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REVIEW

REVISED An overview of civic engagement tools for rural communities

[version 2; peer review: 1 approved, 2 approved with reservations, 1 not approved]

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Abstract

In this research, we explore the role of civic engagement platforms as tools designed to connect various groups in rural areas for collaborative advancement and to support sustainable growth in their communities. We examine these platforms' essential features and influence on rural communities, conducting an overview to identify rural areas' primary challenges and the functionalities needed to address them. Our findings reveal that the long-term capability of these civic engagement platforms can bring beneficial changes in rural territories by offering a unified way of communication, collaboration, and decision-making. The study concludes with suggestions for future research.

Keywords

Smart Communities, Smart Villages, Civic Engagement

This article is included in the Digital Twins collection.

Open Peer Review

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REVISED **Amendments from Version 1**

We have revised the manuscript to remove repeated content and improve clarity. Section 2 now includes details about existing systems. The literature review has been rewritten as continuous text with references, except for original contributions based on our experience developing platforms for rural settings.

A separate section now presents the findings, and the final section has been adjusted to outline the main contributions and open questions. We have also incorporated examples of civic engagement tools from other environments, explaining how they could be adapted to this work.

The original title remains unchanged to maintain consistency with prior citations and downloads. Additionally, we have reviewed related research and adopted common practices, addressing gaps where existing tools do not meet the needs of smaller communities.

Any further responses from the reviewers can be found at the end of the article

Introduction

Recently, there has been an increasing interest in civic engagement solutions to facilitate active participation in communities (Martinez-Gil *et al.*, 2022). Despite the abundance of platforms available for civic engagement, their application in rural areas remains unexplored (Whitacre & Manlove, 2016). Our experience suggests that these tools can effectively support collaborative strategies, helping rural communities address challenges they are currently facing, like depopulation and diminished public services.

In the context of this work, we define *smart community* as a rural-based network whose members are connected by shared interests. At the heart of such a community is the concept of a *smart village*, which we have previously shown to be a rural settlement that leverages technology to improve residents' quality of life or economic opportunities (Martinez-Gil *et al.*, 2019). This includes access to digital services and other aspects of importance in the rural world, such as agricultural automation, renewable energy, etc. This can usually be achieved through technologies such as IoT (Liu *et al.*, 2019) and other emerging approaches (Hoch *et al.*, 2024). Therefore, this concept aims to facilitate technology to overcome critical challenges and facilitate rural territories' economic growth and sustainability (Rozanova *et al.*, 2008).

However, the smart village concept is continuously evolving, and developments in this field are in constant flux. In this way, technology dedicated to civic engagement holds considerable promise (Quinn & Ramasubramanian, 2007). Civic engagement is about individuals participating in their communities, and technology can make this participation more accessible and practical (Bringle *et al.*, 2011). One crucial yet often neglected aspect is developing civic engagement technology in rural communities, which frequently lack technological resources and face critical challenges. This is different, for example, in the context of cities where more research has been carried out (Deng & Fei, 2023) (Korten, 1996) (Romano *et al.*, 2016) (Smith, 2014), perhaps because of the abundance of data and the potential economic benefits of operating in such environments.

In our opinion, these platforms should strengthen ties between residents and their rural communities, giving them a voice and promoting dialogue on issues affecting their lives (Min, 2007). They should offer the possibility of overcoming recurrent obstacles in rural areas and help residents decide about their community's future (Mindel *et al.*, 2016). Therefore, civic engagement platforms could lead to collaborative strategies for addressing many rural challenges (Thompson, 2021).

Our goal in this study is to provide an overview of the civic engagement platforms in rural settings. We aim to contribute to developing these platforms and outline their significance in rural communities. To this end, we have reviewed existing literature on civic engagement platforms and provided the following contributions:

- This research examines the critical features of civic engagement platforms, focusing on rural areas. It will assess how these platforms can support civic engagement. This study will provide insights into the practical challenges encountered while implementing these platforms and propose effective solutions, as detailed in Section 3.
- Additionally, this research will identify the challenges associated with these platforms and discuss their potential impact on rural communities. It will investigate how technology can help promote civic participation, which will be elaborated in Section 4.
- Furthermore, this study will address these platforms' potential risks and disadvantages, including concerns about the possibility of their misuse for harmful purposes. These issues will be thoroughly explored in Section 5.

Beyond the sections above, Section 2 will critically review current civic engagement tools and evaluate their effectiveness in rural settings. Section 6 concludes our overview by summarizing the most important findings and proposing a clear direction for further research.

