



YouCount
Youth Citizen Science

D4.3

Report on the costs and benefits of Citizen Social Science: Analysis based on the YouCount project

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D4.3 Report on the costs and benefits of Citizen Social Science: Analysis based on the YouCount project experience

This deliverable presents an overall assessment of the costs and benefits of Youth Citizen Social Science (Y-CSS) based on the findings from the YouCount project and a broad multicriteria assessment framework developed in the project. The costs and benefits assessments build on data and findings from key deliverables undertaken in all work packages (WP) in the project, especially the findings from the multiple case study (WP2-3) and the evaluation and impact study (WP4).

The vision of YouCount is twofold, addressing and combining both the scientific and societal needs of our time. The scientific *vision* of YouCount is to strengthen the transformative and participatory aspects of CS and social science, by enabling citizen participation in all facets, reaching out for a more egalitarian way of conducting science. The societal vision of YouCount is to contribute to create inclusive and innovative societies for European youths and to empower them in promoting active citizenship and a just and equitable future, particularly for youths with disadvantages.

Table 1: Revision history

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Table 2: Terms and Abbreviations

ABBREVIATION	FULL TERM
CBA	Cost Benefit Analysis
CS	Citizen science
CSS	Citizen social science
KPI	Key Performance Indicators
PAR	Participatory action research
SwafS	Science with and for Society
Y-CSS	Youth citizen social science
YCS	Young citizen scientist

Executive Summary

This aim of this deliverable is to contribute to the evolving understanding of the costs and benefits associated with Citizen Science in general and Youth Citizen Social Science in particular through a critical analysis of the YouCount project findings. This critical examination is grounded in a comprehensive multi-assessment framework that collects evidence of the scientific, social, democratic, economic and individual dimensions of YouCount. The framework is based on the review of the literature, that is presented in section 2 of this deliverable, but it also incorporates some of the insights developed while conducting the project, which helped to refine the categories that are included under each dimension.

Section 3 describes the methodological approach based on the multicriteria framework. The analysis is based on secondary data, using previous deliverables of the project that have, in turn, collected and analysed primary data (both quantitative and qualitative) from the project, that were reviewed to extract information that identifies the costs and benefits (or pros and cons) reflected on the multicriteria framework.

The actual analysis is presented in Section 4, including the main costs and benefits that have been extracted about new topic related knowledge, science quality, enhanced science-society communication and increased open data and open science contributions in the scientific dimension; outreach to disadvantaged groups, more competencies among locals and citizens, increased interest and public engagement in science and new/better policies for social inclusion in the societal dimension; increased inclusiveness in science and increased participation of youth in policy-making and community development in the democratic dimension; financial costs and potential economic implications of successful policy and interventions in the economic dimension; and knowledge and skills development, employability, civic engagement, empowerment and social capital in the individual dimension.

Finally, section 4 concludes with a discussion that summarises the main arguments around the intertwined costs and benefits of youth citizen social sciences, underscoring the importance of strategic resource allocation, optimization of co-creative CSS approaches, and a thoughtful balance between scientific rigor and communication activities in order to deliver valuable scientific outcomes and fostering youth engagement in science, policymaking, and social innovation.

1. Introduction

YouCount is funded under the Horizon 2020 Science with and for Society (SwafS) programme, which recognizes the transformative changes in research and innovation (propelled by digital technologies, globalization, and an imperative need to address societal challenges) and advocates for a transdisciplinary and multi-stakeholder approach. With the aim of promoting open science, the programme explicitly recognizes the role of citizen science (CS), which is envisioned as "linked with outreach activities, science education or various forms of public engagement with science as a way to promote Responsible Research and Innovation" (European Commission, 2018b, p.5). However, it also acknowledges the underexplored nature of this field.

In the natural sciences, CS facilitates large-scale involvement of citizens and data collection, opening new opportunities for knowledge generation that otherwise would not be possible at this scale. Broadening the scope to the social sciences, which already boast a rich tradition of Participatory Action Research (PAR), Citizen Social Science (CSS) has emerged as a contemporary extension of these methodologies, but is a term that can either refer to a form of citizen science in the social sciences or to the activities that focus on the social aspects of citizen science (Albert et al., 2021). YouCount falls within the first acceptance and, as such, it neatly fits the definition of CSS that Göbel et al. (2022, p. 1) provide as "scientific research in the humanities and social sciences, carried out in cooperation between professional and non-professional researchers".

As stated by Albert et al. (2021), CSS not only contributes to scientific endeavours but it also addresses social issues raised by citizens, thus legitimizing research, and giving voice to marginalized groups. Thus, the application of CSS extends beyond the scientific realm to promote open science, foster science-society collaboration, and enhance public engagement, trust, and inclusivity.

However, despite the optimism surrounding CS and CSS, there remains a noticeable gap in empirical studies evaluating its tangible effects. That is why, answering to the challenge posed by the European Commission in the SwafS programme, YouCount endeavours to address this gap by subjecting CSS to a critical examination.

The primary aim of this study is to contribute to the evolving understanding of the costs and benefits associated with Citizen Science through a critical analysis of the YouCount project findings. This critical examination is grounded in a comprehensive multi-assessment framework, encompassing scientific, social, and other relevant dimensions, engaging in a comprehensive discussion to address the overarching question of whether CSS merits the support of future science policy. In doing so, the study aims to address the following research question: What are the costs and benefits of CSS in terms of scientific advancements, social impact, and other relevant dimensions? Concretely, it explores:

- To what extent are CSS initiatives successful in generating new knowledge and fostering social innovations, particularly in the context of enhancing social inclusion and addressing critical societal challenges?
- To what extent do CSS initiatives enhance inclusive science and promote collaboration between science and society?
- In what ways do these initiatives contribute to increased public engagement and trust in science?
- What are the costs of conducting CSS initiatives?

While doing so, it is important to acknowledge certain limitations that stem from the exploratory nature of this study. The first one is that it will not provide a conclusive "yes" or "no" answer to whether CSS should be supported in future science policy. Instead, it will offer insights and considerations based on the findings within the YouCount project context. In addition, the complexities inherent in assessing costs and benefits across diverse dimensions pose inherent challenges. The study will navigate these challenges but does not offer a one-size-fits-all solution due to the intricate nature of citizen science endeavours. Despite these limitations, the study puts forward valuable insights and reflections on the potential of CSS, offering a nuanced perspective grounded in the YouCount project's experiences.

Hence, this study builds on the findings of YouCount, a co-creative youth citizen social science (Y-CSS) project that aims to generate new knowledge and innovations to increase social inclusion of young people across Europe. The project was constructed around 10 cases in 9 countries in which the professional/academic researchers collaborated with young citizen scientists (YCS) or co-researchers who were aged between 13 to 29 years and came from disadvantaged backgrounds.

This report is structured as follows. Section 2 describes our approach to costs and benefits of citizen social science, starting with a brief review of the main aspects that have been addressed in the literature with regard to the costs and benefits of citizen science in general and citizen social science in particular and following with a description of the theoretical approaches to cost benefit analysis and the approach that has been selected for the current study. Section 3 describes the methodological approach based on a multicriteria framework, with the actual analysis presented in Section 4 and the conclusions in Section 5.

2. Our approach to costs and benefits of citizen social sciences

2.1. Costs and benefits of citizen science and citizen social science underlined in the literature

Even though many researchers have highlighted the potential of CS, there is also scepticism and critical voices amongst policy makers and within traditional science that question the role of citizen science within the **scientific domain** in terms of a lack of scientific and theoretic standards, low data quality and subjectivity/objectivity issues. Some publications have, for example, identified flaws in citizen-sourced data, including deviations from standard protocols and biases in recording or in the choice of sampling sites (Irwin, 2018; Hecker et al., 2018). Moreover, CS is found to raise challenges in balancing the needs for professionalisation to secure scientific standards vs. voluntariness, since the more top-down administration of CS can challenge the ideals of bottom-up initiatives. Further, cocreative CSS poses specific challenges in terms of securing data quality and data validity because of its explorative design. Therefore, there are many challenges to deal with when it comes to choosing the optimum methodologies and integrity of methods and data to secure **scientific quality**.

Additionally, there are some challenges associated with open science that did not relate to citizen science when applied to natural sciences but do emerge in citizen social sciences. As Heiss and Matthes (2017) point out, in the former the distinction between the researcher and the object of the study is clear, but it gets blurred in a co-creative citizen social science approach and this might have implications for the accessibility of **open data**.

