





COMMENT



<https://doi.org/10.1057/s41599-024-04320-7>

OPEN

Scaling to new heights: methodological insights for uplifting research on grassroots digital innovation

Paolo Gerli ¹✉, Fabio Neves da Rocha ¹ & Luca Mora^{1,2}

The Covid-19 pandemic has further evidenced the potential of grassroots actors as initiators of digital innovations, in the form of open-source applications, platform cooperatives, and other crowdsourced digital artifacts. These innovations played a crucial role in mitigating the impact of lockdown measures, specifically serving the needs of communities often neglected by commercial offerings from large tech companies. Grassroots digital innovations (GDIs) have long been recognized by scholars and policymakers as potential remedies to market distortions and social iniquities within digitalization processes. Nevertheless, these initiatives have historically struggled to become sustainable. Recent evidence confirms that many GDIs developed in response to the global health crisis are now facing financial issues that threaten their survival. In this commentary, we reflect on this challenge and assert that GDI literature exhibits several shortcomings that contribute to undermining the long-term stability of these initiatives and their capacity to foster more inclusive, just, and sustainable digitalization processes. We examine how these shortcomings can be addressed to enhance both GDI research and practice. Our discussion focuses on three major methodological and conceptual limitations: a tendency towards theory-devoid empiricism, a bias towards successful cases, and a dearth of longitudinal, multi-site analyses. We discuss the causes of each shortcoming and illustrate how they impact both the theoretical and practical development of GDIs. Drawing on this critical examination, we identify four priorities to advance future GDI research: leveraging methodological pluralism, applying theoretical sampling, enhancing qualitative longitudinal research, and strengthening methods for data collection and archival. These priorities aim to inform the agendas of academic communities, funding bodies, and policy institutions dedicated to harnessing the potential of GDIs for more sustainable and inclusive digitalization processes.

¹The Business School, Edinburgh Napier University, Edinburgh, UK. ²Academy of Architecture and Urban Studies & FinEst Centre for Smart Cities, Tallinn University of Technology, Tallinn, Estonia. ✉email: p.gerli@napier.ac.uk

Introduction

According to Ramadi and Nguyen (2021, p. 1), characterizing the Covid-19 pandemic as a catalyst that “turned individuals into problem solvers, innovators, and entrepreneurs” is hardly an exaggeration. The pandemic not only accelerated and amplified innovation in private and public organizations (Bacq et al., 2020; Crick & Crick, 2020), but it also unleashed the innovative potential of worker and producer cooperatives, collectives of citizens, and other civil society organizations.

Besides contributing to the co-creation of crowdsourced medical devices (Levine et al., 2022; Vermicelli et al., 2021), these grassroots actors autonomously initiated their own digital innovations to alleviate the impact of the social restrictions imposed by national governments (UNCTAD, 2021). A notable example from the spring of 2020 is the creation of food-delivery apps and e-commerce platforms by cooperatives or consortia of small enterprises, enabling local restaurants and independent shops to operate during lockdowns (Coop UK, 2021; Papadimitropoulos, 2021). Similarly, across various countries, grassroots movements, collectives of programmers, and citizen groups worked cooperatively to develop open-source applications spanning multiple domains, from eHealth to videoconferencing (Cheney et al., 2023; Gerli et al., 2021).

However, many of these grassroots initiatives that emerged in response to the Covid-19 global crisis have already ceased operations, while others struggle to meet financial requirements for survival (Commons Network, 2023; Wings.coop, 2022). This trend is unsurprising, as previous research has long attested to the precarious and short-lived nature of GDIs (Loader, 2004; Micholia et al., 2018). Consequently, there is a valid concern that the grassroots initiatives launched during the Covid-19 pandemic may eventually join the extensive list of digital innovations that fail to survive beyond their experimental phases (Mora et al., 2023).

Recognizing the potential of GDIs to foster more inclusive, just, and sustainable digitalization processes (Boni et al., 2019), this commentary advocates for the safeguarding and continued cultivation of the expertise, knowledge, values, and artifacts generated by these initiatives (Fait et al., 2023). Driven by this intent, we review ongoing multidisciplinary debates on GDIs, highlighting the vital role of academic research in the development and understanding of these grassroots innovations. However, we also contend that current GDI research presents three major methodological and conceptual shortcomings: a tendency towards “theory-devoid empiricism” (Tan et al., 2020, p. 1), a bias in favor of successful cases (Pitkin, 2001), and a lack of longitudinal, multi-site analyses (Apostolopoulou et al., 2022).

The commentary examines these shortcomings, illustrating how they impact both the theoretical framing and practical development of GDIs. By scrutinizing these conceptual and methodological challenges, our objective is to enrich future research efforts exploring the dynamics of grassroots innovations in the context of digitalization. Consistently, the concluding section of this commentary highlights four priorities and a set of recommendations that should become central to the agendas of academic communities, funding bodies, and policy institutions dedicated to harnessing the potential of GDIs for more sustainable and inclusive digitalization processes.

Grassroots digital innovations in the academic debate

While the recent pandemic has undeniably accelerated the emergence and spread of grassroots digital innovations (GDIs), these initiatives have a longstanding history predating current events. The appropriation of digital technologies by grassroots actors began as far back as the 1990s (Day, 2010), but reports of

community computer networks can be traced to the 1970s (Carroll & Rosson, 2008). Initially focused on the rollout of community-led Wi-Fi networks and online portals (Boateng & Boateng, 2008; Tapia & Ortiz, 2008), grassroots efforts have later expanded to include the launch of cooperatively-owned platforms and the creation of fabrication labs (fablabs) and makerspaces (Boni et al., 2019; Mannan & Pek, 2023a).

Over the past two decades, GDIs have gained prominence in diverse academic debates, being examined from alternative disciplinary and theoretical perspectives. Community informatics scholars have framed these initiatives as effective measures to address the digital divide (Gaved & Mulholland, 2010), while legal scholars and political scientists have emphasized the political nature of GDIs. From their standpoint, GDIs serve a dual purpose; in addition to tackling existing inequalities and promoting digital inclusion, they help safeguard civic freedoms (De Filippi & Tréguer, 2015; Fuchs, 2017). By offering an alternative to capitalist platforms and big tech corporations, these grassroots initiatives aim to contrast the privatization of critical digital infrastructures and to reinstate the democratic control of citizens over technological developments ((De Filippi & Tréguer, 2015; Fortuny-Sicart et al., 2024; Fuchs, 2017; Lynch, 2020).

Similarly, GDIs have been associated with counterculture movements, Do-It-Yourself (DIY) citizenship, and civic technoscience (Brandellero & Niutta, 2023; Calvo, 2022; Eckhardt et al., 2021; Fu et al., 2022; Schmid & Smith, 2021). Due to their dedication to promoting societal change through place-based community activism and the collective appropriation of digital technologies, these grassroots efforts are seen as examples of commons-based peer production advancing radical approaches to digitalization, grounded on collaborative practices and distributed structures rather than extractive business models and centralized decision-making (Aryan et al., 2021; Benkler & Nissenbaum, 2006; Lynch, 2021). Consequently, their innovations are anticipated to lead to ‘cosmolocalism’, a new paradigm of sociality wherein local communities are globally interconnected through production and consumption networks (Schismenos et al., 2020).

Across these diverse research streams, GDIs have been recognized and advocated as a promising paradigm to replace mainstream capitalist practices in the digital economy and enhance the fairness and sustainability of digitalization processes (Zhang et al., 2024)). Nonetheless, scholars have also become increasingly aware of the inherent contradictions characterizing these initiatives and undermining their societal impacts (Apostolopoulou et al., 2022; Fortuny-Sicart et al., 2024). For instance, it has been observed that fablabs and makerspaces are not free from power imbalances and class- or gender-based discriminations (Eckhardt et al., 2021; Vincent, 2023). Concerns have also been raised on whether community broadband networks might even create new forms of digital divide between communities that can afford to build their infrastructures and those that cannot (Gerli & Whalley, 2021; Salemink & Strijker, 2018).