State-of-the-art

The literature identifies several strategies to prevent recurring problems by making these areas more attractive and viable places to live and work (Zavratnik *et al.*, 2018). These strategies include improving access to education, healthcare, and other essential services (e.g., sustainable agriculture, rural tourism, or promotion of local businesses). In addition, initiatives encouraging and supporting remote work could help sustain those rural communities. Several works have addressed this problem, building upon foundational approaches to the challenge (de Zúñiga & Valenzuela, 2011) (Hall, 1986) (Rozanova *et al.*, 2008) (Thompson, 2021). However, more studies still need to be conducted on the potential impact of using civic engagement platforms in a rural context.

In addition, it is also necessary to note that civic engagement platforms are online platforms designed to increase people's involvement in collaborative processes (Cvar *et al.*, 2020). These platforms provide a space where people can express their opinions, share their experiences, and discuss different issues that they consider necessary (Datyev *et al.*, 2020). Therefore, civic engagement platforms have the potential to become an essential tool for enabling people to participate in many short-term but also long-term strategies (Desouza & Bhagwatwar, 2014).

An essential requirement of these platforms is that they should be designed to be inclusive so that all backgrounds are represented and can participate (Chan, 2018). This can increase representation and guarantee that the opinions of minorities are also considered. Furthermore, these platforms can shed light on the decision-making processes and help provide a space for fruitful discussions.

Another essential aspect of civic engagement platforms is that they can promote a sense of community among people (Alayed & Lutters, 2015). The idea is to help increase social cohesion (Boulianne, 2023). This is important as it can promote a sense of belonging and responsibility for the community's well-being (Smith, 2014).

Based on our literature analysis, it is possible to state that a civic engagement platform for smart rural communities should promote rural engagement, ensuring accessibility to those with limited internet access or digital literacy (Harding *et al.*, 2015). This could be done through offline tools and digital training (Boardman *et al.*, 2011). It should cultivate a community spirit, enabling rural residents to connect and discuss local matters. In this sense, people should be encouraged to contribute (Hofmann & Pappas, 2021). It should also promote a data-driven approach and gather insights on rural needs and preferences. Although optional, its integration with local government could also fill the gap between rural stakeholders and their elected officials.

Other interactive features like surveys, polls, and forums can facilitate decision-making. The platform should also recognize linguistic diversity and support multiple languages, ensuring inclusivity (Chen *et al.*, 2012). Lastly, it should also deliver relevant content on critical issues such as local economic, environmental, and social matters directly impacting rural life.

In addition to these core features, a civic engagement platform for smart rural communities should be user-friendly, secure, and accessible on various devices, including smartphones and tablets; usually, web environments are easily adaptable to a wide variety of means of access (Thomas, 2010). These features aim to ensure that the opinions of the rural residents are considered. Additionally, focusing on more academically oriented studies conducted in this setting, we can point out the following:

Robertson comprehensively examines the complex interplay between social media platforms and civic engagement, exploring its historical origins, theoretical foundations, and the practical consequences of this relationship (Robertson, 2018). Furthermore, a similar line of research has also been extensively studied and analyzed by (Warren *et al.*, 2013).

Hanna and Ashby explored the design fiction to explore a new concept for a community engagement platform that blends various technologies. This process led the authors to modify their original design, focusing on a voice user interface and influencing the prototype's design (Hanna & Ashby, 2016).

Martinez-Gil *et al.* describe research on a framework for checking the smartness maturity level of villages in different areas, such as Mobility, Governance, Economy, Environment, Living, and People. The framework was intended to serve as a decision-making tool for various users and has been implemented and evaluated in several municipalities in the European Alpine space. The authors hope to continue improving the framework based on stakeholder feedback (Martinez-Gil *et al.*, 2019).

Beranič *et al.* discuss the development of a Digital Platform as part of the SmartVillages Project to aid the efficient transformation of rural areas into smart villages. Four key functionalities were identified for the platform: Self-assessment, Best Practices, Matchmaking, and Collaboration. The work outlines the specifications, interaction, and position of each functionality in the platform architecture. The platform can be adapted for use in other domains, such as cities, with the essential functionalities adapted to fit the smartness dimensions of the domain (Beranič *et al.*, 2019). This allows for customized smartness assessments and activities within any domain.

Martinez-Gil *et al.* presented a framework for data analysis in smart villages to help rural authorities transition to a sustainable digitalization model to address their challenges. The framework includes tools such as data collection, recommendations for good practices, fake form detection, village clustering, similarity calculation between villages, and ranking creation. The authors believe this framework would help facilitate the transition to smart villages and plan to improve it over time with user feedback. Future work includes collaboration features to reflect reality more accurately through data analysis incorporating input from various sources (Martinez-Gil *et al.*, 2020).

Martinez-Gil *et al.* also presented the development of a platform to help local authorities transition into a new village model using digitalization and technology. The platform is designed for various audiences, including individuals, local authorities, industry, policymakers, and researchers. The platform aims to provide tools for sharing experiences and data analysis to support informed decision-making (Martinez-Gil *et al.*, 2022).