In contrast, however, one important argument for the benefits of CSS is that it can increase the potential of getting data and developing **scientific knowledge about the social challenges and solutions** that we cannot obtain through traditional social science methods (Gold et al., 2023). CSS-based methods might, for example, support citizen-led data gathering that may otherwise go unrecorded or “unnoticed” or can enable large-scale studies through voluntary engagement in data collection (Heiss & Matthes, 2017). This is also recognised in the Mutual Learning Exercise of Citizen Science Initiatives (Gold et al., 2023), which credits CSS for making it possible to **more effectively investigate some research questions not only through the citizens’ lived-experiences**, but also by bringing to the forefront of the research arena **topics that might have scaped the attention of researchers and policy-makers**.

Citizen science can also have benefits in the **economic dimesion** not only by helping to reduce the cost of data gathering in projects through their voluntary contributions, but also by directly contributing to processes of innovation that can foster industrial development (Gold et al., 2023).

This is so because many CS projects have the vocation to generate not only academic knowledge around societal and environmental challenges but also to improve them and this is indeed what lies behind the motivation of citizens to get involved in these projects.

The exploration of the democratic dimension in CSS refers to the extent in which democratic principles and practices are integrated within the framework of scientific research, community engagement, and policy development. This is in line with European policies that attempt to make science more open and inclusive for those further away from science and citizen science is recognized as a pivotal force in **democratising the research process** by actively contributing to shaping the research agenda and amplifying the voices of the most vulnerable (Sis.net, 2017). Despite the promising potential of the democratic dimension in CS, there is a need for a better understanding of how more democratic and participatory forms of CS can be supported, how these processes could be structured, and what outcomes may be expected (Richardson, 2013). The objective of exploring the potential of CSS in the democratic dimension is aligned with the EU Youth Strategy 2019–2027 (European Commission, 2018a) that aims to foster youth participation in democratic life; support social and civic engagement; and ensure that all young people have the necessary resources to take part in society. However, one of the challenges that CS has faced is that not all groups of participants are equally involved in its development. As Pateman et al. (2021) report, certain age-groups, genders, ethnicities and socio-economic groups are usually excluded from this type of projects. YouCount was set out to work with young people from a wide age range (15 to 29 years of age) with disadvantages in terms of living in deprived areas, migrant/refugee background and/or disability. Hence, the group combines several socio-demographic characteristics that set them apart from the “average” citizen participating in CSS. As we will see later, working with this group, while contributing to the democratisation of science it also has associated costs or challenges that might not apply to CSS projects that work with other groups of citizens.

In the **societal domain**, CSS might support citizens and their communities in societal problem solving and have great potential for community development and policy-making concerning societal challenges. There is currently an increasing interest in the potential of CS as innovation in the EU setting (Hecker et al., 2018). Yet, the role of CS in policy-making and decision making is still unexplored (Kieslinger et al., 2017; Richardson, 2017; Shanley et al., 2019) and many CS studies have also struggled to meet decision makers’ needs, generate useful data to inform decisions, or improve ecological resilience (Newman et al., 2017).

The level of involvement of citizens within these projects can differ and, according to Bonney et al. (2009, p. 17) can be classified into three major categories: “1) Contributory projects, which are generally designed by scientists and for which members of the public primarily contribute data; 2) Collaborative projects, which are generally designed by scientists and for which members of the public contribute data but also may help to refine project design, analyze data, or disseminate findings; 3) Co-created projects, which are designed by scientists and members of the public

working together and for which at least some of the public participants are actively involved in most or all steps of the scientific process.” YouCount has opted for the third approach, adopting a **co-creative approach** (Butkevičienė et al., 2021), while also combining it with levels of participation where a wider group of young people participate in more contributory roles or in just some parts of the project. This has implications for the analysis of costs and benefits, that might differ in other approaches that only include lower levels of involvement of the citizens.

Finally, the participation in CS projects can bring **benefits to the individuals** who participate as **citizen scientists**, by increasing their scientific literacy and critical thinking, as well as contributing to their consciousness and awareness about social issues that have an impact on their lives and well-being and through that process become empowered because, as Freire (1970) interprets it, an empowered person in this context is one who possesses a heightened consciousness and understanding of the complexities shaping their existence. It can also have benefits for **academic researchers** who, by embarking on research projects adopting a citizen science approach might learn new skills (SiS.net, 2017). As Blaney et al. (2016) point out, there are additional gains for the citizens, such as meaningful engagement with scientific researchers and acquisition of skills that might later materialise in job opportunities, and well-being benefits linked to the enjoyment of the activity, feelings of doing something worthwhile and the connection with nature or the community; and for the professionals, who might improve their morale.

2.2. Theoretical approaches to cost-benefit analysis

2.2.1 Cost-benefit analysis vs analysis of costs and benefits

Cost-benefit analysis (CBA) is a specific approach to measure the social costs and benefits of a particular project or policy, with the aim of improving the allocative efficiency of the intervention (Boardman et al., 2018). As such, it does not only consider its effectiveness, i.e., whether the desired outcomes or goals have been achieved, but also whether it has done so by making the best use of available resources (Yates, 2015). It has several characteristics that are worth taking into account.

The first characteristic is related to the type of benefits and costs that CBA is set to measure. The former are the benefits for the whole of the society, which, in our case, would include several dimensions, such as scientific outcomes, the impact on the individual citizen scientists, and the wider socio-economic outcomes. For the latter, not only the funding bodies should be considered, but also the costs undertaken by the whole society. In our case, this has important implications, because it should take into consideration, for instance, the time the citizen sciences have devoted to the project, even if they do not receive formal remuneration.

A second characteristic of CBA is that both costs and benefits have to be monetarised, so the totals in each category can be aggregated and the resulting difference (benefits minus costs) or ratio (benefit/costs) can be assessed. This is a complex process that might involve different techniques to assign a value to items that are not already expressed in monetary terms, such as, for instance, the use of opportunity costs to impute a monetary value on the time devoted by citizen scientists or different methods to compute non-market valuations, such as contingent valuation or discrete choice experiments (Nas, 2016).

A third characteristic of CBA is that, sometimes explicitly and on other occasions implicitly, the costs and benefits of a project are compared to some “benchmark”, which in the case of policies usually is the *status quo* situation, with no change of policy (Boardman et al., 2018). When defining projects that are going to be evaluated *ex-post* through CBA, it is common practice to follow the progress of a control group to which the intervention is not applied, so the costs associated with the control group can be compared to the group that has benefited from the alternative intervention. In some cases, especially when CBA is calculated *ex-ante*, it is applied to different policies or investment alternatives to assess which is the most cost-effective option that should be financed. In the case of CSS projects, the benchmark is the use of other scientific approaches, different as well from PAR, because CSS often emanates from this traditional approach (Göbel et al, 2022), the differences between the two are often blurred (Ridley et al., 2023) and most YouCount cases do indeed acknowledge PAR as the methodological approach on which they were built (Pataki, Czeglédi and Butkevičienė, 2023).

2.2.2 Approaches to costs and benefits analysis in this study

Each of the above characteristics poses particular challenges for a CBA to be undertaken. In particular, the combination of the first two, assessing an array of societal costs and benefits and assigning them a monetary value is far too ambitious to be undertaken with even the minimum scientific rigor within the project constraints. Also, given that each scientific project is so unique, it is difficult to think of other projects that might be considered as the benchmark against which to compare the costs and benefits. Therefore, this report takes the approach of analysing the costs and benefits of YouCount with the aim of covering a broad spectrum within them: scientific, societal, democratic, economic, and individual benefits, as well as the costs that go beyond the project’s funding budget. It will not attempt to monetarise them, but rather, by using a multicriteria framework that incorporates both quantitative and qualitative information that has been collected through the project and has been reflected in some of the previous deliverables, it synthesizes the main benefits that have emerged and the costs associated to them. In as much as possible, the report will also reflect on how these benefits and costs compare to what might be expected from other approaches to research.

The analysis of costs and benefits also needs to take into consideration the different modes of producing scientific knowledge. These different modes of knowledge production influence the

meaning and the assessment of aspects such as the research quality or the research mechanisms that need to be put in place in the research process because, as Greenhalgh et al. (2016, p. 2) state: “research impact make different assumptions about the nature of research, purpose of research, the definition of research quality, the role of values in research and its implementation, the mechanisms by which impact is achieved, and the implications for how impact is measured”.