Researchers have agreed that GDIs struggle to align their socio-political missions with their economic needs, and this may ultimately lead to the disruption of these initiatives (Fortuny-Sicart et al., 2024; Sandoval, 2020). An in-depth understanding of this organizational tension and its impacts on GDI development remains, however, underdeveloped, both theoretically and empirically (Mannan & Pek, 2023a; Stremersch et al., 2022; Tan et al., 2020). This reflects a widespread lack of robust methodologies and metrics to systematically assess digital innovations and quantify their long-term outcomes, an issue observed in multiple academic domains, including smart city literature and transition studies (Mora et al., 2023; Gerli

et al., 2024; Bunders et al., 2022). However, we posit that the GDI literature is also afflicted by three specific shortcomings, representing a major obstacle to the advancement of grassroots practices in the context of digitalization processes. These shortcomings are exposed in the following sections, with the aim of exploring both their underlying causes and their implications for grassroots practices.

Shortcoming 1: a tendency towards theory-devoid empiricism

In their recent editorial addressing grassroots and inclusive innovations, Tan et al. (2020, p. 4) underscore the pervasive issue of “theory-devoid empiricism” affecting grassroots innovation literature. Specifically, they contest both the limited application of structured theoretical frameworks to interpret research findings and the lack of theoretical generalizations from empirical analyses. These concerns align with the previous calls for further theorization that have consistently resurfaced among GDI scholars over the past two decades (Bytheway & Mitrovic, 2005; Stillman & Denison, 2014; Stillman & Linger, 2009).

It must be acknowledged that many GDI researchers have endeavored to connect their empirical findings with established theoretical frameworks. Community informatics scholars have applied discourse and social representation theories to investigate how grassroots communities appropriate digital technologies (Bailey & Ngwenyama, 2011; Goodwin, 2012). More recently, the examination of data and platform cooperatives has been approached through the lens of commons theory (Bühler et al., 2023; Fia, 2020). However, with the exception of a few attempts to build theory from case studies, like the work by Mannan and Pek (2023b), the GDI literature has yet to fully seize the opportunity to establish “a stronger conceptual and theoretical base [...] to give the field disciplinary cohesion and direction” (Stillman & Linger, 2009, p. 255).

Echoing Wrona and Gunnesch (2016, p. 745), theory in GDI literature is primarily treated as a “deposited conviction”. When theoretical assumptions are explicitly articulated, the emphasis often revolves around demonstrating how GDIs align with existing theories rather than forging novel theoretical frameworks or extending current ones (Tan et al., 2020). This lack of theorization not only hinders scholarly debates on GDIs but also has important practical implications. As Tan et al. (2020) pointed out, the limited attempts to generalize and theorize from empirical studies constitute a primary impediment to the effectiveness of grassroots innovations, as the promoters of these initiatives are left with minimal guidance to inform their actions. Moreover, we argue that enhanced theoretical and empirical generalizations in GDI research could prove beneficial for policymakers struggling to harness bottom-up innovation and engage grassroots communities in digitalization processes (Mora et al., 2023).

Shortcoming 2: a bias in favor of successful case studies

Empirical research on GDIs also exhibits a propensity to focus narrowly on a small sample of case studies, disproportionately emphasizing successful initiatives (Apostolopoulou et al., 2022; Salcedo et al., 2014). This trend was already noted by Pitkin (2001, p. 3), who criticized community informatics scholars for their “tendency to overlook past failures”. Similarly, in a recent workshop on platform cooperatives¹, both academics and activists voiced their concerns regarding the practice of cherry-picking successful case studies in GDI research.

The consequences of neglecting unsuccessful initiatives extend beyond issues of empirical research integrity (Loader, 2004); it also leaves policymakers and practitioners with incomplete knowledge of the factors influencing the development of GDIs

(Lochner, 2006; Mitrovic & Bytheway, 2006). Recognizing the critical role of knowledge accumulation and dissemination in the diffusion of grassroots innovations (Lang et al., 2020), we assert that the lack of comprehensive empirical observations on unsuccessful GDIs compromises the ability of these initiatives to scale up and replicate.

This bias toward successful cases has also emerged in other knowledge domains. It is widely acknowledged in the social sciences and has been frequently observed in business and management research, especially entrepreneurship studies (Berka & Creamer, 2018; Musinguzi et al., 2023; Vázquez Maguirre et al., 2018). For instance, the literature on social entrepreneurship has faced criticism for its overreliance on descriptive case studies accentuating positive social outcomes rather than conducting in-depth critical analyses of social enterprises (Dey & Steyaert, 2012; Musinguzi et al., 2021). Furthermore, when discussing failure, the social entrepreneurship literature tends to focus on financial and economic performances, while paying little attention to the missed accomplishment of the socio-political missions driving these ventures (Sarma, 2020).

The preference among researchers for success stories is often associated with confirmation biases (Evers & Wu, 2006; Valvi et al., 2013), which reflects the “tendency to seek only information that would confirm a guess or a hypothesis” (Toshkov, 2016, p. 11). Accordingly, scholars are more likely to concentrate on cases that reinforce their theoretical assumptions (McSweeney, 2021) rather than looking for novel, valuable empirical insights that could challenge established viewpoints.

Nevertheless, we acknowledge that pragmatic motives also contribute to the tendency of GDI research to overlook unsuccessful ventures (Bennett & Franzel, 2013). Gathering data on these initiatives can prove arduous, primarily due to the persistent stigma associated with failure (Gino & Staats, 2015; Scuotto et al., 2024), which can make key informants hesitant to discuss their experiences with unsuccessful enterprises (Murto et al., 2020; Penter et al., 2009). In contrast, information on successful projects is usually more accessible, thanks to their widespread recognition in the mass media and comprehensive documentation in archived records (Buckley, 2021; Penter et al., 2020). Even independent observatories and public institutions responsible for collecting data on innovative practices have been found to prioritize success stories over unsuccessful initiatives (Lopez et al., 2019).

Publication biases may further exacerbate this tendency. Academic journals often favor articles presenting positive findings due to their biases toward novelty and normal science (van Witteloostuijn, 2016). The preference for novelty pushes journal editors to prefer cutting-edge, original research over replication studies, a concern already highlighted by numerous business and management scholars (Ryan & A Tipu, 2022; Tipu & Ryan, 2022; Walker et al., 2017). Moreover, the bias toward normal science leads academic journals to be less likely to accept articles that do not align with mainstream paradigms (van Witteloostuijn, 2016).

Finally, scholars have warned against the potential overlap of confirmation and ideological biases in social sciences (Chester, 2021; Honeycutt & Jussim, 2020). Such biases induce researchers to only present findings that reinforce their ideological beliefs (Moosa, 2019), and have been observed, for example, in previous research on civic movements (Anisin, 2020). Whereas the extant literature has recognized that ideological biases in mainstream socio-technical systems can undermine the production and dissemination of knowledge on grassroots innovations (Gerli et al., 2024; Orozco-Meléndez & Paneque-Gálvez, 2024), additional attention should be given to the potential biases also affecting empirical and theoretical research on GDIs.

Table 1 Priorities and recommendations for future GDI research.

Priority	Recommendations for researchers	Recommendations for research funders and policymakers
Leverage “methodological pluralism” to strengthen theory development.	Prioritize multiple-case study analyses. Engage with a wider variety of methodologies. Engage with relationally reflexive practices.	Support the creation of multidisciplinary research networks focusing on GDIs. Encourage and sustain active participation in these networks of scholars from underrepresented fields and communities.
Apply theoretical sampling to select the objects of empirical analyses.	Select the cases, subjects, and timeframes of empirical investigations based on specific theoretical constructs. When comparative analyses are not viable, focus on extreme or deviant cases and/or prioritize embedded case study designs.	
Sustain and incentivize qualitative longitudinal research on GDIs.	Engage with data collection methods and methodological approaches enabling qualitative longitudinal research (such as the biography of artifacts and practices).	In the distribution of research funding, prioritize longitudinal studies over cross-sectional analyses of GDIs. Grant adequate resources to collect data over extended periods and to mitigate participant attrition over time.
Strengthen data collection and archival methods for GDIs	Leverage participatory action research and expert interviews to investigate GDIs taking place in contexts where official records are limited or difficult to access. Harness digital archives and participatory archiving methods to conduct longitudinal analyses.	Nurture cross-sector collaborative efforts to enhance the quality and coverage of digital archives. Provide material support for GDIs to implement participatory archiving methods. Support the work of non-profit organizations and universities acting as external moderators of participatory archives.