Hassan discussed the concept of gamification and its potential application in civic engagement platforms. Gamification involves using innovative elements to motivate users in non-gaming contexts. The author proves that gamification could benefit civic engagement platforms, as they often need higher engagement levels (Hassan, 2017). Gamification is also the central topic of exploring what elements within mobile e-participation

(m-participation) tools contribute to increased citizen involvement in urban governance (Thiel, 2015a). The study specifically focuses on the potential of game elements like achievement badges, reward systems, and opportunities for social interaction. The goal is to understand how these elements foster continuous dialogue.

Last, Stojanova *et al.* examined over one hundred policies, projects, programs, or actions related to rural development. From this analysis, the research presents key findings and makes future recommendations. These insights aim to guide future research in the field and inform policymakers at local, regional, national, and EU levels. The work outlines the significance of rural development and its policy implications (Stojanova *et al.*, 2021).

Regarding the existing systems, and to name just a few, we can mention some examples such as Maptionnaire[1] that integrates residents' input and knowledge into rural planning efforts. It addresses challenges such as geographic isolation and limited internet access by using tools like phone surveys and community mapping to involve rural populations in the planning process.

Another interesting system is Granicus[2] that offers tools for government-citizen communication, including email and SMS notifications, social media integration, and a system for managing public information content. It also supports community participation through tools that gather public input via surveys, forums, and polls.

CitizenLab[3] provides a platform for participatory governance, enabling online consultations, collaborative decision-making, and activities such as idea submission, voting, and data analysis.

Rocket.Chat[4] is a secure, adaptable platform for civic engagement. It supports encrypted communication, offers customization options, and can be deployed on-site while integrating with third-party applications.

Finally, OpenGov[5], that although it is more focused on governance, delivers a cloud-based solution for government operations, focusing on budgeting, performance tracking, and citizen involvement.

These systems are not approached from a purely academic perspective, but they are still able to paint a tight picture of what you may encounter in terms of commercial solutions.

In the following section, we intend to detail a strategy for creating and implementing successful civic engagement platforms in rural areas. These solutions can guarantee that every community is integrated into the digital era with adequate support. Additionally, they are incorporating gamification techniques into civic engagement platforms in a manner that can significantly boost user retention.

Civic engagement features for Rural communities

Rural territories face several problems, including population decline and lack of access to public services. Such problems can lead to a potential decrease in quality of life (Stojanova *et al.*, 2022). The literature suggests that several strategies can be used to avoid these recurring problems. One of these strategies is implementing civic engagement platforms that promote a sense of community and ensure all opinions are, at least, heard. Below, we explain some of the features that would be desirable in this kind of platform.

Short-term/operational features

A smart community (at least in a rural context) is an ecosystem where digital tools directly address the complex issues of rural life. Smart communities are intended to improve quality of life, boost economic potential, and promote sustainability by facilitating access to information and creating the conditions for active community engagement. Table 1 shows us the features that, in our experience, civic engagement platforms should include:

Therefore, at least in the short term, the design of a civic engagement platform for a rural territory should be intensely focused on accessibility, customization, community engagement, and integrating real-time data and other digital tools.

Long-term/strategic features

Civic engagement tools should also offer resources that help rural communities engage with each other and external stakeholders. The goal is to achieve long-term and sustainable outcomes and processes in a community-context environment. Many long-term or strategic features should be implemented in this regard. Table 2 shows us the most important ones according to our experience, each with a description and its corresponding benefit:

Therefore, long-term/strategic features should cover principles like inclusivity and alignment to local norms, plans for effective engagement through customized communication, measuring engagement effectiveness using feedback mechanisms, and processes for identifying and analyzing the stakeholders' participation. Additionally, these platforms should address the execution of evidence-based community programs.

Gamification aspects

In the context of civic engagement platforms, the possibility of including gamification elements might help address the issue of low engagement levels that often undermine the intended purpose of these platforms (Escobar & Vásquez-Urriago, 2014) (Hassan & Hamari, 2020) (Jiang *et al.*, 2021) (Lehner *et al.*, 2014). Therefore, the goal is to motivate community members with game elements such as point systems, badges, or rewards to boost engagement levels (Thiel, 2015b). Table 3

[1] https://www.maptionnaire.com/

[2] https://granicus.com/

[3] https://citizenlab.ca/

[4] https://rocket.chat/

[5] https://opengov.com/

Table 1. Features, Descriptions, and Benefits of Rural Engagement Platforms.