According to Gibbons (2003, p. 230), Mode 1 responds to a disciplinary structure to knowledge production, which is the model followed by most universities, where “the disciplinary structure determines the important problems and how they should be dealt with and by whom. It also specifies what should be regarded as a good contribution to the field.” In contrast to the Mode 1 of knowledge production that takes place in the academic disciplinary context, Mode 2 of knowledge production takes place in the context of its application; it is transdisciplinary, heterogeneous and non-hierarchical and takes place in flexible research teams that change as the task requires; and, quality control is carried out by the participants themselves in the knowledge production process (Gibbon, 1994).

CSS stems from participatory approaches and such approaches, like the action research, are consistent with Mode 2 knowledge production (Gustavsen, 2003; Karlsen & Larrea, 2014). Thus, while in Mode 1 research quality is represented by measures of excellence and originality; in Mode 2, quality is assessed with respect to utilitarian values and criteria in producing socially robust knowledge (Bornmann, 2013).

3. Methodological approach to the analysis of costs and benefits based on a multicriteria framework

One of the primary scientific objectives of YouCount is to systematically establish evidence regarding the costs and benefits associated with youth citizen social science. This is to be achieved through a robust mixed-method approach, grounded in the evaluation of scientific, societal, and individual outcomes derived from YouCount's research initiatives. Considering the intricate nature of conducting research across multiple countries and the extensive empirical investigations based on 10 case studies, this section of the methodology seeks to articulate and elucidate the strategies employed to fulfil the objective of reflecting the costs and benefits of youth citizen social science, drawing from YouCount's research findings.

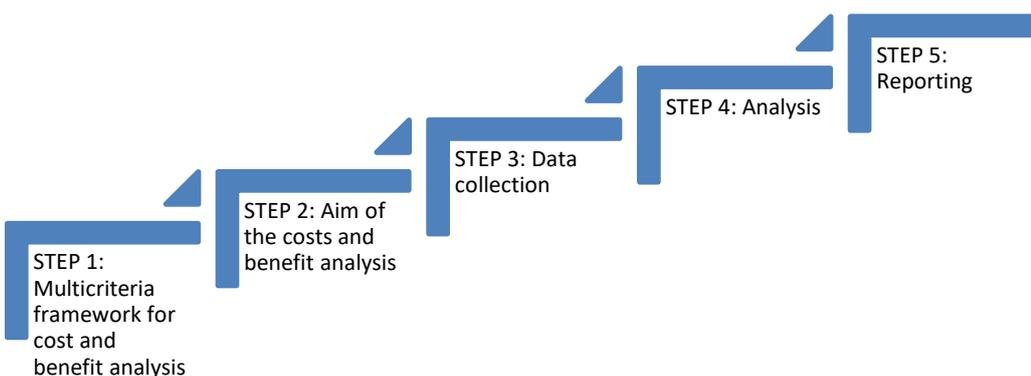
Given the complexity inherent in a multi-country context and the diversity of empirical studies, this methodological section serves the purpose of outlining the approach taken to understand and interpret the results. It provides insights into how the project navigates through a varied array of

research sub-studies, each contributing rich data to the overall understanding. The methodology not only defines the type of research conducted but also delves into the specific methodologies chosen. It explicates what aspects will be observed, outlining the intricacies of data collection and analysis processes, ultimately facilitating the extraction of key conclusions from the comprehensive empirical research conducted within the YouCount project.

Our methodological approach, which combines both deductive and inductive reasoning modes with a focus on the deductive approach, is used to analyse the costs and benefits associated with youth citizen social science. A systematic technique based on previously developed theories or conceptual frameworks, from which the researcher constructs categories prior to the study, is necessary for deductive analysis. They then associate links found in the data with those particular categories. Although an established multicriteria framework for cost and benefit analysis serves as the foundation for the research, the data analysis also accounts for the possibility of new emerging categories and statements that do not fit the original framework. The researcher's inductively developed thinking, which generates its own reasoning, is put into action.

Following Pearse (2019) and Miles and Hubermans' (1994) three consecutive steps suggested for qualitative analysis (data reduction, data display, and conclusion drawing), the research team has elaborated a tailored five step process for a combined approach to deductive and inductive thematic analysis.

Figure 1. The methodological approach for the analysis of costs and benefits



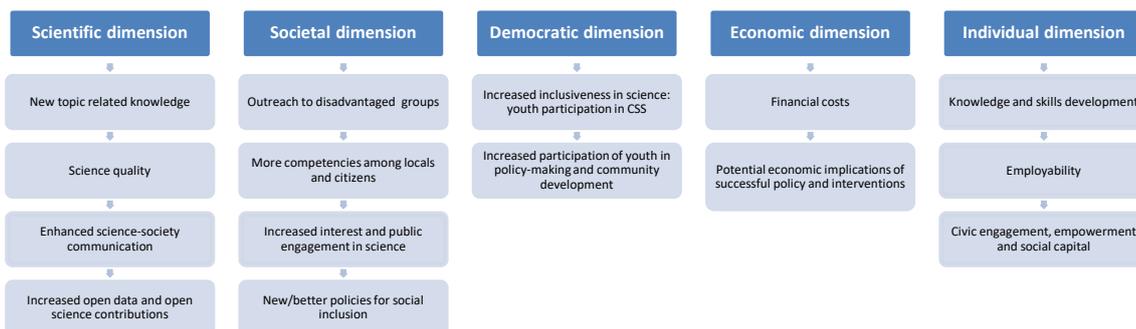
Source: Own elaboration from Pearse N. (2019); Miles & Huberman (1994)

Step 1. The multicriteria framework for cost and benefit analysis

The analysis starts from a multicriteria framework, which encompasses a first list of the possible costs and benefits associated to citizen social science. This multicriteria framework reflect our decisions about which variables are most crucial, which associations are most likely to be significant, and, consequently, what data should be gathered and examined.

All in all, the objective of such multicriteria framework is to provide a framework for collecting evidence of the costs and benefits of Y-CSS based on open data of the scientific, social, democratic, economic and individual dimensions of YouCount and its research outcomes. It is based on the review of the literature (as described in section 2) but it also incorporates some of the insights developed while conducting the project, such as, the co-evaluation framework of YouCount by Juricek et al. (2021) which have helped us to refine the categories that are included under each dimension, as shown in Figure 2.

Figure 2: Multicriteria framework for the analysis of the costs and benefits of YouCount



Source: Own elaboration

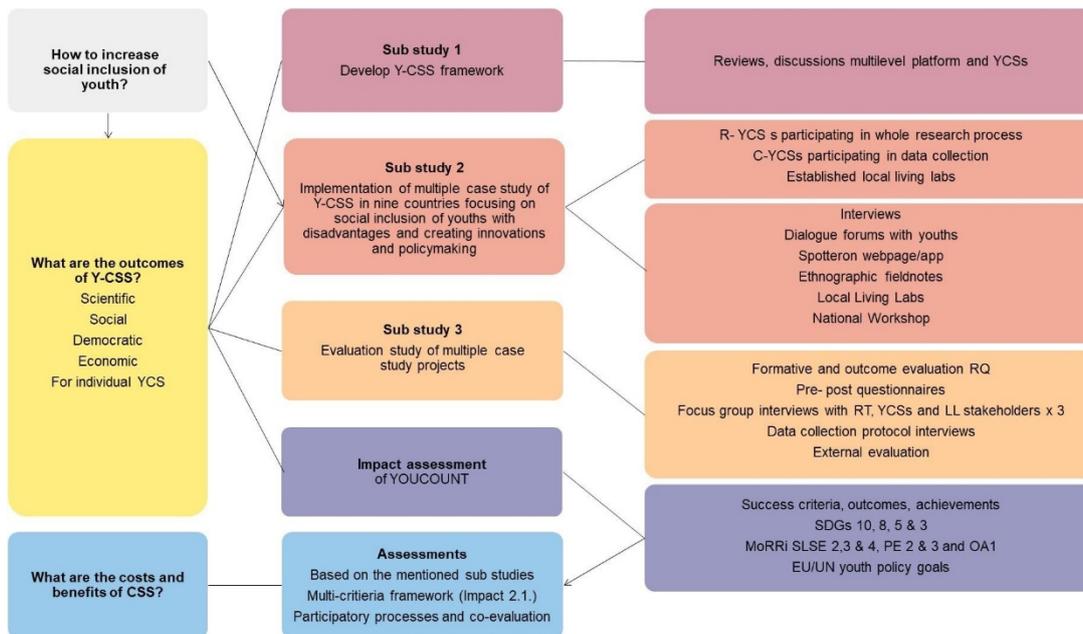
Step 2. Aim of the cost and benefit analysis

The goal of the cost and benefit analysis is to find proof of the costs and benefits of Y-CSS by conducting an analysis based on YouCount's findings. Based on the multicriteria framework mentioned above, the pros and cons of Y-CSS within each dimension and category.