Shortcoming 3: a dearth of multi-site and longitudinal analyses

Another shortcoming exhibited by the existing body of GDI literature is the lack of longitudinal and multi-site perspectives, arising from its overreliance on cross-sectional case study analyses (Cousin & Audebrand, 2020; Mannan & Pek, 2023b). This lack inhibits the scope for both theoretical and empirical generalizations (Stremersch et al., 2022; Tsang, 2014b), leaving scholars and practitioners with an unsystematic understanding of the factors influencing GDI development over time and across diverse geographical contexts.

Furthermore, existing cross-sectional analyses tend to focus on the initial phases of GDI development, a trend also observed in the broader literature on sociotechnical transitions and grassroots innovations (Havas et al., 2023; Roberts & Geels, 2019). This “overwhelming emphasis on early stages” (Sovacool et al., 2020, p. 2) leads to reductive interpretations of the role played by grassroots actors in transformative processes and to partial overviews of the factors contributing to the long-term success of their initiatives (Baxter et al., 2020; Berka & Creamer, 2018).

Impediments to longitudinal, multi-site analyses have been extensively discussed in entrepreneurship and innovation studies (Irfan et al., 2022; Sjögren et al., 2020). Beyond the financial and managerial burdens associated with collecting data over multiple timeframes and locations, longitudinal research is hampered by the reluctance of individuals to participate in long-term research projects and the high levels of staff turnover in innovative organizations (Blazejewski, 2011; Patnaik et al., 2022). These challenges are also likely to significantly affect research on GDIs, as these initiatives are renowned for facing significant budget restrictions and a shortage of human resources (Bunders et al., 2022; Gerli & Whalley, 2021).

Advocating for change in future GDI research

In this section, we present some methodological considerations addressing the root causes of the shortcomings that we

introduced. Specifically, we detail four priorities, each accompanied by actionable recommendations that are not confined to academic communities. As shown in Table 1, these recommendations are also pertinent to funding agencies and policy-making institutions that shape GDI practices and academic research agendas (Pettigrew, 1990).

Priority 1: Leverage “methodological pluralism” to strengthen theory development. As articulated in the previous sections, further research efforts are required to advance theory development in the GDI domain (Stillman & Denison, 2014; Tan et al., 2020) and to overcome the tendency of GDI scholars to over-rely on cross-sectional analyses of successful case studies (Apostolopoulou et al., 2022; Cousin & Audebrand, 2020). To address these shortcomings, we urge researchers to refine their case study designs and engage with a wider variety of methodologies. Adopting “methodological pluralism” has proved effective in enriching our understanding of innovative processes and bolstering theory-building in entrepreneurship studies (Carsrud & Brännback, 2014, p. 178), and we expect similar results in the GDI field.

While GDI scholars commonly rely on case study analyses, this methodology is not inherently restrictive and has already demonstrated its potential for theory development (Eisenhardt, 2021; Gerring, 2006; Yin, 2009). However, to fully harness such potential, we encourage GDI researchers to prefer multiple-case study designs over single-case study analyses. Multiple case studies tend to yield more generalizable results and more robust theoretical advancements (Dul & Hak, 2007; Tsang, 2014a, 2014b). Evidence of this potential is already seen in those very few studies where comparative approaches have been adopted to conduct cross-country and cross-sectoral analyses of GDIs. These studies have substantially deepened both theoretical and empirical insights into GDI development (Borghetti et al., 2021; Mannan & Pek, 2023b).

Moreover, we recommend further engaging with alternative qualitative methodologies that can complement case study

analyses. For example, ethnography could be particularly valuable in identifying regular patterns of GDI development across various contexts (Atkinson, 2015), challenging “taken-for-granted assumptions about glossy stories” (Carsrud & Brännback, 2014, p. 224). Action research could further strengthen empirical and theoretical generalizations by helping GDI scholars and practitioners to jointly uncover unexplored issues and novel solutions (McNabb, 2008). We also see grounded theory as a promising approach for explanatory studies on the dynamics existing between different factors, actions, and trajectories of GDI development (Corbin & Strauss, 2015).

Additionally, we argue that the advancement of theory in the GDI field could benefit from relationally reflexive practices. These practices encourage scholars to critically examine their theoretical and methodological assumptions through their engagement with alternative research paradigms and communities (Hibbert et al., 2014).

Building multidisciplinary research networks is crucial for sustaining this process. Whereas examples of these networks already exist in the GDI domain (Bunders et al., 2022; Sandoval, 2020), research funders could further facilitate relationally reflexive practices by promoting the active participation of scholars from underrepresented fields and communities (Flint et al., 2022). The inclusion of alternative disciplinary perspectives is also crucial to foster relational reflexivity and overcome the current fragmentation in GDI research, which tends to overlook how technological, economic, and political dimensions integrate and influence each other in grassroots innovation (Fortuny-Sicart et al., 2024). In particular, research funders should incentivize the collaboration of social and computer scientists with grassroots communities to facilitate the co-design of GDIs that are scalable and resilient, from both a techno-economic and a social perspective (Rodrigues et al., 2022).

Priority 2: Apply theoretical sampling to select the objects of empirical analyses. The methodological approaches discussed in the previous section are still susceptible to selection and confirmation biases (Haverland & Van Der Veer, 2018), which represents another major shortcoming affecting GDI research. To overcome this issue, we urge scholars to apply theoretical sampling when selecting the units of analysis of their empirical investigations (Eisenhardt, 2021; Neergaard & Ulhøi, 2007). This sampling approach ensures that the cases, subjects, and timeframes selected for empirical analyses are purposely chosen to shed light on specific theoretical constructs (Gerring, 2006; McNabb, 2008) and to eliminate alternative explanations of the phenomenon being investigated (Ridder, 2017; Toshkov, 2016).

Although it may limit the scope for empirical generalizations (Gobo, 2008), theoretical sampling is recognized as the most appropriate sampling approach for case study analyses (Yin, 2009), ethnography (Eisenhardt et al., 2016) and grounded theory (Corbin & Strauss, 2015), as it is expected to boost the explanatory potential and theoretical generalizability of qualitative research. Furthermore, theoretical sampling can strengthen theory development from single-case study analyses (Eisenhardt et al., 2016; Yin, 2009).

Methodology scholars have agreed that, when comparative studies are not a viable option, theoretical sampling should be applied to identify extreme or deviant cases, presenting outcomes and trajectories that significantly diverge from what existing theories predict (Gerring & Cojocar, 2016; Neergaard & Ulhøi, 2007). The analysis of these cases is expected to provide more theoretically rich findings, thereby allowing for theoretical generalization from single case studies (Yin, 2013). However, when studying extreme or deviant cases, we still recommend

analyzing the same initiative over multiple periods (Helfat, 2007; Ulriksen & Dadalauri, 2016) and prioritizing embedded case study designs (Yin, 2009), collecting data from different locations contributing to and benefitting from the same GDI (Gerli & Whalley, 2021).

Priority 3: Sustain and incentivize qualitative longitudinal research on GDIs. Research on GDIs also faces limitations due to the predominance of cross-sectional analyses, which provide only a snapshot of these initiatives, rather than exploring their evolution over time and across multiple sites (Cousin & Audebrand, 2020; Mannan & Pek, 2023). Empirical investigations focusing on a particular point in time and space inevitably result in circumstantial and static representations, failing to capture the ‘messiness’ (Latour, 1987) and dynamisms of GDIs (Pollock & Williams, 2008). This contributes to providing a partial view on the success or failure of GDIs, and limits the scope for fully unraveling the tensions that may emerge between the techno-economic and socio-political objectives of these initiatives (Fortuny-Sicart et al., 2024; Stremersch et al., 2022).

To address this gap, we call for a more extensive use of qualitative longitudinal research (Galloway et al., 2015) in the study of GDIs. This approach is more apt to reveal the dynamism and causal processes underlying the long-term development of GDIs (Treanor et al., 2021). Moreover, as observed in the literature on collaborative innovation, longitudinal analyses are likely to provide richer insights into the internal tensions that grassroots initiatives experience over different development stages; and these insights are, in turn, expected to boost the ability of practitioners to both predict and address such trade-offs (Haring et al., 2023).

In particular, we suggest adopting the biography of artifacts and practices (BoAP), a longitudinal and multi-site methodology that has already been applied to the in-depth study of various technological developments, such as Wi-Fi networks, eHealth systems, and grassroots filmmaking (Campagnolo et al., 2019; Suh & Williams, 2021; Wiegel et al., 2020). The BoAP methodology involves conducting a series of interconnected studies that trace the life of an artifact across different timeframes and locations (Glaser et al., 2021; Pollock & Williams, 2008). By extending the spatial and temporal scope of empirical research and facilitating comparative analyses, BoAP can significantly enhance theoretical development in the GDI field (Apostolopoulou et al., 2022; Stremersch et al., 2022).