Feature	Description	Benefit
Content customization	To allow users to customize the content that is more relevant to their interests (e.g., agriculture, education, and local news information).	Information that meets the specific needs and interests of the community members.
Community engagement	To facilitate collaboration and promote information sharing and participation in virtual discussions.	Improved communication and collaboration within the community.
Integration	To integrate with other tools like online marketplaces and provide a straightforward suite of services.	Access to many services improving stakeholder convenience and efficiency.
Mobile accessibility	To be accessible on mobile devices, enabling access to resources from anywhere.	High accessibility and convenience for community members on the go.
Multi-lingual support	To support multiple languages to ensure accessibility for non-dominant language speakers.	Broader accessibility and inclusivity.
Real-time data	To incorporate real-time analytics and relevant information on crop prices, diseases, or weather forecasts.	Relevant information that helps community members to make decisions.
User-friendly interface	User-friendly interface accessible to people with little digital literacy.	Easier adoption and use by a wider range of community members.

Table 2. Table of Community Engagement Features, Descriptions, and Benefits.

Feature	Description	Benefit
Community engagement principles	Guidelines that show how engagement should be approached, with a focus on the coverage of the needs of the community members.	It ensures that engagement methods are ethical and aligned with community practices.
Strategies for effective engagement	Tailored communication, shared planning, and ongoing conversations to help build strong relationships within a diverse community.	It improves the effectiveness of engagement efforts, leading to more successful and sustainable results.
Tools for measuring engagement effectiveness	Tools including surveys and KPIs designed to evaluate the extent and impact of the activities.	It provides quantitative and qualitative indicators to improve engagement strategies over time.
Identifying and analyzing stakeholders and their interests	Identifying key community members (sometimes called local heroes) and understanding their influence.	It ensures an inclusive approach to engagement, considering diverse needs and viewpoints.
Developing an evidence-based community program	Creation of community programs based on empirical evidence and best practices tailored to the needs of the rural community.	It increases the likelihood of program success due to the support of initiatives in local areas.
Implementing the program	Actual execution of community programs, involving resource allocation, activity coordination, and stakeholder collaboration.	It translates plans into action, leading to tangible improvements and progress within the community.

Table 3. Gamification Techniques for Civic Engagement Platforms for Rural Communities.

Technique	Description	How to Achieve it
Leaderboards	Using leaderboards to show top members supports healthy competition. This is effective for promoting a sense of community and recognition.	Implement a system to track user participation and contributions. Display a leaderboard to highlight top performers.
Challenges	Creating specific challenges for members. Completing these can earn points or rewards, increasing members' sense of accomplishment.	Develop a set of challenges relevant to the community. Reward members with points or other incentives for completing these tasks.
Storytelling	Encouraging members to share experiences related to the community. This can earn rewards and foster a sense of connection and empathy.	Create a platform feature for members to share their stories. Offer rewards for sharing and engaging with the stories of others.

summarizes the most relevant gamification aspects that, in our opinion, should be implemented in platforms of this kind.

When designing gamification strategies for rural engagement platforms, it is essential to consider rural communities' particular characteristics. Platforms should be created using intuitive design features, keeping limited internet access and low literacy rates in mind (Hodges, 2004). Additionally, gamification strategies should incorporate local cultural elements to engage the local population better. The purpose is to improve participation levels while creating a sense of community, competition, and accomplishment that encourages stakeholders to contribute (Rehm *et al.*, 2018).

Role of motivational techniques

Motivational techniques are important in driving participation (Bassanelli *et al.*, 2022). In the context of civic engagement platforms this is typically done across the three phases: co-design, co-development, and co-delivery. The principal aim is to use gamification to improve engagement and promote behavioral change within rural communities.

Co-design phase. Motivational techniques ensure active participation and idea generation in the co-design phase, where stakeholders collaboratively conceptualize and design sustainable innovation processes. Integrating gamification methods and tools incentivizes involvement and serves as a comprehensive data collection and analysis mechanism. Through gamification, stakeholders engage in activities that facilitate understanding various aspects crucial for sustainable innovation. This includes assessing the state of an area, identifying available resources, mapping the skills of citizens, determining desired services, and evaluating the overall needs and potential of a rural area.

Co-development phase. During the co-development phase, where the designed solutions are refined and developed, motivational techniques are instrumental in maintaining momentum and enthusiasm among participants. They continue to drive engagement by providing tangible incentives for continued involvement. Through gamification, tasks related to prototyping and testing are transformed into interactive and enjoyable experiences. Leaderboards, challenges, and stories incentivize active participation, fostering a sense of collaboration among stakeholders. Feedback loops and regular communication channels also ensure that participants remain motivated and invested in the co-development process.

Co-delivery phase. In the co-delivery phase, where the implemented solutions are deployed and evaluated, the significance of motivational techniques in sustaining community participation and facilitating behavioral change cannot be overstated. Gamification-based methods serve as catalysts for driving adoption and adherence, encouraging individuals to embrace innovative practices and solutions. Through a motivation toolkit, participants are equipped with the resources and incentives necessary to engage in call-to-action activities and actively effect meaningful behavioral changes. Feedback mechanisms, reward systems, and social incentives reinforce desired behaviors, empowering communities to take ownership of rural innovations and drive sustainable change.