Step 3. Data collection

The research findings of YouCount are utilised to compile evidence regarding the costs and benefits of Y-CSS. The following figure illustrates the main YouCount’s research substudies and their main outputs.

Figure 3. Framework for the main research substudies in YouCount



The analysis is based on secondary data, using previous deliverables of the project that have, in turn, collected and analysed primary data (both quantitative and qualitative) from the project. The main deliverables are:

- *D2.3 Meta report of the experiences with case study implementation* by Ridley et al. 2023
- *D3.1 Report CSS as innovation* by Pataki, Czeglédi and Butkevičienė, 2023
- *D3.2 Meta-report concerning typology of drivers and model for social inclusion* by Pataki et al., 2023
- *D4.1 Cross-case evaluation* by Saumer et al., 2023
- *D4.4 Report on impact assessments by YouCount* of Lorenz et al., 2023
- Several chapters from the *Handbook of Youth Citizen Social Science. Working with Young People and the Local Community for Social Change* by Borgström et al., 2024

Step 4. Analysis of the cost and benefit of Y-CSS

The analysis consists of reviewing the deliverables identified above to extract information that identifies the costs and benefits (or pros and cons) reflected on the multicriteria framework presented in Figure 2. The research team looks for evidence in the data set to answer to the proposition defined in step 2, that is, to understand to which extent the costs and benefits of Y-CSS as defined in the dimensions and categories of the multicriteria framework are relevant in Y-CSS.

A methodological limitation pertaining to the study is subjectivity. The researchers bring their values into the research process. Thus, to minimise bias, the data analysis included a triangulated process to cross-check and validate the evidence by:

- Conducting individual analyses of the data
- Sharing initial reflections with the rest of the research team
- Conducting a reflection session for confirming and agreeing on conclusions

Step 5. Reporting

The findings are written up and presented in the following section.

4. Costs and benefits of CSS through the YouCount project experience

4.1. *Scientific dimension*

Knowledge generation

YouCount was aiming to co-create new knowledge both on **social inclusion** and new **social innovation** addressing social inclusion. The rationale for using CSS is that it makes it possible to investigate issues that might not have been able to be researched otherwise by adding the lived-in experiences of the young co-researchers.

Young people, specifically 162 YCS and 47 students, **actively participated** in multiple case studies within YouCount, contributing significantly throughout the entire research process. Additionally, 209 YCS provided valuable observations and comments, identifying opportunities for social and civic engagement. YCS played a pivotal role in contributing to 43% of the publications based on the project's findings. Furthermore, YCS delivered Master and Bachelor Theses on YouCount's research topics, making substantial contributions to the knowledge addressed by CSS.

Incorporating the voices of the youth can also **help to overcome the homogeneity of some scientific communities**, as reported by Hagen and Lorenzen (2024) quoting one of the YouCount researchers: “We are a diverse group of researchers when it comes to gender, age, and national and disciplinary background. But we are all middle class white Western Europeans and this has made us particularly aware of the power imbalances between us and the youth, but also of the potential for genuine, new data and research questions that we wouldn’t have produced ourselves.” What is more, as Canto-Farachala et al. (2024a) point out “**Young citizen scientists are expert facilitators of dialogue with other youth**” and can therefore help in the process of gathering information that will contribute to generate knowledge.

Regarding **new knowledge on social inclusion**, Pataki et al. (2023) in D3.2 synthesise the new knowledge that was generated around this topic **by incorporating the youth perspective**. Interestingly, the paradigm of social inclusion diverges from traditional adult-centric definitions, emphasizing active participation, meaningful connections, and the preservation of fundamental rights. Young individuals view social inclusion as an ongoing, reciprocal process demanding active involvement rather than passive integration, fundamentally redefining its essence. Some critical issues around the topical knowledge (youth social inclusion) from the youth perspective provide insights to policymakers to develop more resonant and inclusive strategies that reflect and address the nuanced perspectives of young people on social inclusion (see for example the recommendations to better embrace youth perspectives on social inclusion suggested by Lorenz et al., 2024).

However, the evaluation report (Saumer et al., 2023) offers conflicting views about whether the project has managed to achieve the aim of producing new knowledge on social inclusion. On the one hand, there was a view that the involvement of the citizen scientists helped to provide a more accurate representation of reality, as also reported by Canto-Farachala et al. (2024a) quoting one of the researchers: “We always prepared agendas with topics we wanted to discuss, but in the conversations with the young people, unexpected things happened, and we had to set our agendas aside and discuss what the young people wanted to – and needed to – bring up. After each meeting, I went home with a lot of insights as a researcher, but also emotional insights into what it's like to be young in a place like Botkyrka.”

On the other hand, under scientific standards, new knowledge must contribute to the state of the art. According to the evaluation report, some researchers and citizen scientists **questioned its unique contribution to scientific knowledge generation**. This might explain why, even if more publications could be developed in the future, the number of planned publications on the topic of social inclusion (4) is not likely to reach the target of 6 publications set by the YouCount Key Performance Indicators (KPI) (Lorenz et al., 2023). Saumer et al. (2023) conclude that, in the realm of the social sciences, **the ability to generate data and theoretical insights that go beyond traditional techniques is questionable**. This is partly explained because the bar to contribute to theory building is particularly high for citizen scientists.

While these concerns remain, some of the features developed as part of the CSS approach in YouCount, such as the living labs, have contributed to generating **new knowledge on social innovation**, reflected in the YouCount report on social innovation (Pataki, Czeglédi and Butkevičienė, 2023), that might not have been possible otherwise.

As Hagen and Lorenzen (2024) acknowledge, generating knowledge through co-creative approaches requires a **diversity of skills** among the researchers. **Larger teams** seem to benefit from their inherent variety of personal and professional competences and strengths, but this increases the need for resources used to manage larger teams (and the diversity of academic backgrounds adds challenges with regard to data quality, as will be discussed below).

Co-creation is also very **time-demanding for researchers**. This is one of the main issues that has come strongly in several of the deliverables that analyse the results of the project. Time is necessary to create the right environment and to get the relationships right for co-creation as well as to establish co-creational dynamics to define research topics and questions, collect data and analyse it (Ridley et al., 2023, pp.54-60). Pataki, Czeglédi and Butkevičienė, (2023, pp. 21-22) also remark that time gains primary significance due to the need to find a joint rhythm in the research process between researchers and YCS. This is because CSS needs more time than conventional research to build or re-build social relations and this is connected to the issue of power, because ensuring high quality of research requires giving time to learn the times of the others and to facilitate temporal alignment of actors to be truly inclusive. This might create some conflict to comply with the temporalities set by the funding programme. The evaluation report (Saumer et al., 2023, pp. 30-31) also points out that one of the major findings is the underestimated workload for professional researchers, who have to struggle with multiple roles and have the risk of overburdening. Realistic planning ahead needs to be incorporated to account for this.

On the YCS side there are also time costs that need to be reflected upon. While there are some individual benefits (that will be discussed in section 4.5), the time that citizens dedicate to the projects is often seen as a way to reduce costs, but the societal cost of their involvement should be taken into consideration. In CBA analysis, there are several techniques that are used to impute a monetary value to the time that volunteers incorporate to the project. In YouCount the issue has also been raised of whether YCS should receive monetary rewards, because, while in some cases intrinsic motivation might be enough it should also be combined with some form of materialistic compensation for their time (Saumer et al. 2023, p. 29). This is particularly relevant given the profile of citizen scientists in YouCount: youth from vulnerable backgrounds. Otherwise, there might also be a risk of overburdening them, while they struggle to balance different aspects of their lives. Additionally, Saumer et al. (2023, p. 31) also highlight that strong emphasis on co-creation might confuse the YCS (because they can feel a lack of direction, especially at the beginning of the project) and overwhelm them, if they feel they have to contribute to every step of the research process.