It must be noted, though, that the effective implementation of this methodological approach may be impeded by access and resource limitations (Hyysalo et al., 2019). Researchers should, therefore, judiciously select pivotal moments for their BoAP studies and employ a range of data collection methods to ensure robustness, reliability, and validity in their findings (Glaser et al., 2021; Hyysalo et al., 2019).

More broadly, to address the practical challenges of qualitative longitudinal research (Treanor et al., 2021), we encourage funding bodies to explicitly prioritize support for longitudinal studies over cross-sectional analyses of GDIs, ensuring that they are appropriately resourced for data collection over extended periods (Banati, 2021; Blazejewski, 2011). Additional strategies should also be implemented to mitigate the loss of participants over time, a common issue in qualitative longitudinal studies (Galloway et al., 2015; Ployhart & Vandenberg, 2010).

Compensating GDI employees and volunteers for their time dedicated to data collection activities could help incentivize their participation in longitudinal research: the positive effect of these incentives has already been captured in medical and social science studies (Williamson et al., 2014; Yu et al., 2017). However, for

GDI already receiving public funding, it would be reasonable to expect a commitment to engage in longitudinal research without additional incentives (Gálvez Rodríguez et al., 2012).

Priority 4: Strengthening data collection and archival methods for GDIs. GDI research too often relies on the cross-sectional analyses of a limited sample of successful cases. To overcome this limitation, we call for additional efforts to systematically collect, archive, and curate longitudinal data on grassroots innovations from a wide range of industries and regions. Therefore, we encourage GDI researchers to engage with a broader array of data collection methods, which could particularly help to expand the coverage of those grassroots initiatives taking place in institutional and industrial contexts where official records are limited or difficult to access.

One such method is participatory action research, which has been successfully applied to the study of grassroots movements characterized by informal structures (de Jong et al., 2019; Maiba, 2005). This data collection method not only allows access to unique information sources (Stringer & Aragón, 2020) but also naturally produces longitudinal data (Coghlan & Brannick, 2010). Expert interviews can also be a valuable alternative, particularly when participatory observation is not feasible and key informants within grassroots organizations are difficult to access because of practical or ethical constraints (Bogner et al., 2018).

Regarding secondary data sources, GDI scholars could benefit from digital archives that store periodic snapshots of websites and other digital interfaces (Helmond & van der Vlist, 2019). These archives facilitate longitudinal analyses by helping to trace the chronological evolution of online artifacts (Brügger, 2018; Curty & Zhang, 2013) and also provide information on initiatives that are no longer active (Jia, 2022; Saylor et al., 2023). However, it is important to acknowledge and address the biases and deficiencies that these datasets are affected by (Brügger, 2018; Lomborg, 2012). This is why we urge public institutions, research entities, and non-profit organizations to engage in collaborative efforts aiming at enhancing the quality and coverage of these digital archives (Arora et al., 2016). Meanwhile, despite some limitations, these sources remain a valid resource for scholars, offering granular data for tracking the long-term development of GDIs (Helmond & van der Vlist, 2019).

We also recommend a greater engagement with participatory archiving methods (Poole, 2019; Roeschley & Kim, 2019). These methods leverage the collective intelligence of grassroots communities for the shared control and curation of digital and physical archives (Benoit, Eveleigh (2019b)). Such practices are already used by activist groups and social movements to document their own histories and progress in real-time (Douglas, 2019). Similarly, GDI promoters could employ participatory archiving to document activities and achievements across various locations.

Finally, we advocate for additional material support to promote the implementation of participatory archiving in GDIs. Funding bodies should provide both financial and technical assistance for secure data storage (Benoit, Eveleigh (2019a)). Non-profit organizations and academic institutions could also contribute by acting as external moderators to enhance the transparency and integrity of participatory archives (Benoit, Eveleigh (2019a); Benoit, Roeschley (2019)). This support is fully justified, considering the potential of participatory archiving to counteract the misrepresentation of marginalized communities and the underrepresentation of unconventional initiatives (Benoit, Roeschley (2019); Flinn et al., 2019).

Conclusion

As noted by Fonseca et al. (2022, p. 8), there is nowadays “an impetus toward alternatives to face the countless ongoing

uncertainties and predicted collapses” leveraging “the inventive capacity of the Earth’s intertwined living intelligences”. Undoubtedly the Covid-19 pandemic well evidenced how the collective intelligence of grassroots actors can significantly contribute to the development of digital innovation addressing major societal challenges (Ramadi & Nguyen, 2021). Yet the long-term impact of these grassroots efforts remains limited, also due to persistent shortcomings in the extant literature that constrain both the theoretical understanding and practice of GDIs (Apostolopoulou et al., 2022; Tan et al., 2020).

Drawing on ongoing academic debates, this commentary delves into such shortcomings and then identifies a set of priorities and mitigatory actions. Various methodological approaches are presented as potential remedies to the current lack of longitudinal, comparative analyses and to counteract biases and misrepresentations in current datasets. Furthermore, we call for adjustments in the agendas of research funders and other institutions promoting the investigation of GDIs. Only through the concerted efforts of these actors, research on GDIs can further advance to support the long-term development of these initiatives and maximize their contribution towards a more sustainable and fairer digitalization.

The research agenda set in this commentary will also contribute to advancing the managerial practice of GDIs and enhancing their socio-economic impacts. By expanding the scope and rigor of the academic investigations focusing on these initiatives, their promoters will have access to a richer and more robust knowledge base, pivotal to refining their business models, guiding their strategic decisions, and maximizing their value creation (Abdulkader et al., 2020; Fait et al., 2023). Furthermore, our call for additional support in favor of multidisciplinary knowledge-sharing networks and advanced archiving practices echoes existing research highlighting the crucial role that knowledge intermediaries play in fostering socio-technical transitions and maximizing their societal impacts (Sovacool et al., 2020). Finally, by urging research funders and policy-makers to sustain GDI research through targeted interventions, the recommendations outlined in our agenda will likely reinforce the relationship between academic institutions and grassroots organizations, whose collaboration has already proved to be a key enabler of GDI development (Gerli et al., 2024).

Data availability

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

Received: 2 February 2024; Accepted: 19 December 2024;

Published online: 03 February 2025

Note

- 1 This workshop, titled “Democratizing platforms: The case of Platform Cooperativism”, was held in Milan, Italy, in July 2023 and organized by Fondazione Feltrinelli. It involved members of the cooperative sectors, founders of platform cooperatives, and academics with expertise in this research domain.

References

- Abdulkader B, Magni D, Cillo V, Papa A, Micera R (2020) Aligning firm’s value system and open innovation: a new framework of business process management beyond the business model innovation. *Bus. Process Manag. J.* 26(5):999–1020. <https://doi.org/10.1108/BPMJ-05-2020-0231>
- Anisn A (2020) Debunking the myths behind nonviolent civil resistance. *Crit. Sociol.* 46(7-8):1121–1139. <https://doi.org/10.1177/0896920520913982>
- Apostolopoulou E, Bormpoudakis D, Chatzipavlidis A, Cortés Vázquez JJ, Florea I, Gearey M, Levy J, Loginova J, Ordner J, Partridge T (2022) Radical social innovations and the spatialities of grassroots activism: navigating pathways