Roadmap

Based on our experience, we have created a roadmap to build the ideal platform for boosting civic engagement in rural areas. Our strategic plan includes platform development, community participation, and measuring impact for long-term success, as shown in Table 4.

Figure 1 provides a flowchart illustrating the life cycle of building civic engagement tools in rural settings. This process is depicted through a series of interconnected nodes or processes, each representing a critical cycle stage. As can be seen, feedback loops must be frequent; otherwise, there is a risk of low participation of community members.

Limitations

Civic engagement platforms hold promise in facilitating participatory activities, particularly within rural areas that might experience restricted accessibility to conventional forms of civic involvement. However, several challenges must be faced to ensure these platforms are effective (DePaula *et al.*, 2018). Table 5 shows us some of the most critical obstacles to effectively operating such platforms.

Table 4. Phases in the Development of Civic Engagement Platforms for Rural Communities.

Phase	Description	Outcome
Platform Design	This phase should focus on accessibility and compatibility across different devices. Implementation of strict security and privacy measures to safeguard user information.	Accessible and secure platform focusing on user experience, especially for rural communities.
Community Engagement	Engagement and community participation are vital. Collaboration between platform developers and community leaders to address local issues and priorities. Strategies should consider rural challenges, like language barriers, and include diverse participation methods.	Strong community involvement and tailored solutions addressing specific needs and challenges of rural communities.
Sustainability	Focus on developing sustainable business models for long-term viability. Utilize public-private partnerships for support. Regular evaluations to measure impact and identify improvement opportunities	Long-term, scalable solutions with measurable impacts, ensuring the continuous relevance and improvement of the platform.

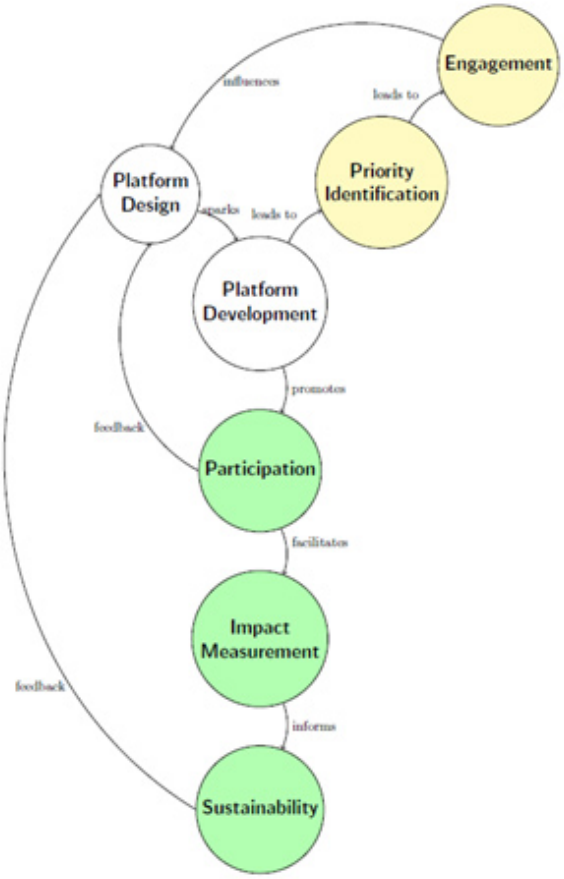

Figure 1. Life cycle concerning designing and deploying Civic Engagement Platforms for the rural world.

Risks and Limitations

Table 5. Risks/Limitations and Mitigations in Civic Engagement Platforms for Rural Communities.

Risk/Limitation	Description	Mitigation
Digital Divide	Not all rural areas might have reliable internet access to allow people to connect. This digital divide can further marginalize communities that are already disadvantaged (Purdy, 2017) (Whitacre & Manlove, 2016).	Implement alternative access ways such as offline capabilities and utilize local community centers for access.
Limited participation	Even if the infrastructure is available, platform participation can be low due to low digital literacy, lack of trust in the platform, or lack of interest. This can undermine the platform's effectiveness (AlAwadhi, 2023).	Provide digital literacy training, guarantee transparency and security of the platforms, and engage communities in the design of these platforms.
Contextual factors	Many rural communities have distinctive cultural and social contexts that may need to be better fitted to existing civic engagement platforms. Designing platforms tailored to these communities' needs is essential (Boulianne, 2023).	Collaborate with local leaders and community members to create and adapt platforms to local norms.
Bias and representation	Platform contents may be biased towards certain groups or may not adequately represent the diversity of their communities (Uslaner & Brown, 2005). It is necessary to ensure that the platform represents the entire community.	Actively seek diverse perspectives in the development phase, implement features that promote diverse profiles, and regularly review content and user feedback for biases.
Sustainability	It might require resources to maintain, which may not be feasible in rural areas with limited resources considering the long-term sustainability and exploring alternative funding models (Stojanova *et al.*, 2022).	Explore partnerships with NGOs, government agencies, and the private sector for support, and develop low-resource solutions.