Science quality

If we were to focus on how research quality is assessed in **Mode 1** knowledge production mode, we would focus on measuring the **traditional excellence indicators**. In this regard, the KPI reported by Lorenz et al. (2023) indicate that the project so far is planning to publish 24 publications in different formats, 14 of which have already been published or accepted for publication, including 4 articles in scientific journals out of the 13 that are planned. Horizon 2020 did not establish any targets for SwafS projects but it sets a target of 20 publications per €10 million funding for all societal challenges (European Commission, 2015). **With a budget of €2,2 million is already close to achieving such a target but the overall assessment about the quality of the publications depends on whether the planned publications are delivered and where they are published.**

However, YouCount acknowledges the need for reservations regarding its scientific outcomes, particularly in achieving the ambitious goal of publishing 13 articles in scientific journals. While 38% have been accepted, a significant 67% are still in the planning stage. This deviation can be attributed to two main factors according to Lorenz et al. (2023): Firstly, the initial objective was overly ambitious, considering the time-consuming nature of planning and publishing scientific papers. The tendency for such publications to occur towards the end of the project, when results become available, further complicates the alignment with the project's timeline. Secondly, the current situation underscores the tension between co-creative CSS and traditional social sciences. **The participatory approach in co-creative CSS demands a substantial amount of time**, impacting researchers' capacity and prioritization of local research activities over writing scientific publications.

As CSS is consistent with **Mode 2 knowledge** production where scientific quality is assessed against more utilitarian objectives, there is also a suggestion to emphasize the **benefits of research beyond traditional scientific writing**, recognizing the broader impact and value of co-creative CSS in practical and societal contexts that is addressed under other dimensions in this framework.

Some of the concerns regarding scientific quality have to do with **low data quality**. YouCount used a combination of quantitative and qualitative data as described in Ridley et al. (2023): focus groups and workshops, qualitative interviews, survey methods, mapping methods, creative methods and the YouCount App. As Norvoll (2024) states, given the different backgrounds the researchers had, it was difficult to agree on common and good **documentation procedures**. The focus on flexibility and co-creative activities and the work-intensive nature of co-creative activities that left little time for documentation work during the implementation phase added to the challenge. This generated some difficulties during the cross-case analysis phase. Given these difficulties, something that we have learnt through YouCount is that **communication can also contribute to the documentation procedure** because every time you share anything from the

project you are not only contributing to open science (as stated further down in this section) but you can also go back to these materials for different purposes (Canto-Farachala et al., 2024a).

Therefore, more acknowledgement and recognition of the heterogeneity of documentation and the need to establish clear documentation procedures in citizen social science is needed by mainstream research institutions and research funding organisations because well conducted participatory process would most likely lead to more reliable and valid data and to more relevant findings if proper documentation procedures are established.

YouCount has also provided some insights about **data collected through apps**, as described in Ridley et al. (2023). We learned that careful planning for digital tools includes a reflection on the purpose of creating a new app versus using existing ones or leveraging data from social media platforms. Legal aspects, especially when involving minors, must be addressed. Ethics, privacy, and consent are paramount. Co-creating a new app requires collaboration with professional citizen science app design companies for tailored features and guidance on online privacy, security, and digital ethics. Engaging ethical committees and data protection authorities early is essential, especially when dealing with underage participants.

The YouCount project demonstrated the **potential of well-designed citizen science apps** in gathering rich data but also underscored the **need for careful planning, ethical considerations, and adaptation** to the varying preferences and contexts of youth engagement. Thus, the app development was found to be very time consuming. So, it is important to consider costs versus benefits in the single project. In YouCount we experienced some challenges but could also see some scientific potential in terms of unique data about young people's experiences. However, this will need more focused scientific work to be realised than we have been able to in the YouCount project so far.

YouCount has also unveiled some concerns about **digital fatigue** even among the digital native youth. In some cases, youth specifically opted for analogue tools to foster more face-to-face collaborations in their local research groups and interactions with stakeholders (Pataki, Czeglédi and Butkevičienė, 2023).

Enhanced Science-Society Collaboration

When examining the benefits of Citizen Social Science (CSS), it is crucial to direct attention towards the distinctive benefits that emerge from collaborating with young citizen scientists, going beyond the mere assessment of research quality. The impact assessment report of YouCount (Lorenz et al., 2023) highlights that the ten case studies conducted across nine European countries **actively engaged young citizen scientists (YCS)** in research and innovation. The App study, successfully engaged 347 young participants, resulting in 958 validated spots and 150 questionnaire responses. The substantial involvement of YCS, exceeding 1000 spots and answers, highlights a commendable

level of achievement, even if it failed short from the aim of reaching 700 participants because of fewer youths participated in the app study than estimated. The scientific outcomes from this data needs to be exploited in the future and, thus, its scientific value is still to be demonstrated.

YCS have proven to be highly active participants **in various facets of project** communication, including scientific results such as books, conference proceedings, theses, and new research collaborations. Beyond this, their engagement extends to local community outreach activities, encompassing exhibitions, dissemination events, media interviews leading to media coverage, and the creation of videos that share their experiences. Their contributions go beyond mere participation, involving tasks such as material preparation, presenting findings, and offering personal insights into their YouCount experiences.

This robust involvement of YCS in both micro and macro-level communication spaces underscores their **significant role in amplifying the overall impact** of the YouCount project and thus contributing to widening the benefits. Their engagement not only enhances the project's reach but also contributes to a more comprehensive understanding and appreciation of the project's outcomes within the scientific community and the local communities involved. This synergy between youth participants and project communication strategies highlights the dynamic and reciprocal nature of the engagement, emphasizing the vital role of youth in maximizing the societal and scientific benefits of the project.

Increased open data

An additional element is whether YouCount can contribute to future knowledge generation by providing open data from the multiple case and evaluation study to be used by other researchers. While this is something more feasible in the natural sciences, where large amounts of quantitative data are gathered, the **heterogeneity of mainly qualitative data** generated in YouCount through interviews, focus groups/workshops, mapping and creative methods is likely to pose a challenge in this regard. As reflected in one of the chapters of the YouCount handbook (Norvoll, 2024) this also partly stemmed from the struggle to find a **good balance concerning the rights of young people to have a say in what matters to them vs confidentiality needs** and correct personal data procession according to the General Data Protection Regulation (GDPR). These challenges were particularly obvious for the YouCount app. A key learning stated by Norvoll (2024) is “the importance of considering when and how social data can be made openly in a meaningful way during the project process. Too premature open data may not give meaning or be incorrect so there may be better ways of being transparent and communicative in an early phase of the research process.”

As a result, as Lorenz et al. (2023) point out, YouCount can offer open data through the ten case study reports, the evaluation substudy's data (including the process survey results, interviews, and focus group results) and the app data, which are classified as primary data, and through the deliverables based on such primary data, which are classified as secondary data and are already

available in the YouCount website and Zenodo. Whether and how this data is used remains to be seen.

4.2. Societal dimension

Outreach to disadvantaged groups

As mentioned before, one of the main characteristics of YouCount is its focus on working with a group of disadvantaged youth in terms of living in deprived areas, migrant/refugee background and/or disability. As such, it evidences the potential to foster societal engagement with groups that are often left behind from the usual mechanisms of participation. The impact report (Lorenz et al., 2023) specifies that, through the 10 cases, the project has reached 892 youth who have been involved in different ways throughout the project: as co-researchers, imputing data on the app, participating in the dialogue forums... Their active involvement in producing scientific research has been discussed in the previous section. Some of the challenges discussed above concerning co-creation are particularly amplified when working with this group of citizens, particularly with regard to ethical considerations that have to be taken into consideration given their vulnerable situation. However, **CSS can indeed constitute a means to reach out to these disadvantaged groups** and, while doing so, contribute to enhance the links between science and society as well as produce some benefits at societal level and, particularly for the individuals involved as will be discussed in the individual dimension subsection below.

That is relevant because what arises from the YouCount experience is that the immediate benefits that can be assessed at this stage primarily target the participants directly engaged in the project and their communities. This is one of the conclusions that Saumer et al. (2023, pp. 31-32) point out, i.e., that the original expectations about the potential for long-lasting societal through specific innovations and direct suggestions on how to improve the lives of the youth have not been fulfilled. However, these benefits reflect a sustained trend that emerges clearly when approaching societal challenges through CSS, and if extrapolated and scaled up, could reach higher levels of societal benefits, though reaching out the wider society or part of it.

