Technoficing: Reinterpretation of Gandhian Perspectives on Technology

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1 Introduction

It is anticipated that social enterprises will encourage innovation adoption among the marginalized through intermediation activities to achieve social impact (Ramani et al., 2017). Such collaborative work of intermediaries with local organizations and institutions contributes to the creation of livelihood opportunities for people experiencing poverty through digital[1] and innovative solutions (Bhatt et al., 2021;

[1] We acknowledge that the digital technology has potential to impact on social interactions within organizational (Qureshi et al., 2018a) and online context (e.g. Qureshi et al., 2020, 2022a); however, in this case our focus is on rural marginalized communities, sometimes referred to as the base of the pyramid populations (Qureshi et al., 2016, 2021a, b, c, d)

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Escobedo et al., 2021; Hota et al., 2021; PwC, 2022; Qiu et al., 2021; Zainuddin et al., 2022). The approach to the use of technology, as purported by Gandhi, emphasized on the importance of working together with both public-public and public-private institutions, particularly in relation to informal, farmer-centered innovations (Singh et al., 2020). Farmers have evolved into negotiators and co-creators of knowledge and innovation under this people-centric innovation framework (Chambers, 2009; Parth et al., 2021; Parthiban et al., 2020a, 2021). However, rural areas in India face multiple challenges due to caste and gender-based marginalization (Bhatt, 2013, 2022, Bhatt et al., this volume-a, 2023; Hota et al., 2023; Maurer & Qureshi, 2021; Qureshi et al., 2017, 2018b, 2022b, 2023; Riaz & Qureshi, 2017; Sutter et al., 2023) and deteriorating environmental situation (cf. Bansal et al., 2014; Wang et al., 2022). For example, only 13% of women own land, while over 85% of rural women are employed in agriculture, diluting their negotiating power in society significantly (Oxfam India, 2018, see also, Bhatt et al., 2022; Ghatak et al., this volume). This needs inclusive development through technology that can be used by anyone in rural and marginalized contexts.

A path to technological self-reliance for inclusive development was shown by Gandhi when he promoted the Khadi movement. Spinning and weaving activities mostly using the simple *Charkha*—a small, portable spinning wheel used to spin cotton or other fibers into thread—were adopted as a means to improve the conditions of the marginalized segment of society (Dixit & Lal, 2016; Menon, 2020). It was expected then that leveraging such an appropriate technology would be socially liberating, resource-conserving, and employment generative. It seeks to achieve a balance between industry and agriculture, as well as between modern and traditional technology traditions (Guha, 1988). Gandhi's concern about technology's social, economic, political, and philosophical impact conflicts with the industrialization envisioned by policymakers at the time of India's independence. However, there is increasing awareness about sustainable and responsible technologies after the introduction of the United Nations Sustainable Development Goals that promote a bottom-up approach through a participatory framework and offers avenues for co-designing and co-creation with the stakeholders (Chien et al., 2021; Qureshi et al., 2021d; Rothe et al., 2022). This chapter employs a Gandhian framework of appropriate technology to examine how social enterprises leverage *technoficing* for social transformation. *Technoficing* is *"the purposeful pursuit of social objectives using a technology that is good enough and appropriate"* in the contexts it is being deployed (Qureshi et al., 2021d, p. 654, see also 2022b).

Further, this chapter explores how a *technoficing* approach to development aligns with Gandhian views of appropriate technology. We also explore the role of the *technoficing* approach in creating value for the beneficiaries of a social intermediary in the Indian context. This is relevant since social intermediaries face severe challenges in co-designing a socio-technical approach for societal welfare purposes (Cortesi et al., 2022; Fogli et al., 2020; Parthiban et al., 2021) especially in a country as diverse as India, which is divided among several social fault lines (Bhatt, 2022; Pillai et al., 2021a, b; Qureshi et al., 2023; Sutter et al., 2023). The process of information diffusion and technology adoption is challenging in resource-constrained

contexts characterized by social hierarchy (Qureshi et al., 2018b, 2022b, 2023). It is essential for the intermediaries to adapt their activities that not only take into account the context of the beneficiary community but also build their capabilities (Bhatt et al., 2022; Qureshi et al., 2023). Thus, intermediaries need to be socially oriented and committed to maximize the marginalized communities' benefits and align social intermediation activities with these objectives when implementing digital social intermediation (Parth et al., 2021; Parthiban et al., 2020a, b, 2021; Zainuddin et al., 2022). We study a social intermediary, with extensive partnerships with its various field-based organizations that engage with rural marginalized farming communities.