Discussion

Solving the problems that we have seen requires close collaboration between platform developers, community organizations, and local authorities. Platforms should be designed with a clear focus on accessibility and the specific needs of rural areas, considering challenges like limited connectivity and lower levels of digital literacy. Tailored solutions make it easier for individuals in these communities to engage effectively.

Involving local communities from the start is essential. This ensures that the tools align with the realities of daily life and address practical concerns. Community organizations can function as intermediaries, providing valuable knowledge about local conditions and encouraging participation.

To ensure long-term success, it is important to monitor the use and outcomes of these tools over time. Regular assessment of participation levels and tangible benefits can guide adjustments to improve effectiveness. Training programs and ongoing technical support can further strengthen engagement and usability.

Sustained collaboration between all stakeholders is critical. When platform developers, community leaders, and local authorities work together consistently, they can create solutions that help rural populations and provide lasting benefits.

Ongoing research to improve engagement and participation in rural communities has enormous potential to support more effective collaboration. However, to fully realize this potential, it is vital to consider rural communities' particular context and conduct permanent evaluation and adaptation to ensure their sustainability and effectiveness.

Conclusions and future work

In this work, we have seen the potential benefits of implementing civic engagement platforms in rural areas, such as increased collaboration, better access to information and resources, and facilitating informed decisions. We have also envisioned several challenges and constraints in developing these platforms, such as the need for digital literacy and access to technology.

Considering rural communities' unique context is essential when designing and implementing engagement platforms and for ongoing evaluation and adaptation. We can envision prospective directions for research and development in this area, including the possibility of transferring the lessons learned from one platform to another. Current technology has the potential to support more effective and inclusive engagement in rural communities, but it is essential to consider the stakeholder's needs in the design phase.

Future research should concentrate on developing more accessible and user-friendly civic engagement platforms. These platforms must effectively engage a broader spectrum of people, including those with limited digital skills and technology access. Potential strategies involve the creation of tailored training programs specific to supporting individuals who use these interfaces; furthermore, it is essential to design intuitive navigation systems for enhanced user experience.

Another area of future research could be to assess the long-term impact of smart community engagement platforms on rural communities. This could include conducting research studies to examine changes in community participation and collaboration over time due to the use of these platforms. Research could help identify critical factors contributing to these platforms' long-term sustainability.

Data availability

No data are associated with this article.

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Open Peer Review

Current Peer Review Status: ✔ ✘ ? ?

Version 2

Reviewer Report 05 March 2025

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?

Stavros Sindakis
Hellenic Open University, Patras, Greece

The paper is a valuable contribution to the study of civic engagement in rural communities, highlighting the potential of digital platforms to enhance participation. However, it requires substantial improvements in theoretical grounding, methodological transparency, and evidence-based analysis. Strengthening these aspects will significantly improve the scientific rigor and impact of the study.

1. Is the topic of the review discussed comprehensively in the context of the current literature?
Analysis: The paper provides a broad review of civic engagement platforms, citing various sources and incorporating insights from previous studies. However, several gaps remain:

- Limited discussion on methodologies used in past research: The review lacks a structured approach in comparing existing civic engagement tools. There is no clear framework for evaluating these tools.
- Insufficient contextualization of key concepts: The definitions of civic engagement, smart villages, and smart communities are present but not deeply analyzed in relation to rural policy frameworks. The paper would benefit from stronger theoretical grounding in civic engagement research.
- Lack of reference to EU rural development policies: Since the study focuses on rural communities, incorporating references to EU smart village policies, rural sustainability strategies, or governance frameworks would strengthen its relevance.

Recommendation for Improvement:

- Introduce a comparative framework to analyze different civic engagement platforms.
- Expand the theoretical background by discussing smart community and smart village policies in-depth.
- Reference EU rural development policies to contextualize civic engagement in policy discussions.

2. Are all factual statements correct and adequately supported by citations?
Analysis: While the paper includes a substantial number of references, several factual claims are

not fully substantiated. For example:
- The section on gamification aspects states that gamification techniques "significantly boost user retention," but does not provide empirical evidence to support this claim.
- Some statements on the effectiveness of civic engagement platforms rely on author experience rather than peer-reviewed studies.
- The literature review does not systematically differentiate between theoretical contributions and empirical findings, making it unclear which aspects are evidence-based.