More competencies among locals and citizens

One of the expected benefits of CSS is that it increases the competences of the participants so they can contribute to positive changes in their environment. The local research teams noted a significant shift in the **attitudes of young citizen scientists towards their communities and stakeholders**. This transformation not only made participants more confident within their groups but also empowered them to engage in meaningful discussions with stakeholders. The enhanced communication skills contribute to improved societal interactions. Moreover, the project had a lasting impact on the youth, as they expressed a desire to continue creating positive change even after the project's conclusion. This indicates the potential for sustained societal engagement led

by motivated and empowered young individuals, contributing to long-term community betterment. As Butkevičienė and Borgström (2024) expressed it: “The young citizen scientists who participated in the research teams in YouCount were enthusiastic about their experience with citizen social science and about the opportunities it offered them to engage in promoting changes in their communities”.

As the project evolved into national workshops, the perceived most meaningful benefits shifted to the learning opportunities provided. This underscores the **societal value of continuous learning and growth for all parties involved**, including the youth, researchers, and stakeholders, contributing to a more informed and engaged society. In words of one of the young co-researchers quoted by Butkevičienė and Börgstrom (2024): *“I would like to see more citizen social science projects involving young people, because there are many things to improve, and we can contribute”*.

The results from the process survey for the co-evaluation of CSS analysed in the impact report (Lorenz et al., 2024, pp. 51-52) show that participants that had been involved for longer time in the project felt that **the project could help them to engage more in society and in politics, know more about their rights, be more involved in the local community, belong more to the community and increase their local network**. Although these can be seen as individual outcomes (and are, hence, analysed in section 4.5 below) they could potentially have wider benefits on society. Still, these potential benefits cannot yet be assessed.

The project also facilitated a noteworthy change in dynamics where conversations within the Living Labs were actively led by young citizen scientists. This empowerment of the youth in guiding discussions and decision-making processes reflects a positive societal shift, **giving voice and influence on the younger generation** (this is stated for example in Pataki et al., 2023).

As such, YouCount emerged as a **valuable resource supporting socio-cultural inclusion** and empowerment at both individual and collective levels within local communities. By fostering social dynamics that are accepted by the community, the project contributed to creating an inclusive societal environment (Butkevičienė and David Borgström, 2024 highlight the potential of CSS experiences to support to support collective empowerment into local communities)

Increased interest and public engagement in science

Regarding increased interest in science in the society, the project has shown that it can engage several hundred youth in scientific projects. The results from the process survey presented in the impact report (Lorenz et al., 2024, pp. 51-52) also show that those who had been involved for longer time in the project had **more interest in science in general**. Still, given that there has been a large amount of dropouts, it is not clear whether there is a bias effect and those who have

remained longer in the project had a stronger interest in science that was part of their original motivation

New/better policies for social inclusion

Fourth, **interactions between youth and local stakeholders in YouCount were recognized as innovative by all parties involved**. These interactions served as a unique and positive contribution to societal engagement, fostering creative collaborations and improving the overall effectiveness of citizen social science initiatives. According to the impact report (Lorenz et al. 2023, pp. 69-70), the researchers indicate that 25 initiatives at case level address better community plans or development strategies and that 4 local policies and 2 initiatives of local social services for migrants have been improved, but most seem to be possible outcomes that might take place in the future. Some of the changes, particularly with regard to future changes in policies, would happen after the time of span of the project and, while the stakeholders evaluate the insights as valuable and both professional researchers and YCS hope that policymakers and other stakeholders incorporate this knowledge into their future projects, this cannot be assessed yet.

4.3. Democratic dimension

YouCount's initial ambition was to break down traditional barriers between researchers and the public, empowering individuals to contribute to and shape the scientific and societal agendas. The democratic dimension looks at in what extent the diverse perspectives and knowledge of citizen social scientists are considered in the research process as well if there is an increased participation of youth in policymaking and the creation of social innovations that address social inclusion (the topical knowledge in YouCount).

Increased inclusiveness in science: youth participation in CSS

In the introductory chapter of the Handbook of Youth Citizen Social Science, Canto-Farachala et al. (2024b) reflect on the democratic dimension of CSS. They acknowledge the deliberate and conscious effort made in YouCount to democratize and enhance inclusivity in scientific processes. On the one hand, the approach in YouCount includes **bringing in underrepresented youth populations**, and emphasizing reflexivity, inclusivity, and responsiveness at every stage. Several project outcomes evidence this effort. Some examples include conceptual, innovative, evaluation and ethical framework for youth citizen social science by Butkevičienė et al. (2021); the practices to empower young co-researchers in citizen social science emerging for YouCount activities compiled by Murray et al. (2023); and the experiences of using citizens science as a tool for exploring young people's perspectives on social inclusion by Pataki et al. (2023). On the other hand, despite the evidence of YouCount having worked towards democratising science, it needs to be acknowledged that **a lot of effort on recruitment and engagement** has been done in the

project, and that according to the research teams, the case studies were **lacking to have enough good engagement strategies** to reach out those more far away from science.

A notable aspect of the democratic dimension is the recognition and naming of **ethical challenges** inherent in high co-creation levels in CSS. The findings not only identified these challenges but also offered practical suggestions on how to mitigate and handle them effectively. First, particular attention needs to be given to the well-being of young co-researchers deeply involved in the research teams. Second, to reinforce ethical considerations and provide guidance throughout the project, an ethical board of experts was established in YouCount. The involvement of external experts signalled a commitment to ethical practices and further strengthened the democratic ethos of the CSS approach adopted in the YouCount project. See for example the establishment of collaboration with the local data protection office/ethical approval institutions and the Safety and Ethics Board (SEB) as well as procedures and status of formal ethics approvals of the multiple case- and evaluation studies of YouCount (Ridley & Norvoll, 2022).

Increased participation of youth in policy-making and community development

When it comes to foster youth participation in democratic life, Butkevičienė and Borgström, (2024) in the Handbook of Youth Citizen Social Science, acknowledge that ‘the combination of youth citizen scientists and stakeholders, is the gold of a co-creative approach’ and thus it illustrates how CSS in **YouCount has included diverse perspectives valuably in co-creative policymaking and social innovation**. However, when analysing whether CSS in YouCount managed to co-create social innovations and policymaking, some findings indicate that the direct effects on policymaking are not immediately apparent, because it is either too early to observe changes, that require more time to materialise, or because the direct attribution on policymaking has not been identified beyond the described recommendations and proposals. Nevertheless, several cases have reached a stage where the potential effect on policymaking affecting young people is foreseeable (see Lorenz et al., 2023).

In terms of the level of involvement, the project's outcomes demonstrate **active engagement with youth citizen scientists**, as evidenced by the level of involvement of participants in the living labs (Lorenz et al., 2023). The project engaged young citizen scientists and stakeholders in the establishment of nine living labs with 90–135 stakeholders and 18 dialogue forums involving C-YCS and community stakeholders.

In terms of local policy development, one of the benefits that YouCount stresses is the potential to **generate innovations that serve as building blocks for future changes in policymaking**, reflecting the progressive impact of CSS in fostering meaningful engagement and transformation within the community (see Lorenz et al., 2023). There is a wide acknowledgement of the significant contribution of YCS in collecting, structuring, and systematically examining crucial information

about the research topic across the YouCount findings (see for example Lorenz et al., 2023; Pataki et al., 2023; Murray et al., 2023; Ridley et al., 2023).

However, some achievements show the Y-CSS potential to inform policymaking that go beyond 'setting the scene' for future policymaking: two policy briefs informing European and local policymaking; stronger collaboration between young citizen social scientists (youth council) and local stakeholders municipality in the Swedish, UK and Norwegian cases.

4.4. Economic dimension

Financial costs

Embarking on a comprehensive exploration of the costs and benefits associated with the Youth Citizen Social Science initiative, this analysis is rooted in the framework of the YouCount project, funded by Horizon 2020. The project total funding was €2.2 million, a budget that was split as follows: €1.5 million corresponded to total direct costs for personnel (accounting for 234 work hours measured in person months), €306 thousand other direct costs (including about €113 thousand for travel) and the rest being indirect costs.

