radial benchmark (left) and relative agreement plot (right)**



Notes: Cross-organizational benchmark (left) and detailed insight into one dimension, considering relative agreement (right) for interpretation by participants from the organizations. This figure refers to a fictional organization called EXAMPLO.



Such detailed comparisons are necessary to enable citizen scientists to identify possible improvements and set priorities. The plots were presented with an interpretation guide that explains what combinations of high/low mean scores and high/low relative agreement mean, and how to act on the insights from a management perspective. For a detailed open-access description, we refer to [4] and [12]. Brief descriptions are provided below:

- **The top-right corner** indicates relatively high agreement on high managerial practice evaluation.
- **The top-left corner** indicates relatively high agreement on low managerial practice evaluation.
- **The bottom-right corner** indicates relatively low agreement on low managerial practice evaluation.
- **The bottom-left corner** indicates relatively low agreement on high managerial practice evaluation [12].

The VEC reports are semi-automatically generated using the raw data exports from Qualtrics and a Quarto-based script in R. This process supports further scaling of the project. Participants analyzed and discussed their results with other participants and with us during subsequent citizen science workshops.

### **Interactive workshops with key-contact people as citizen scientists**

The semi-automated feedback reports formed the cornerstone input for follow-up workshops with volunteer managers. These citizen scientists acted as *multipliers/ambassadors* supported by the VEC reports, and were invited to reflect on and discuss further steps with their organizational management teams. We supported this next step by supplying a framework, provided as part of the VEC reports, geared toward prioritization and strategic decision-making [12]. To improve future VEC batches, we implemented an open feedback loop, asking key contact people to evaluate their project participation and provide feedback on the reports. The feedback was constructive and is elaborated upon in the Project Assessment section.

Lastly, the participatory design may be at least as enjoyable for engaged citizen scientists as stargazing or chasing rare species in nature, because it offers the potential for positive change within the participating organizations and their communities. We received direct feedback that this immediate societal impact has been a strong motivation for volunteer managers to invest their time, and especially that of their volunteers, in the project and to become engaged citizen scientists.

Participating in and collaborating on the VEC project were evaluated mostly positively, and some participants have already requested admission to next year's batch. We highlight our reciprocal approach to citizen science in social science research by providing data-driven insights into organizational life free of charge, complemented by an educational initiative targeting organizational multipliers (i.e., volunteer managers). With our pilot project, we created synergies and spillover effects between research and participating organizations, thereby ensuring reciprocity and making the investment worthwhile for all involved.



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## Project assessment and learnings for other researchers and us

### *Opportunities for improvement*

We are aware of the VEC survey's length (about 15 to 20 minutes), which is longer than the self-administered volunteer satisfaction surveys commonly used in practice. These are usually shorter but offer a low level of actionability in terms of identifying concrete management improvements. The elaborate dataset used for the VEC reports is necessary to achieve a sound measurement of all six dimensions, enabling detailed feedback reports and allowing high-impact research on top. While it is the researchers' responsibility to maintain a good balance between survey length and the potential for high-value practical insights, participating organizations also need to be aware of the trade-off between insightful reports and survey length.

Furthermore, organizations need to understand the implications of utilizing the VEC tool, which operates efficiently and is available at no cost but relies on automated dissemination (i.e., automated survey links). Even though we have highlighted this point during preparatory workshops with participants, we have encountered some challenges with automated emails sent from the survey software, Qualtrics, being caught in organizations' IT security filters. This situation sometimes resulted in key contacts being uninformed, leading to misunderstandings. While we resolved the immediate issues, it remains the responsibility of key contact persons to be on standby during the VEC project. From the researchers' perspective, we will strengthen our disclaimers and supporting information, encouraging participants to monitor spam folders and/or check with their IT departments' quarantine folders. This is essential to keep the project scalable.

Large, medium, and small civil society organizations have been invited to participate in the VEC project. However, it is important to note that a few organizations did not receive VEC reports as planned due to insufficient response rates. Smaller organizations, which often lack the resources and capacity to conduct such analyses independently, should be aware of this. The VEC initiative stands out as an inclusive opportunity for all civil society organizations, providing them with access to valuable insights that they might not otherwise obtain. It is therefore an important responsibility of the key contact persons to ensure that the minimum number of respondents is met.

### *Key learning points*

- One can tap the unrealized citizen science potential in the third sector; however ...
- One must be ethical and thoughtful about how to approach this in a reciprocal way. Only extracting data without actively returning managerial insights might negatively affect organizational output.
- This is a replicable approach, as the need for empirical insights into managerial capacities to increase volunteer satisfaction is strong, proven by the engagement of participating organizations.
- This is a scalable approach, allowing for much higher numbers of participating civil society organizations if the right digital infrastructure is utilized.
- Setting up infrastructure and organizational contacts once can be sufficient to build the basis for reproducing this regularly in the foreseeable future.



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## **Implications and recommendations**

Other scholars interested in adopting this approach will benefit from understanding and committing to the fact that effective collaboration with civil society organizations requires reciprocity from all participants. Moreover, reports need to be as self-explanatory as possible so they can be used and interpreted without requiring additional input. Furthermore, it is equally important to maintain a constant personal (not solely automated) communication flow, which helps avoiding misunderstandings before they arise.

We also want to highlight accessibility: many civil society organizations involve elderly volunteers and/or people with migration backgrounds. Hence, simplifying the vocabulary used in survey items, replacing complex rating systems with straightforward language, and adding additional language options are logical next steps toward achieving more generalizable insights.

The findings from the VEC pilot project highlight the transformative potential of citizen science methodologies in enhancing volunteer management within civil society organizations. By integrating empirical insights into volunteer satisfaction, organizations can make informed strategic decisions that directly impact their operational effectiveness and volunteer retention. The reciprocal nature of this approach not only benefits the organizations involved but also enriches the academic research landscape by providing relevant, context-specific data. Moving forward, civil society organizations must recognize the value of collaborative partnerships with researchers, ensuring that data collection efforts are ethically aligned with the goal of improving service provision within civil society.

## **Author bios**

Kai U. Klein is a PhD candidate at the Institute for Public Management and Governance within the Department of Management at the Vienna University of Economics and Business. Kai U. Klein has been a visiting scholar at the University of Antwerp. His dissertation is set in the context of welfare state retrenchment, focusing on consequences and coping strategies for civil society organizations. In his PhD research, he investigates volunteer satisfaction and intergroup conflict in volunteer management, fragmented group inclusion in mixed nonprofit workforces, and the impact of organizational networks disseminating professional management practices.

Jurgen Willems is a professor at the Institute for Public Management and Governance, Department of Management at the Vienna University of Economics and Business. He is also the Academic Director of two Executive MBA programs focused on Life Sciences and Health Care Management at the WU Executive Academy. His teaching covers various management topics, including Organizational Behavior, Management and Digital Transformation, and Public and Nonprofit Governance. Jurgen Willems has been a visiting scholar at the University of Southern Denmark, the American University in Washington, l'Université de La Réunion, the University of Missouri, and the University of Texas at Austin. His research covers a variety of topics on citizen-state and citizen-society interactions.



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