Recommendation for Improvement:
- Ensure that all claims about engagement effectiveness and platform benefits are supported by empirical research.
- Clearly differentiate between author insights and peer-reviewed findings.
- Provide case studies or specific examples where gamification has been successfully applied in civic engagement.

3. Is the review written in accessible language?
Analysis: The article is mostly readable, but several issues hinder clarity:
- Repetitive sections: Some parts of the text, particularly in the Introduction and State-of-the-Art sections, restate information unnecessarily.
- Overuse of technical jargon: While the article is aimed at an academic audience, some complex terms (e.g., "civic engagement frameworks" and "data-driven participation") should be better explained.
- Unstructured presentation: The bullet-point format in the literature review (now changed in v2) still lacks a cohesive narrative flow.

Recommendation for Improvement:
- Remove redundant sections and ensure each paragraph presents unique insights.
- Define technical terms when first introduced.
- Improve flow between sections by using clear transitions and topic sentences.

4. Are the conclusions drawn appropriate in the context of the current research literature?
Analysis: The conclusions summarize the findings well but lack critical reflection:
- The paper does not critically evaluate the limitations of civic engagement platforms beyond technical barriers.
- The potential risks of civic engagement platforms, such as data privacy concerns, digital exclusion, or misinformation, are minimally addressed.
- The recommendations for future research are too broad—it would be beneficial to suggest specific methodologies or case studies to explore.

Recommendation for Improvement:
- Include a critical discussion on the challenges of digital engagement beyond infrastructure and participation.
- Discuss potential unintended consequences, such as bias in engagement tools, privacy risks, or political misuse.
- Offer specific directions for future research, such as:
  - Investigating user behavior on civic platforms using mixed-method approaches.
  - Studying longitudinal impacts of engagement platforms on rural governance.
  - Examining the role of AI and automation in civic participation.

Is the topic of the review discussed comprehensively in the context of the current literature?
Partly

Are all factual statements correct and adequately supported by citations?
Partly

Is the review written in accessible language?
Partly

Are the conclusions drawn appropriate in the context of the current research literature?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: I specialize in innovation, entrepreneurship, knowledge management, and digital transformation, with a strong focus on academic publishing, ethical research practices, and technological applications in business and society. My expertise extends to civic engagement technologies, digital governance, and smart community development, making me well-positioned to provide a critical review of your paper.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 24 February 2025

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Magdalena Anna Zwolińska-Ligaj
Faculty of Economic Sciences, John Paul II University in Biała Podlaska, Biala Podlaska, LUBELSKIE, Poland
Danuta Jolanta Guzal-Dec
Faculty of Economic Sciences, John Paul II University in Biała Podlaska, Biała Podlaska, LUBELSKIE, Poland

The review addresses the current and significant problem of the role and possibilities of using digital technologies in the development process of rural communities.

The article is interesting but draws attention to several issues. It does not present a detailed research methodology and does not characterize the research material used. To ensure the

academic validity of the text, these elements must be taken into account. The reader can guess, for example, that the authors performed some sort of structured review of selected platforms or a literature review on platforms, the results of which are included in tables. However, there is no knowledge of the criteria for selecting platforms for analysis, the methodological approach used, and finally - the number of platforms analyzed. It is therefore difficult to assess the scientific value of such a study. Care should be taken to ensure that all statements are supported by relevant and up-to-date references.

Also, the theoretical review creates opportunities for enhancement. Key concepts such as civic engagement (appearing in the title of the work) were not explained with an indication of its relevance to the development of rural communities/smart rural communities, insufficient reference was made to the concepts of smart communities and smart villages (especially since these concepts were indicated as keywords). The theoretical basis/concept of policy formulation towards rural areas was not presented/indicated in the paper. It seems that by invoking the above concepts, it would be necessary to refer more extensively to the assumptions of the European Union's policy towards rural development - its conceptual/theoretical foundations (among others, sustainable development), including current definitions and key factors of rural development, including objectives, directions and, finally, policy tools with the indication of ICT technologies. Such a context seems necessary given the conclusions that can be drawn from Figure 1. It seems that Figure 1 needs more commentary.

Characteristics of civic engagement platforms need to be strengthened. It seems essential to provide a full characterization of civic engagement platforms, their features, diversity/types, possibilities for their use within the framework of rural development policy - how and by whom they can be used, what specific benefits can be obtained, the scale of their use and by which actors involved in the rural development process. The paper lacks references to research on existing platforms.

Additional remarks

1. It is advisable to indicate the sources of the objects included.

2. In some passages, the structure of the paper and the composition of the text are unreadable (formatting of sub-headings, section titles, placing objects directly after each other without commentary).

3. Consideration could be given to numbering the sections as there are references to section numbers in the introduction.

Is the topic of the review discussed comprehensively in the context of the current literature?

No

Are all factual statements correct and adequately supported by citations?

Partly

Is the review written in accessible language?