- for tackling inequality and reinventing the commons. *J. Pol. Ecol.* 29(1):144–188
- Arora SK, Li Y, Youtie J, Shapira P (2016) Using the wayback machine to mine websites in the social sciences: A methodological resource. *J. Assoc. Inf. Sci. Technol.* 67(8):1904–1915
- Aryan V, Bertling J, Liedtke C (2021) Topology, typology, and dynamics of commons-based peer production: On platforms, actors, and innovation in the maker movement. *Creativity Innov. Manag.* 30(1):63–79. <https://doi.org/10.1111/caim.12392>
- Atkinson, P (2015). *For ethnography*. SAGE Publications Ltd
- Bacq S, Geoghegan W, Josefy M, Stevenson R, Williams TA (2020) The COVID-19 Virtual Idea Blitz: Marshaling social entrepreneurship to rapidly respond to urgent grand challenges. *Bus. Horiz.* 63(6):705–723. <https://doi.org/10.1016/j.bushor.2020.05.002>
- Bailey A, Ngwenyama O (2011) The challenge of e-participation in the digital city: Exploring generational influences among community telecentre users. *Telemat. Inform.* 28(3):204–214
- Banati P (2021) Sustainable human development across the life course: Evidence from longitudinal research. Bristol University Press
- Baxter J, Walker C, Ellis G, Devine-Wright P, Adams M, Fullerton RS (2020) Scale, history and justice in community wind energy: An empirical review. *Energy Res. Soc. Sci.* 68:101532. <https://doi.org/10.1016/j.erss.2020.101532>
- Benkler Y, Nissenbaum H (2006) Commons-based Peer Production and Virtue. *J. Political Philos.* 14(4):394–419. <https://doi.org/10.1111/j.1467-9760.2006.00235.x>
- Bennett M, Franzel S (2013) Can organic and resource-conserving agriculture improve livelihoods? A synthesis. *Int. J. Agric. Sustainability* 11(3):193–215. <https://doi.org/10.1080/14735903.2012.724925>
- Benoit III, E, Eveleigh, A (2019a). Challenges, opportunities and future directions of participatory archives. In A. Eveleigh & I. I. E. Benoit (Eds.), *Participatory Archives: Theory and Practice* (pp. 211–218). Facet. <https://doi.org/10.29085/9781783303588.018>
- Benoit III, E, & Eveleigh, A (2019b). Defining and framing participatory archives in archival science. In *Participatory Archives: Theory and Practice*, 1–12. Cambridge University Press
- Benoit III, E, Roeschley, A (2019). Degrees of mediation: a review of the intersectionality between community and participatory archives. In A. Eveleigh & I. I. E. Benoit (Eds.), *Participatory Archives: Theory and Practice* (pp. 159–172). Facet. <https://doi.org/10.29085/9781783303588.014>
- Berka AL, Creamer E (2018) Taking stock of the local impacts of community owned renewable energy: A review and research agenda. *Renew. Sustain. Energy Rev.* 82:3400–3419. <https://doi.org/10.1016/j.rser.2017.10.050>
- Blazewski, S (2011). When truth is the daughter of time: Longitudinal case studies in international business research. *Rethinking the case study in international business and management research*, 251
- Boateng, K, & Boateng, BA (2008). Open source community portals for e-government. In *Electronic Government: Concepts, Methodologies, Tools, and Applications* (pp. 2903–2909). IGI Global
- Bogner, A, Littig, B, & Menz, W (2018). Generating qualitative data with experts and elites. In U. Flick (Ed.), *The SAGE Handbook of Qualitative Data Collection*. SAGE Publications Ltd. <https://doi.org/10.4135/9781526416070>
- Boni A, López-Fogués A, Fernández-Baldor Á, Millan G, Belda-Miquel S (2019) Initiatives towards a participatory smart city. The role of digital grassroots innovations. *J. Glob. ethics* 15(2):168–182
- Borghini P, Murgia A, Mondon-Navazo M, Mezihorak P (2021) Mind the gap between discourses and practices: Platform workers' representation in France and Italy. *Eur. J. Ind. Relat.* 27(4):425–443. <https://doi.org/10.1177/09596801211004268>
- Brandellero A, Niutta A (2023) Making sustainability transitions in collaborative spaces of making: Exploring opportunities and limitations in Turin. *Cities* 136:104233. <https://doi.org/10.1016/j.cities.2023.104233>
- Brügger, N (2018). *The archived web: doing history in the digital age*. MIT Press
- Buckley PJ (2021) The role of history in international business: evidence, research practices, methods and theory. *Br. J. Manag.* 32(3):797–811. <https://doi.org/10.1111/1467-8551.12446>
- Bühler, MM, Calzada, I, Cane, I, Jelinek, T, Kapoor, A, Mannan, M, Mehta, S, Micheli, M, Mookerjee, V, Nübel, K (2023). Data cooperatives as catalysts for collaboration, data sharing, and the (trans) formation of the digital commons
- Bunders DJ, Arets M, Frenken K, De Moor T (2022) The feasibility of platform cooperatives in the gig economy. *J. Co-operative Organ. Manag.* 10(1):100167. <https://doi.org/10.1016/j.jcom.2022.100167>
- Bytheway, A, Mitrovic, Z (2005). Managing Knowledge of a new Discipline: Does Community Informatics Have a Theoretical Basis? Proceedings of the 4th International Conference on Intellectual Capital, Knowledge Management and Organisational Learning: ICICKM,
- Calvo D (2022) Free software meets Facebook: Placing digital platforms' usage by free culture communities. *N. Media Soc.* 24(5):1076–1096. <https://doi.org/10.1177/1461444820971629>
- Campagnolo GM, Giannatou E, Franklin M, Stewart J, Williams R (2019) Revolution remixed? The emergence of Open Content Film-making as a viable component within the mainstream film industry. *Inf., Commun. Soc.* 22(13):1871–1888. <https://doi.org/10.1080/1369118X.2018.1465109>
- Carroll JM, Rosson MB (2008) Theorizing mobility in community networks. *Int. J. Hum.-Computer Stud.* 66(12):944–962. <https://doi.org/10.1016/j.ijhcs.2008.07.003>
- Carsrud, AL, & Brännback, M (2014). *Handbook of research methods and applications in entrepreneurship and small business*. Edward Elgar
- Cheney, G, Noyes, M, Do, E, Vieta, M, Azkarraga, J, & Michel, C (2023). Democracy, Equity, and Justice. In *Cooperatives at Work* (pp. 35–74). Emerald Publishing Limited. <https://doi.org/10.1108/978-1-83867-825-820231002>
- Chester L (2021) A case of confirmation bias. *J. Economic Issues* 55(3):584–589
- Coghlan, D, & Brannick, T (2010). *Doing action research in your own organization* (3rd ed.). Sage
- Commons Network (2023) Ups and Downs of a Platform Coop: Lessons from Meet.coop. <https://www.commonsnetwork.org/2023/03/21/ups-and-downs-of-a-platform-coop/>
- Coop UK. (2021). *Wings: Fairer food delivery that improves working lives*. <https://www.uk.coop/case-studies/wings-fairer-food-delivery-improves-working-lives-unfound>
- Corbin, JM, & Strauss, AL (2015). *Basics of qualitative research : techniques and procedures for developing grounded theory* (Fourth edition. ed.). SAGE
- Cousin, L, & Audebrand, LK (2020). *Uberization or platform cooperativism: a social justice perspective* 36th EGOS Colloquium, Hamburg, Germany
- Crick JM, Crick D (2020) Coopetition and COVID-19: Collaborative business-to-business marketing strategies in a pandemic crisis. *Ind. Mark. Manag.* 88:206–213. <https://doi.org/10.1016/j.indmarman.2020.05.016>
- Curry RG, Zhang P (2013) Website features that gave rise to social commerce: a historical analysis. *Electron. Commer. Res. Appl.* 12(4):260–279. <https://doi.org/10.1016/j.elerap.2013.04.001>
- Day P (2010) A brief introduction to the history of community informatics. *AI SOCIETY* 25(3):259–263. <https://doi.org/10.1007/s00146-010-0286-2>
- De Filippi, P, & Tréguer, F (2015). Expanding the Internet Commons: The Subversive Potential of Wireless Community Networks. *Journal of Peer Production*
- Dey P, Steyaert C (2012) Social entrepreneurship: critique and the radical enactment of the social. *Soc. Enterp. J.* 8(2):90–107. <https://doi.org/10.1108/17508611211252828>
- Douglas, J (2019). Documenting a social movement in real time: the Preserve the Baltimore Uprising 2015 archive project. In A. Eveleigh & I. I. E. Benoit (Eds.), *Participatory Archives: Theory and Practice* (pp. 191–202). Facet. <https://doi.org/10.29085/9781783303588.016>
- Dul, J, & Hak, T (2007). *Case study methodology in business research*. Routledge
- Eckhardt J, Kaletka C, Pelka B, Unterfrauner E, Voigt C, Zirngiebl M (2021) Gender in the making: An empirical approach to understand gender relations in the maker movement. *Int. J. Hum.-Computer Stud.* 145:102548. <https://doi.org/10.1016/j.ijhcs.2020.102548>
- Eisenhardt KM (2021) What is the Eisenhardt Method, really? *Strategic Organ.* 19(1):147–160. <https://doi.org/10.1177/1476127020982866>
- Eisenhardt KM, Graebner ME, Sonenshein S (2016) Grand Challenges and Inductive Methods: Rigor without Rigor Mortis. *Acad. Manag. J.* 59(4):1113–1123. <https://doi.org/10.5465/amj.2016.4004>
- Evers CW, Wu EH (2006) On Generalising from Single Case Studies: Epistemological Reflections. *J. Philos. Educ.* 40(4):511–526. <https://doi.org/10.1111/j.1467-9752.2006.00519.x>
- Fait M, Magni D, Perano M, Farina Briamonte M, Sasso P (2023) Grassroot processes of knowledge sharing to build social innovation capabilities. *J. Knowl. Manag.* 27(5):1390–1408. <https://doi.org/10.1108/JKM-04-2022-0338>
- Fia T (2020) An alternative to data ownership: Managing access to non-personal data through the commons. *Glob. Jurist* 21(1):181–210
- Flinn, A, Sexton, A, Benoit III, E, & Eveleigh, A (2019). Activist participatory communities in archival contexts: theoretical perspectives. *Participatory Archives: Theory and Practice*, 173–190
- Flint A, Howard G, Baidya M, Wondim T, Poudel M, Nijhawan A, Mulugeta Y, Sharma S (2022) Equity in Global North–South research partnerships: interrogating UK funding models. *Glob. Soc. Chall. J.* 1(1):76–93. <https://doi.org/10.1332/vqil8302>
- Fonseca RAA, Irving MdA, Nasri YXG, Ferreira GF (2022) Sustainability and social transformation: the role of ecovillages in confluence with the pluriverse of community-led alternatives. *Clim. Action* 1(1):23. <https://doi.org/10.1007/s44168-022-00022-5>
- Fortuny-Sicart A, Pansera M, Lloveras J (2024) Directing innovation through confrontation and democratisation: the case of platform cooperativism. *J. Responsible Innov.* 11(1):2414512. <https://doi.org/10.1080/23299460.2024.2414512>
- Fu P, Li L, Xie X (2022) Reconstructing makerspaces in China: mass innovation space and the transformative creative industries. *Humanities Soc. Sci. Commun.* 9(1):1–8