At the time of writing this report, YouCount nears its completion and the ongoing effort to furnish a precise overview of actual costs continues. While the final financial report remains pending, insights gleaned from the first periodic report and internal reporting, accessible to consortium partners in the project's 27th month, reveal a notable trend. It becomes evident that, on the whole, partners invested more person months than initially anticipated, with many exceeding the allocated resources for the project.

As described in several deliverables (e.g., D4.1 Evaluation study, D4. 4 Impact and D5.4 Handbook for Y-CSS), conducting co-creative youth citizen social science and including partly underrepresented youths and communities are found to be work intensive. There is considerable work with collaborative and creative methods compared to more traditional kinds of social sciences and the risks of overburdening researchers as well as the young citizen scientists are described. The work-intensive nature is also seen in the use of resources where a considerable part of the person month is used for the case study. Several partners also needed to include junior researchers to increase numbers of person months. This was also seen as reasonable given the many practical tasks following this kind of research. In addition, the cases used resources to other direct costs when it came to meetings with youths and local stakeholders (such as living lab meetings), incentives to engage the youths and some travel costs on local level.

This suggests that initial calculations might not have accurately accounted for the comprehensive effort exerted by consortium partners, emphasizing the importance of ongoing adjustments and adaptability in CSS. The disparity between projected and actual efforts underscores the dynamic

nature of such endeavours, necessitating a flexible approach to resource planning and allocation. However, increasing or modifying resource allocation is an impossible task as funding schemes remain invariable over the project implementation.

Potential economic implications of successful policy and interventions

While some CS projects might be designed with the idea of developing innovations that might directly open opportunities for business opportunities, this was not the case of YouCount. Even so, the social innovation developed in one of the cases in Hungary around a community garden resulted in the garden becoming a supplier of a vegetable box scheme in the nearby town, thus providing a source of revenue for the villagers. What is more, they are now connected with two networks of agricultural innovation (the permaculture movement and the environmental urban consumers) that might amplify the economic results in the future (Pataki, Czeglédi and Butkevičienė, 2023). The Norwegian case also reported some direct economic benefits for some of the youth who got part-time jobs through their participation in the project and who also developed a new framing of a youth desired job and came up with several social innovation ideas, such as a youth social inclusion label in the window for employers that have youth at work, to design a dedicated job platform for youth or to secure tax relief for companies that hire youth actively (Pataki et al., 2023). If implemented, these ideas might have a positive economic impact but, as discussed elsewhere whether the policies and plans are actually put into effect is still to be seen.

4.5. Individuals' dimension

YouCount places a significant focus on fostering positive benefits on various participants, including citizen social scientists, professional researchers, and stakeholders. The research results, encompassing reports, papers, and conference proceedings, reflect this deliberate focus on promoting benefits at the individual level. YouCount, across its different work packages, explicitly attends to the well-being of participants.

In essence, YouCount is actively engaged in proactively stimulating positive outcomes on individuals. Departing from this initially deliberative exercise of generating benefits in individual, the YouCount research also digs into the tensions that this approach brings to CSS approach and the individuals themselves.

According to the impact assessment study (see Lorenz et al., 2023), CSS not only enhances individual capacities such as education and skills but also brings about positive changes in attitudes and behaviours. Moreover, it generates diverse social outcomes, including strengthened networks, increased social capital, and heightened citizen engagement, highlighting the multifaceted benefits of CSS at the participant level. It generally shows the broader social effects

of CSS. The findings from YouCount within each of the categories of the multidimensional framework are analysed below.

Knowledge skills and development

Under this category we firstly present some of the results that have to do with knowledge and skills development with regard to science. By analysing the process evaluation survey and comparing the responses of YCS that have been engaged in the project with those from more recent participants, the impact report (Lorenz et al, 2023) concludes that the project has contributed to increase both **their knowledge about and their interest in science** and this constitutes a clear benefit of the CSS approach, as this had not occurred if they had not been directly involved in the training and research activities. This is confirmed in the evaluation report (Saumer et al, 2023) that points out that **theoretical training was harder to achieve than “hands-on” practical training**, with creativity and gamification being mentioned as the most engaging means of teaching science. However, the report also indicates that, in many cases, **scientific knowledge was simply not relevant or interesting**, especially for vulnerable or marginalised youth who might have more pressing concerns. It is interesting, though, that for some of the youth the participation in the project can really make a difference in terms of **stimulating scientific careers** because, as Pataki, Czeglédi, Ridley et al. (2023) describe, the lack of representation and references of people with a different background might exclude them from the scientific arena.

With regard to **cognitive, social and functional competences**, both the impact report and the evaluation report acknowledge that YCS have increased their skills, something that is recognised by the YCS themselves and by the researchers, who can observe the evolution of the youth. These increased competences are once again the result of the training but also of the CSS approach that allows them to put the skills into practice in a real setting. However, as indicated by some of the researchers and reflected in the evaluation report, these are short term impressions, and they should measure again in the future to really estimate potential educational outcomes.

Lorenz et al. (2023) draw attention to the fact that **researchers also benefit from the participation in the project by gaining capabilities** to adopt a youth-centre approach, implementing new practices that go beyond their traditional methods. It gives them the opportunity to develop new skills (such as empathy, facilitation, listening, managing uncertainties, etc.) that might not be in the skill set of conventionally trained social science researchers (Pataki et al., 2023). This is particularly true for several researchers in this project who might be more or less versed on PAR but have not been involved in citizen science projects before or who had not previously worked with the youth. It has allowed them to experiment with new creative techniques.

Employability

A few of the YCS have already expressed that the participation had positive financial outcomes as their participation opened more **opportunities in the job marked**, for example by receiving job-offers in the local community or getting a new job based on the references (Hagen et al., 2024) from researchers. CSS – opening doors to academia and scientific skill making– may thus have a potential concerning youth employment that might become more apparent in the future.

Civic engagement, empowerment and social capital

The empowerment of the young YCS who have participated in YouCount is one of the main elements that arise from the analysis on different work packages in the project. As highlighted in the meta-report on the drivers on social inclusion (Pataki, Czeglédi, Ridley et al., 2023), **empowerment has occurred through three channels:** through the knowledge and insights developed by the case studies (as empowerment is related to social inclusion, the focus of YouCount research topic), through the case studies research design and use of participatory approaches and taking place beyond the case studies. The last two channels are particularly related to the potential of citizen science for empowerment.

Regarding case study design, **the use of participatory methods in living labs was credited for contributing to empowerment by generating “safe spaces”** where they could meet with other persons meeting similar challenges where they all could be “seen and heard”. These “safe spaces” gave them the opportunity to engage on quality communication that went beyond simple consultations (which are more common in other research approaches in which the individuals have a more passive and disempowered role as providers of information). As such, the YCS felt empowered in the relation with researchers (making suggestions and contributing to the research design) and stakeholders (which allowed them to offer unique viewpoints and expressing requests about aspects that need to be improved).

As to the elements of **empowerment that occur beyond the case studies**, the interaction with stakeholders allowed them to develop their own confidence; the exchange information with other youth help them to collectively address some of the challenges they face in their day-to-day life; the different means that were used to disseminate the learnings from the project (such as a collectively produced video) or through the way they were portrayed in the local news helped them to feel empowered in the context of the wider community.

The evaluation report (Saumer et al., 2023) also highlights that empowerment at the individual micro-level and at the collective macro-level were reported in all case studies. As a consequence of the CSS approach, YCS were **treated as experts by stakeholders and frequently felt heard**. Investigating their own surroundings help the YCS to own them. The combination of the networks that they have created, the skills they have developed and the certificates they have obtained

increase their **future opportunities for education and work, thus becoming an empowering asset.**

Examples of YouCount benefiting participant in **increasing their social networks** can be found in Butkevičienė and Börgstrom (2024) where, based on the impact assessment findings, they see that youth involved in CSS reported gaining new opportunities for participating in discussions and working spaces that they typically do not have access to, leading to a strengthening of their social networks. In the same vein, youth participants in YouCount felt genuinely included, not just as passive participants but as co-researchers with the ability to affect decision-making. The researchers were open to listening and adapting to the youth's perspectives (see Canto-Farachala et al., 2024a)

However, youth participants in YouCount found themselves in a mediating role, **feeling like both "data" and "data gatherers," which complicated their involvement** in the project (D.4.1: Saumer et al., 2023: 27).