Yes

Are the conclusions drawn appropriate in the context of the current research literature?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: regional and local development, sustainable and smart development, innovation and entrepreneurship

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Version 1

Reviewer Report 06 November 2024

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Lynn Schofield Clark
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I believe that there is some value to this article, but it is written in a repetitive way that makes it challenging to read. Because of a lack of information about existing systems, it is difficult to parse the specific contribution of this article. The piece needs significant editing to improve its clarity.

For example, consider the section titled, State-of-the-art, which reads:

“One area where technology has the potential to have a significant impact is civic engagement (Quinn & Ramasubramanian, 2007). Civic engagement means individuals participating in their community, and technology can make this process easier and more accessible than ever before (Bringle *et al.*, 2011). Despite years of study and exploration, one area that has been overlooked is the technology for civic engagement in rural areas.”

This section comes immediately after the introduction, which already has provided a definition of civic engagement and already has noted the need for examination of civic engagement platform use in rural communities. The use of similar words (“one area”) and similar sentence structures makes it read as if written by AI.

The initial literature review is written in bullet point format, which is unusual for an academic article and therefore fails to offer an overall summary of the literature in service of an argument. Several points are repeated (population decline in rural areas) and claims are made without support ("Table 3 summarizes the most relevant gamification aspects most frequently implemented in platforms of this kind," although there is no evidence provided that suggests that these are the most frequently implemented aspects) .

The discussion section is missing and the concluding section is inadequate.

The title is inaccurate, as the article seems to be interested in presenting a rationale for a particular approach to the development of civic engagement tools for rural communities. It is not an "overview," as there are no tools that are reviewed, and in fact it is difficult to envision what, exactly, they have in mind because there are no examples discussed. It would be helpful, for instance, to discuss a particular tool that is used in urban communities and to then review how this would need to be modified for rural community use. This would help to clarify the particular contribution of this study. As it is, the features, descriptions, and benefits seem that they would apply equally well in urban, rural, or other settings in almost all cases.

My suggestion is that the authors read other academic articles in this area and model their writing after those. The authors also will want to be much more specific about what is lacking in existing tools, and what their model proposes to offer in the way of alternatives.

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Is the topic of the review discussed comprehensively in the context of the current literature?

No

Are all factual statements correct and adequately supported by citations?

No

Is the review written in accessible language?

No

Are the conclusions drawn appropriate in the context of the current research literature?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: online civic engagement, platforms, digital studies

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Author Response 27 Jan 2025

Jorge Martinez Gil

Dear Prof. Lynn Schofield Clark,

Thank you very much for taking the time to read the manuscript and provide feedback. We understand that revisions are necessary, and we appreciate the chance to improve the work. We would also like to mention that this work is focused on the European Union, which may differ in certain respects from other regions of the world.

1. We have cut back on reiterations and have now included details about existing systems in Section 2.

2. We have noticed that some sections have repeated points made earlier. We have modified those passages, so each part has offered unique content, and the text now flows without unnecessary recurrence.

3. We have transformed the bullet-point literature review into continuous prose. We have added references to support each claim. Please note, however, that we do not have references for some of the statements made in this paper as they are our own contribution and are based on over 8 years of experience building platforms for rural environments, please see: https://smart-villages.eu or https://smart-alps.eu. We acknowledge that this was not entirely clear in the first version, and we have worked to improve it.

4. We have created a dedicated section that has discussed the findings. The final part has been revised to present what this manuscript has accomplished and what remains open for future work.

5. We have introduced known civic engagement tools from other settings and have described how they could be adapted. We hope that this has made the intended contribution clearer and more concrete.

Please note that we have not changed the title. This is problematic at this point as the preprint has been circulated, has had many downloads and has been cited in some technical reports. Changing the title could lead to a lot of confusion at this stage.

6. We have examined other scholarly works in this area and have followed practices that have appeared commonly in related articles.

We have explained where current tools have not met the needs of smaller communities and have shown how this work has addressed those gaps.

Competing Interests: No competing interests were disclosed.

Reviewer Report 24 September 2024

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Chanda Chansa Thelma
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The study is significant as it explored the role of civic engagement platforms as tools designed to connect various groups in rural areas for collaborative advancement and to support sustainable growth in their communities. additionally, the study has presented an overview of using digital technology to improve engagement and participation in rural communities. it has also highlighted the potential benefits of implementing civic engagement platforms, such as increased collaboration, better access to information and resources, and facilitating informed decisions. However, the authors should work on tenses to suit the report format as it should be.

Is the topic of the review discussed comprehensively in the context of the current literature?
Yes

Are all factual statements correct and adequately supported by citations?
Yes

Is the review written in accessible language?
No

Are the conclusions drawn appropriate in the context of the current research literature?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Civic Education, Civic Engagement, Citizenship.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.