- Fuchs C (2017) Sustainability and community networks. *Telemat. Inform.* 34(2):628–639. <https://doi.org/10.1016/j.tele.2016.10.003>
- Galloway L, Kapasi I, Whittam G (2015) How not to do it!! A salutary lesson on longitudinal and qualitative research approaches for entrepreneurship researchers. *Int. J. Entrepreneurial Behav. Res.* 21(3):489–500. <https://doi.org/10.1108/IJEBR-12-2013-0224>
- Gálvez Rodríguez MdM, Caba Pérez MdC, López Godoy M (2012) Determining Factors in Online Transparency of NGOs: A Spanish Case Study. *Voluntas: Int. J. Voluntary and Nonprofit Organ.* 23(3):661–683. <https://doi.org/10.1007/s11266-011-9229-x>
- Gaved MB, Mulholland P (2010) Networking communities from the bottom up: grassroots approaches to overcoming the digital divide. *AI SOCIETY* 25(3):345–357. <https://doi.org/10.1007/s00146-009-0259-5>
- Gerli P, Whalley J (2021) Fibre to the countryside: a comparison of public and community initiatives tackling the rural digital divide in the UK. *Telecommun. Policy* 45(10):102222
- Gerli P, Arakpogun EO, Elsahn Z, Olan F, Prime KS (2021) Beyond contact-tracing: The public value of eHealth application in a pandemic. *Gov. Inf. Q.* 38(3):101581. <https://doi.org/10.1016/j.giq.2021.101581>
- Gerli P, Zhang J, Mora L, Sancino A (2024) Friends or enemies? Unravelling niche-regime interactions in grassroots digital innovations. *Technological Forecasting and Social Change*, in press
- Gerring J, Cojocaru L (2016) Selecting Cases for Intensive Analysis: A Diversity of Goals and Methods. *Sociological Methods Res.* 45(3):392–423. <https://doi.org/10.1177/00491241166631692>
- Gerring J (2006) *Case study research: Principles and practices*. Cambridge university press
- Gino F, Staats B (2015) Why organizations don't learn. *Harv. Bus. Rev.* 93(11):110–118
- Glaser VL, Pollock N, D'Adderio L (2021) The Biography of an Algorithm: Performing algorithmic technologies in organizations. *Organ. Theory* 2(2):26317877211004609. <https://doi.org/10.1177/26317877211004609>
- Gobo, G (2008). *The SAGE Handbook of Social Research Methods*. In: SAGE Publications Ltd. <https://doi.org/10.4135/9781446212165>
- Goodwin I (2012) Theorizing community as discourse in community informatics: "Resistant identities" and contested technologies. *Commun. Crit./Cultural Stud.* 9(1):47–66
- Haring M, Schiller J, Gersch M, Amelung V (2023) Why should stakeholders consider the effect of tensions in collaborative innovation in healthcare—lessons learned from surveying integrated care projects in Germany. *BMC Health Serv. Res.* 23(1):1292. <https://doi.org/10.1186/s12913-023-10323-y>
- Havas A, Scharfing D, Weber KM (2023) Innovation studies, social innovation, and sustainability transitions research: From mutual ignorance towards an integrative perspective? *Environ. Innov. Societal Transit.* 48:100754. <https://doi.org/10.1016/j.eist.2023.100754>
- Haverland, M, & Van Der Veer, R (2018). *The case of case study research in Europe: practice and potential*. Springer
- Helfat, CE (2007). *Stylized facts, empirical research and theory development in management*. In (Vol. 5, pp. 185-192): Sage Publications Sage UK: London, England
- Helmond, A, & van der Vlist, FN (2019). Social media and platform historiography: Challenges and opportunities. *TMG-J. Media History*, 22(1)
- Hibbert P, Sillince J, Diefenbach T, Cunliffe AL (2014) Relationally Reflexive Practice: A Generative Approach to Theory Development in Qualitative Research. *Organ. Res. methods* 17(3):278–298. <https://doi.org/10.1177/1094428114524829>
- Honeycutt N, Jussim L (2020) A Model of Political Bias in Social Science Research. *Psychological Inq.* 31(1):73–85. <https://doi.org/10.1080/1047840X.2020.1722600>
- Hyysalo S, Pollock N, Williams RA (2019) Method Matters in the Social Study of Technology: Investigating the Biographies of Artifacts and Practices. *Sci. Technol. Stud.* 32(3):2–25. <https://doi.org/10.23987/sts.65532>
- Irfan I, Sumbal MSUK, Khurshid F, Chan FTS (2022) Toward a resilient supply chain model: critical role of knowledge management and dynamic capabilities. *Ind. Manag. Data Syst.* 122(5):1153–1182. <https://doi.org/10.1108/IMDS-06-2021-0356>
- Jia L (2022) Forgotten passwords and Long-Gone exes: the life and death of Renren. *Internet Histories* 6(1-2):133–153. <https://doi.org/10.1080/24701475.2022.2065153>
- de Jong G, Fajardo Rojas MA, Almeyda G (2019) Grounding participatory action research in rural Colombia: a demonstration study on youth financial inclusion. *Int. J. Lifelong Educ.* 38(2):184–197
- Lang R, Chatterton P, Mullins D (2020) Grassroots innovations in community-led housing in England: the role and evolution of intermediaries. *Int. J. Urban Sustain. Dev.* 12(1):52–72. <https://doi.org/10.1080/19463138.2019.1663525>
- Latour B (1987) *Science in action: How to follow scientists and engineers through society*. Harvard university press
- Levine M, Levine L, Xun H, Gerber A, Antonietti M, Mathew PJ, Singh D (2022) Face Off: 3D-Printed Masks as a Cost-Effective and Reusable Alternative to N95 Respirators: A Feasibility Study. *Am. J. Med.* 135(9):1109–1115. <https://doi.org/10.1016/j.amjmed.2022.04.026>
- Loader B (2004) *A literature review of community informatics initiatives*. Joseph Rowntree Foundation, York
- Lochner, FC (2006) A cost maturity model for community informatics projects in the developing world. *The Journal of Community Informatics*, 2(2)
- Lomborg S (2012) Researching Communicative Practice: Web Archiving in Qualitative Social Media Research. *J. Technol. Hum. Serv.* 30(3-4):219–231. <https://doi.org/10.1080/15228835.2012.744719>
- Lopez FJD, Bastein T, Tukker A (2019) Business Model Innovation for Resource-efficiency, Circularity and Cleaner Production: What 143 Cases Tell Us. *Ecol. Econ.* 155:20–35. <https://doi.org/10.1016/j.ecolecon.2018.03.009>
- Lynch CR (2020) Contesting Digital Futures: Urban Politics, Alternative Economies, and the Movement for Technological Sovereignty in Barcelona. *Antipode* 52(3):660–680. <https://doi.org/10.1111/anti.12522>
- Lynch CR (2021) Internet infrastructure and the commons: grassroots knowledge sharing in Barcelona. *Regional Stud.* 55(12):1868–1877. <https://doi.org/10.1080/00343404.2020.1869200>
- Maiba H (2005) Grassroots Transnational Social Movement Activism: The Case of Peoples' Global Action. *Sociological Focus* 38(1):41–63. <https://doi.org/10.1080/00380237.2005.10571256>
- Mannan, M, & Pek, S (2023a). Platform cooperatives and the dilemmas of platform worker-member participation. *New Technology, Work and Employment*, n/a(n/a). <https://doi.org/10.1111/ntwe.12273>
- Mannan, M, & Pek, S (2023b). Platform cooperatives and the dilemmas of platform worker-member participation. *New Technology, Work and Employment*. <https://doi.org/10.1111/ntwe.12273>
- McNabb, DE (2008) *Research methods in public administration and nonprofit management: quantitative and qualitative approaches* (2nd ed.). M. E. Sharpe
- McSweeney B (2021) Fooling ourselves and others: confirmation bias and the trustworthiness of qualitative research – Part 1 (the threats). *J. Organ. Change Manag.* 34(5):1063–1075. <https://doi.org/10.1108/JOCM-04-2021-0117>
- Micholia P, Karaliopoulos M, Koutsopoulos I, Navarro L, Vias R. B, Boucas D, Michalis M, Antoniadis P (2018) Community networks and sustainability: a survey of perceptions, practices, and proposed solutions. *IEEE Commun Surv. Tutor.* 20(4):3581–3606
- Mitrovi Z, Bytheway A (2006) Community Informatics research and practice: A discussion of the status quo and the use of grounded theory. *Community Informatics for Developing Countries: Understanding and Organising for a Participatory Future* Information Society, Cape Town: CIDC 2006 Conference Committee, pp229-244,
- Moosa IA (2019) The fragility of results and bias in empirical research: an exploratory exposition. *J. Economic Methodol.* 26(4):347–360. <https://doi.org/10.1080/1350178X.2018.1556798>
- Mora L, Gerli P, Ardito L, Messeni Petruzzelli A (2023) Smart city governance from an innovation management perspective: Theoretical framing, review of current practices, and future research agenda. *Technovation* 123:102717. <https://doi.org/10.1016/j.technovation.2023.102717>
- Murto P, Hyysalo S, Juntunen JK, Jalas M (2020) Capturing the micro-level of intermediation in transitions: Comparing ethnographic and interview methods. *Environ. Innov. Societal Transit.* 36:406–417. <https://doi.org/10.1016/j.eist.2020.01.004>
- Musinguzi P, Baker D, Larder N, Villano RA (2023) The measurement of social impacts in rural social enterprises: a systematic literature review and future research implications. *Regional Stud., Regional Sci.* 10(1):139–166. <https://doi.org/10.1080/21681376.2023.2178324>
- Musinguzi, P, Baker, D, Larder, N, & Villano, RA (2021). Rural Development Focused Social and Solidarity Economy Organisations' Social Impact Measurement: A Systematic Review and Ways Forward. *OECD. Accessed September, 1, 2021*
- Neergaard, H, & Ulhoi, JP (2007). *Handbook of qualitative research methods in entrepreneurship*. Edward Elgar
- Orozco-Meléndez JF, Paneque-Gálvez J (2024) Co-producing uncomfortable, transdisciplinary, actionable knowledges against the corporate food regime through critical science approaches. *Environ., Dev. Sustainability* 26(12):29863–29890. <https://doi.org/10.1007/s10668-023-03377-9>
- Papadimitropoulos E (2021) Platform capitalism, platform cooperativism, and the commons. *Rethinking Marxism* 33(2):246–262
- Patnaik S, Pereira V, Temouri Y (2022) Intra-organisational dynamics as 'dark side' in inter-organizational relationships: Evidence from a longitudinal investigation into a university-industry collaboration. *Technol. Forecast. Soc. Change* 174:121259. <https://doi.org/10.1016/j.techfore.2021.121259>
- Penter K, Pervan G, Wreford J (2009) Offshore BPO at large captive operations in India. *Inf. Technol. People* 22(3):201–222. <https://doi.org/10.1108/09593840910981419>