In addition to contributing to the Gandhian, *technoficing*, and social intermediation literature, the findings shed light on achieving social impact through technoficing, which can benefit practitioners engaged in resource-constrained environments. Digital social innovation that utilizes a *technoficing* approach is defined by several key elements, including easy-to-use technology, the establishment of linkages with community members, familiarity with supported activities, awareness of marginalization, and social stratification.

2 Theoretical Background

2.1 Gandhi's Views on Technology

The perspective of Gandhi on technology is rooted in the principles of distributive justice, equitable access to resources, and the provision of basic necessities (Ninan, 2009; Bakker, 1990; see also, Qureshi et al., 2022b, 2023). According to Gandhi, technology should be contextual and relevant to the society it serves and must prioritize the alignment between technology and people (Roy, 2007), who are expected to use it, to reduce costs, and to increase accessibility for the marginalized (see Qureshi et al. 2021d, 2022b). The Charkha is an exemplar of this approach, as it provided a sense of agency to society through decentralized means in resource-constrained settings (Bhaduri & Kumar, 2009). Gandhi also recognized the need to locate industries among the masses, rather than centralized production centers, as this approach ensures that the benefits of industrialization are available to marginalized communities (Patnaik & Bhowmick, 2019).

Moreover, Gandhi emphasized the need for appropriate technology that enhances the productive capacities of the masses and can be utilized by less-skilled laborers (Prahalad & Mashelkar, 2010). This technology must be socially and culturally flexible, affordable, and prioritize the welfare of the individual over the quantity of commodities transacted. Gandhian innovation requires an uncompromising focus on people and integration of all areas of innovation, rendering discrete categorization unnecessary. The principles of *Swadeshi* and self-reliance are central to Gandhi's approach to technology, as is a gender-sensitive, integrated approach to ensure that the most marginalized have their fundamental needs met (Patnaik & Bhowmick, 2019).

Gandhi's perspective on technology challenges the traditional approach to innovation, as it integrates all areas of innovation and requires a clear vision and inclusive goals. To achieve a dynamic interdependence based on cooperative competition and Gandhian innovation, it is essential to place technology and business models appropriately. A deep analysis of the social structure is required to determine the applicability of relevant technology and to empower the community by leveraging their traditional knowledge and diverse talents. Overall, Gandhi's perspective on technology prioritizes the welfare of the individual and the social fabric of society, rather than mass consumption and accumulation of knowledge that is detached from the ground realities.

2.2 Social Intermediation

Social intermediation refers to the process of connecting individuals or groups from marginalized communities to formal markets to enable knowledge sharing, co-creation, economic value addition, and enhance livelihood opportunities (Kistruck et al., 2008, 2013a, b, Pandey et al., 2021; Parth et al., 2021; Parthiban et al., 2021; Pillai et al., 2021b; Qureshi et al., 2021d). It is a critical aspect of rural development in societies where social and economic constraints due to extensive social stratification and discriminatory social norms impede the livelihood opportunities for the marginalized (Bhatt et al., 2022, this volume-a, 2023; Qureshi et al., 2022b, 2023; Sutter et al., 2023). In such contexts, social intermediation plays a vital role in bridging the gap between marginalized communities and market access and leading to interactions among the various social groups, thus enhancing collaboration and promoting economic development (Bhatt 2022; Bhatt et al., 2023, this volume-a; Parthiban 2020a, b; Qureshi et al. 2018b; Hota et al., 2019, 2023).