Despite these challenges, a shared **sense of pride and achievement** emerged among participants, with youth expressing pride in representing the research project they had been part of. Co-creation efforts, while ideal, can lead to time-wasting and overburdening, particularly in the initial stages of the process.

Despite these benefits, and, even if as the process unfolded, the social component, including relationship building, became a more significant motivator, **being a citizen social scientist requires time and effort**, and, following some of the discussions above, paying them hourly salaries is recommended to provide them with a fair reward. Financial remuneration is also seen as a way to affirm the value of young citizen scientists, thus contributing to a virtuous circle of empowerment.

6. Conclusions

The YouCount project navigated a complex terrain throughout its different research sub studies and project activities, while also focusing on delivering valuable scientific outcomes and fostering youth engagement in science, policymaking, and social innovation. The journey underscores the importance of strategic resource allocation, optimization of co-creative CSS approaches, and a thoughtful balance between scientific rigor and communication activities. As Y-CSS continues to evolve, the lessons learned from projects like YouCount serve as guideposts for future endeavours, ensuring that the exploration of youth citizen social science remains both impactful and sustainable in the ever-evolving landscape of social science research.

In the realm of social research and the emergence of Youth Citizen Social Science (Y-CSS) has brought forth a range of benefits (the so-called 'Pros') and costs (the so called' Cons').

Before delving into the analysis of the evidence provided by YouCount regarding the benefits and costs of conducting youth citizen social science, it is crucial to recognize that the adoption of a co-creative approach like Y-CSS aligns more closely with Mode 2 knowledge production, as defined by Gibbons (1994). In contrast to the more disciplinary Mode 1 knowledge production, Mode 2 operates within the context of its application. It is characterized by transdisciplinarity, heterogeneity, and non-hierarchical structures, taking place in flexible research teams that adapt to the evolving task. Quality control is undertaken by the participants themselves. Consequently, in this form of knowledge production, the collaborative nature and the uncertainties inherent to negotiations among participants can result in advantages and disadvantages, that are by far different from a more disciplinary research approach in Mode 1.

Researchers acknowledged the work-intensive nature of co-creative Y-CSS, with concerns about potential overburdening. The co-creative nature of youth citizen social science introduces a tension when compared to traditional social sciences, particularly in the time-intensive planning stages and in the collaborative efforts within the projects. Balancing the thoroughness of co-creative approaches can potentially influence traditional scientific production.

The analysis undertaken in this document leads to the following discussion that summarise the main arguments around the costs and benefits of youth citizen social sciences.

1. Participating in youth citizen social science (Y-CSS) yields potential benefits for the individuals involved. First, engaging in Y-CSS contributes to the development of cognitive, functional, and social competencies among citizen social scientists, fostering a well-rounded skill set. Second, for traditionally trained social science researchers, involvement in Y-CSS introduces a fresh skill set, broadening their capabilities beyond conventional research methodologies and youth-led co-creative exercises. Third, youth citizen social science acts as an empowerment process, empowering citizen social scientists to actively participate in the research process, fostering a sense of ownership and agency. Fourth, participants in youth citizen social science experience a profound sense of pride, stemming from their meaningful contributions to the research and the positive impact their involvement has on the community. Fifth, the social component of youth citizen social science serves as a powerful incentive, promoting collaboration and teamwork. The sense of community and shared purpose enhances the overall experience for participants. Finally, the involvement in Y-CSS opens doors to increased future opportunities for participants, providing them with valuable experiences and networks that can positively influence their personal and professional trajectories.

However, the combination of being both data gatherers and research objects introduces challenges for young citizen scientists, creating complexities and potential conflicts within the dynamics of the research process. In addition, as it is usual in co-creative approaches, young citizen scientists may experience a sense of time wastage or overburdening due to

the demanding nature of the research, making it challenging to balance participation with other responsibilities and potentially leading to feelings of stress. In addition to that, the issue of payment for young citizen scientists raises concerns about fair compensation for their contributions. Inadequate remuneration may act as a deterrent, especially for younger participants who may require financial support.

2. Living and working closely with Youth Citizen Social Science participants over an extended period offers a more profound understanding of their views and daily life context. This prolonged engagement allows for richer insights into their experiences and fosters meaningful connections. Nevertheless, it's essential to consider potential drawbacks. Y-CSS may face challenges in providing significant value-added data and theoretical insights compared to traditional research methods. The effectiveness of Y-CSS in surpassing conventional techniques becomes a point of scrutiny, raising questions about the justification for the investment of time and resources.
3. Youth citizen social science stimulate new ways of collaborating, communication and conducting research for generating new social innovations. But, if focusing only on the processual aspects, such as building long lasting relationships, or new encounters for collaborations as defined by Pataki, Czeglédi and Butkevičienė (2023) and not emphasising on generating social innovations, may reduce the innovation capacity of youth citizen social science.
4. New CSS digital tools, such as the YouCount app study, have the potential to break new ground, contributing to new richer and contextual social data and unique insights to social issue. YouCount findings also provide insights on the different alternatives and procedures to consider when approaching the technology as a means for Y-CSS. While this is something more feasible in the natural sciences, where large amounts of quantitative data are gathered, the heterogeneity of mainly qualitative data generated in YouCount through interviews, focus groups/workshops, mapping and creative methods is likely to pose a challenge in this regard. Moreover, costly procurement and work intensive tasks (recruit, conduct the research, data analysis and gain ethics approvals) associated to these tools development, can overburden the youth citizen science projects.
5. Collaborating with youths and local stakeholders in Y-CSS enhances science-society relations, fostering a more open and inclusive scientific environment. Nevertheless, the resource-intensive and time-consuming nature of practical research may contribute to a reduction in the quantity of scientific writing. Striking a balance between active engagement and rigorous scientific writing becomes a tension in youth citizen social science.
6. One significant advantage is the observed positive changes in attitudes towards the community. Through active participation in youth citizen social science, individuals develop a deeper understanding and connection to their community, leading to a shift in perspectives and attitudes towards engaging in their communities. This approach fosters youth-led conversations as they empower young individuals to take the lead in discussions,

ensuring that their voices are not only heard but they also play a central role in shaping the narrative around community issues. Thus, they provide substantial support for inclusion and empowerment within the local community. Moreover, by involving youth in decision-making processes, it fosters a sense of belonging and agency, empowering individuals to actively contribute to the improvement of their community. Nevertheless, although these benefits can reflect a sustained trend in the local communities, the scope of the benefits can be limited. It needs to be seen if these benefits can be extrapolated and scaled up, and thus, if they can reach other groups of people and stakeholders in society.

7. Engaging in Y-CSS supports more informed policymaking at the local level, leveraging insights gathered from active community involvement. However, there may be limitations in its contribution to policy development at the national and European level, despite the consortium efforts in disseminating YouCount findings at this level (see for example, the Policy Brief on youth citizen social science by Lorenz et al., 2024). The localized focus of YouCount's cases may result in outcomes that are specifically tailored to the unique needs and dynamics of the local community, potentially limiting their applicability or resonance at a broader, national scale.
8. Participating in youth citizen social science ensures that the voices of the youth are heard and provides opportunities to have a meaningful say in local community settings. However, despite these efforts, there are limited benefits in terms of policy changes. Therefore, it might be the case, that alternative approaches to deliberative processes prove to be more effective in driving substantial transformations in policy.
9. Youth citizen social science contributes to the development of novel means for citizen engagement at both local and EU levels. However, facilitating this kind of democratic work and engagement can be time-consuming for researchers. The commitment required to effectively engage with citizens, especially at the EU level, poses challenges in terms of time allocation, associated travel costs, particularly for EU-level engagements, further contributing to the resource-intensive nature of this approach. Addressing the time and financial constraints is crucial especially when operating on a broader geographic scale like the EU.
10. The dynamic nature of CSS demands a flexible approach to financing. The traditional model of public competitive research funding may not align seamlessly with the evolving needs and fluidity of Y-CSS projects. The rigid structure of such funding mechanisms may pose challenges in adequately supporting the dynamic and responsive nature of community-driven research initiatives. Addressing these financial considerations is essential to sustain the positive outcomes of Y-CSS initiatives. Implementing flexible financing models and carefully monitoring resource allocations can help optimize the impact of Y-CSS while ensuring responsible and effective use of resources.

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