- Penter, K, Perrin, B, Wreford, J, & Pervan, G (2020). Designing a Sourcing Ecosystem for Strategic Innovation Through “Big Data” Applications. Digital Technologies for Global Sourcing of Services: 14th International Workshop on Global Sourcing of Information Technology and Business Processes, Global Sourcing 2019, Obergurgl, Austria, December 18–21, 2019, Proceedings 14.
- Pettigrew AM (1990) Longitudinal Field Research on Change: Theory and Practice. *Organ. Sci.* 1(3):267–292. <https://doi.org/10.1287/orsc.1.3.267>
- Pitkin, B (2001, 6–6 Jan. 2001). Community informatics: hope or hype? Proceedings of the 34th Annual Hawaii International Conference on System Sciences, Ployhart RE, Vandenberg RJ (2010) Longitudinal Research: The Theory, Design, and Analysis of Change *J. Manage* 36(1):94–120. <https://doi.org/10.1177/0149206309352110>
- Pollock, N, & Williams, R (2008). *Software and organisations: The biography of the enterprise-wide system or how SAP conquered the world*. Routledge
- Poole, AH (2019). Social tagging and commenting in participatory archives: a critical literature review. *Participatory Archives: Theory and Practice*, 15–31
- Ramadi, KB, & Nguyen, FT (2021). Rapid crowdsourced innovation for COVID-19 response and economic growth. *npj Digital Medicine*, 4(1). <https://doi.org/10.1038/s41746-021-00397-5>
- Ridder H-G (2017) The theory contribution of case study research designs. *Bus. Res.* 10(2):281–305. <https://doi.org/10.1007/s40685-017-0045-z>
- Roberts C, Geels FW (2019) Conditions and intervention strategies for the deliberate acceleration of socio-technical transitions: lessons from a comparative multi-level analysis of two historical case studies in Dutch and Danish heating. *Technol. Anal. Strategic Manag.* 31(9):1081–1103. <https://doi.org/10.1080/09537325.2019.1584286>
- Rodrigues SM, Kanduri A, Nyamathi A, Dutt N, Khargonekar P, Rahmani AM (2022) Digital Health–Enabled Community–Centered Care: Scalable Model to Empower Future Community Health Workers Using Human-in-the-Loop Artificial Intelligence [Viewpoint]. *JMIR Form. Res* 6(4):e29535. <https://doi.org/10.2196/29535>
- Roeschley A, Kim J (2019) Something that feels like a community”: the role of personal stories in building community-based participatory archives. *Archival Sci.* 19(1):27–49. <https://doi.org/10.1007/s10502-019-09302-2>
- Ryan JC, A Tipu SA (2022) Business and management research: Low instances of replication studies and a lack of author independence in replications. *Res. Policy* 51(1):104408. <https://doi.org/10.1016/j.respol.2021.104408>
- Salcedo, J, Fuster Morell, M, Berlinger, M, Martinez, R, & Tebbens, W (2014). Mapping the common based peer production: a crowd-sourcing experiment. The Internet, Policy & Politics Conference, University of Oxford,
- Salemink K, Srijker D (2018) The participation society and its inability to correct the failure of market players to deliver adequate service levels in rural areas. *Telecommun. Policy* 42(9):757–765. <https://doi.org/10.1016/j.telpol.2018.03.013>
- Sandoval M (2020) Entrepreneurial activism? Platform cooperativism between subversion and co-optation. *Crit. Sociol.* 46(6):801–817
- Sarma, SK (2020). Investigating Failed Social Entrepreneurship: A ‘Process Research’ Perspective. In S. Majumdar & E. M. Reji, *Methodological Issues in Social Entrepreneurship Knowledge and Practice* Singapore
- Saylor, R, Lahiri A, Warnick B, Baid C (2023) Looking Back To Venture Forward: Exploring Idea and Identity Work in Public Failure Narratives. *Entrepreneurship Theory Pract.* 47(2):398–429. <https://doi.org/10.1177/10422587211057027>
- Schismenos, A, Niaros, V, & Lemos, L (2020). Cosmopolitanism: understanding the transitional dynamics towards post-capitalism. *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society*, 670–684
- Schmid B, Smith TS (2021) Social transformation and postcapitalist possibility: Emerging dialogues between practice theory and diverse economies. *Prog. Hum. Geogr.* 45(2):253–275. <https://doi.org/10.1177/0309132520905642>
- Scuotto V, Magni D, Garcia-Perez A, Pironti M (2024) The impact of innovation failure: Entrepreneurship adversity or opportunity? *Technovation* 131:102944. <https://doi.org/10.1016/j.technovation.2023.102944>
- Sjögren, H, Yusuf, F, & Sanandaji, T (2020). *Profiles of Entrepreneurial Success in a Welfare State: Using Statistical Prosopography and Cluster Analysis to Classify Top Swedish Entrepreneurs*
- Sovacool BK, Turnheim B, Martiskainen M, Brown D, Kivimaa P (2020) Guides or gatekeepers? Incumbent-oriented transition intermediaries in a low-carbon era. *Energy Res. Soc. Sci.* 66:101490. <https://doi.org/10.1016/j.erss.2020.101490>
- Stillman L, Linger H (2009) Community Informatics and Information Systems: Can They Be Better Connected? *Inf. Soc.* 25(4):255–264. <https://doi.org/10.1080/01972240903028706>
- Stillman L, Denison T (2014) The Capability Approach Community Informatics. *Inf. Soc.* 30(3):200–211. <https://doi.org/10.1080/01972243.2014.896687>
- Stremersch S, Camacho N, Keko E, Wuyts S (2022) Grassroots innovation success: The role of self-determination and leadership style. *Int. J. Res. Mark.* 39(2):396–414. <https://doi.org/10.1016/j.ijresmar.2021.10.003>
- Stringer, ET, Aragón, AO (2020). *Action research*. Sage publications
- Suh, J-H, & Williams, R (2021). The complex temporal dynamics of an emerging infrastructure innovation: revisiting the ‘failure’ of the ‘successful’ innovation of Wireless Broadband (WiBro) in South Korea. *Technology Analysis & Strategic Management*, 1–16. <https://doi.org/10.1080/09537325.2023.2216812>
- Tan, W-L, Gangopadhyay, P, & Hauptman, O (2020). Introduction to the special issue on “Grassroots and inclusive innovations: Conceptualizing synergies and complementarities”. *Technological Forecasting and Social Change*, 120409. <https://doi.org/10.1016/j.techfore.2020.120409>
- Tapia, AH, & Ortiz, JA (2008). Keeping Promises: Municipal communities struggle to fulfill promises to narrow the digital divide with Municipal Community Wireless Networks. *The Journal of Community Informatics*, 4(1). <https://doi.org/10.15353/joci.v4i1.2968>
- Tipu SAA, Ryan JC (2022) Are business and management journals anti-replication? An analysis of editorial policies. *Manag. Res. Rev.* 45(1):101–117. <https://doi.org/10.1108/MRR-01-2021-0050>
- Toshkov D (2016). *Research design in political science*. Bloomsbury Publishing
- Treanor MC, Patrick R, Wenham A (2021) Qualitative Longitudinal Research: From Monochrome to Technicolour. *Soc. Policy Soc.* 20(4):635–651. <https://doi.org/10.1017/S1474746421000270>
- Tsang E (2014b) Generalizing from research findings: The merits of case studies. *Int. J. Manag. Rev.* 16(4):369–383. <https://doi.org/10.1111/ijmr.12024>
- Tsang E (2014a) Case studies and generalization in information systems research: A critical realist perspective. *J. Strategic Inf. Syst.* 23(2):174–186. <https://doi.org/10.1016/j.jsis.2013.09.002>
- Ulriksen MS, Dadalauri N (2016) Single case studies and theory-testing: the knots and dots of the process-tracing method. *Int. J. Soc. Res. Methodol.* 19(2):223–239. <https://doi.org/10.1080/13645579.2014.979718>
- UNCTAD. (2021). *Covid-19 and e-commerce: a global review* (United Nations Publications, Issue. <https://unctad.org/publication/covid-19-and-e-commerce-global-review>
- Valvi AC, Frangos CC, Frangos CC (2013) Online and mobile customer behaviour: a critical evaluation of Grounded Theory studies. *Behav. Inf. Technol.* 32(7):655–667. <https://doi.org/10.1080/0144929X.2013.789082>
- Vázquez Maguirre M, Portales L, Velásquez Bellido I (2018) Indigenous social enterprises as drivers of sustainable development: Insights from Mexico and Peru. *Crit. Sociol.* 44(2):323–340
- Vermicelli S, Cricelli L, Grimaldi M (2021) How can crowdsourcing help tackle the COVID-19 pandemic? An explorative overview of innovative collaborative practices. *RD Manag.* 51(2):183–194. <https://doi.org/10.1111/radm.12443>
- Vincent O (2023) An economy in the making: Negotiating capitalist and beyond-capitalist ontologies and relations in makerspaces. *Environ. Plan. A: Econ. Space* 55(1):3–21. <https://doi.org/10.1177/0308518x221124140>
- Walker RM, James O, Brewer GA (2017) Replication, experiments and knowledge in public management research. *Public Manag. Rev.* 19(9):1221–1234. <https://doi.org/10.1080/14719037.2017.1282003>
- Wiegel V, King A, Mozaffar H, Cresswell K, Williams R, Sheik A (2020) A systematic analysis of the optimization of computerized physician order entry and clinical decision support systems: a qualitative study in English hospitals. *Health Inform. J.* 26(2):1118–1132
- Williamson E, Abrahams H, Morgan K, Cameron A (2014) Tracking homeless women in qualitative longitudinal research. *Eur. J. Homelessness* 8(2):69–91
- Wings.coop (2022) Next steps: The future for Wings. <https://www.wings.coop/news/next-steps>
- van Witteeloostuijn A (2016) What happened to Popperian falsification? Publishing neutral and negative findings: Moving away from biased publication practices. *Cross cultural strategic Manag.* 23(3):481–508. <https://doi.org/10.1108/CCSM-03-2016-0084>
- Wrona T, Gunnesch M (2016) The one who sees more is more right: how theory enhances the ‘repertoire to interpret’ in qualitative case study research. *J. Bus. Econ.* 86(7):723–749. <https://doi.org/10.1007/s11573-015-0799-8>
- Yin RK (2013) Validity and generalization in future case study evaluations. *Evaluation* 19(3):321–332. <https://doi.org/10.1177/1356389013497081>
- Yin, RK (2009). *Case study research: Design and methods* (Vol. 5). sage
- Yu S, Alper H.E, Nguyen AM et al. (2017) The effectiveness of a monetary incentive offer on survey response rates and response completeness in a longitudinal study *BMC Med Res Methodol* 17:77
- Zhang, J, Zamani, ED, Gerli, P, Mora, L (2024). Co-constructing cooperative value ecosystems: A critical realist perspective. *Information Systems Journal*, n/a(n/a). <https://doi.org/10.1111/isj.12549>

Acknowledgements

This work has been supported by the European Commission through the Horizon 2020 project FinEst Twins (Grant No. 856602).

Author contributions

Paolo Gerli: Conceptualization, Methodology, Investigation, Writing—Original Draft, Writing—Review & Editing. Fabio Neves da Rocha: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing—Review & Editing; Luca Mora: Conceptualization, Methodology, Writing - Review & Editing.

Competing interests

The authors declare no competing interests.

Ethical statements

This article does not contain any studies with human participants performed by any of the authors.

Informed consent

This article does not contain any studies with human participants performed by any of the authors.

Additional information

Correspondence and requests for materials should be addressed to Paolo Gerli.

Reprints and permission information is available at <http://www.nature.com/reprints>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Open Access This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

© The Author(s) 2025