Digital technology can aid social intermediation (Qurehi et al., 2021a, b, c, d). In rural areas, where traditional market structures are primitive and dispersed and poverty alleviation programs are hindered by discriminatory social norms, *technoficing* can serve as a means of promoting social intermediation. The digital social innovation projects that leverage the *technoficing* approach can enable knowledge sharing between communities, enhance social transformation, and create economic value in resource-constrained settings. However, to promote effective social intermediation, it is crucial to ensure that capacity building in rural areas is robust enough to enable the participation of marginalized groups. The absence of formal institutions and mistrust among communities can hinder the participation of external agencies and their personnel in rural development activities. To overcome these challenges, robust boundary workers are required to facilitate substantive knowledge sharing and participant transformation (Qureshi et al., 2018b). Furthermore, social capital plays a significant role in enabling social intermediation activities in rural areas (Bhatt, 2017; Bhatt et al., 2019, Qureshi et al., 2016). Gandhian literature indicates that it is the collective capital and not the individual capabilities of the social groups that will guarantee capability expansion (Mehmood & Imran, 2021; cf. Galang &

Vaughter, 2020). Therefore, being socially embedded in the context is a prerequisite, for any manner of development through social innovation and *technoficing*. This is consistent with Gandhian teachings regarding constructive work and *Sarvodaya*, in which he advocated for the eradication of social fault lines to promote collaboration and economic development. Given the difficulties in overcoming such entrenched fault lines, social intermediaries use various approaches such as scaffolding, constructive work, and prolonged persuasion (Bhatt et al., 2022; Qureshi et al., 2023; Sutter et al., 2023).

Thus, social intermediation plays a vital role in promoting inclusive development (Mahajan & Qureshi, this volume) in rural areas by connecting diverse communities, enabling knowledge sharing (Qureshi et al., 2018b), and creating livelihood opportunities (Bhatt & Qureshi, this volume; Bhatt et al., this volume-a, b; Iyengar & Bhatt, this volume; Javeri et al., this volume; Kumar et al., this volume; Qureshi et al., 2022b;). *Technoficing* can serve as an effective approach to implement digital social innovation through social intermediation in resource-constrained settings. However, effective social intermediation requires robust capacity building, the involvement of boundary workers, and the promotion of social capital to overcome the challenges posed by social stratification and discriminatory social norms in rural areas. Next, we discuss technoficing in detail.

2.3 Technoficing *and Social Value Creation*

In recent years, the concept of *technoficing* proposed as a pragmatic and context-specific approach to technology deployment (Qureshi et al., 2021a, b, c, d, 2022b). *Technoficing* emphasizes the use of existing technology that meets basic needs and can be easily integrated into local infrastructure, rather than developing new technology from scratch. This approach can save time and resources while also promoting greater accessibility and adoption of technology in areas where technical support for advanced technology may be lacking. *Technoficing* recognizes the rapid pace of digital technology evolution and the limitations of seeking cutting-edge technology in resource-constrained contexts. Instead, it focuses on choosing technology that is good enough for the purpose it is being deployed, aligns with the available infrastructure, and is easy to use and maintain (Qureshi et al., 2021d). This approach can promote local ownership and sustainability of technology, as it is more likely to be adopted and maintained by the local community if it aligns with their existing infrastructure and is easy to use and maintain (Qureshi et al., 2022b).

There are several aspects in which *technoficing* differs from the appropriate technology approach that aims to design and develop technologies specifically for the local context. The "appropriate technology" approach emphasizes the designing of technologies, sometimes from scratch, that are simple and environmentally sustainable to address development challenges. We acknowledge that the term appropriate technology encompasses some concepts we wish to convey through *technoficing*. Nevertheless, we also acknowledge that the term appropriate technologies carry

certain limitations and connotations. Based on our experience with organizations such as Center for Appropriate Technology (CfAT) and Centre for Technology Alternatives for Rural Areas (CTARA), we understand that appropriate technology refers to a movement aimed at designing and developing technologies that are specifically tailored to the rural context. While this approach has had some success in non-digital technology domains, such as improvised cookstoves and solar lamps, it has proven to be challenging and unsustainable in the realm of digital technology, as it requires significant resources and quickly becomes obsolete due to the rapid evolution of digital technologies (e.g., One Laptop per Child (OLPC) project). Therefore, an alternative approach would be to select readily available technologies that are simple to use, fit for the purpose they are being deployed, aligned with the existing infrastructure (e.g., using mobile connectivity instead of broadband), and easy to maintain, rather than attempting to develop from scratch a context-specific appropriate technology that may be elusive. We refer to this approach as *technoficing*, which entails leveraging commonly available and accessible technologies to achieve broader social impact in rural areas. In this context, rather than prioritizing cutting-edge or state-of-the-art features, the focus of technoficing should be on meeting local needs, ensuring technology availability and accessibility for the community, which aligns with a more inclusive view of development rather than a technocratic approach.

Technoficing relies on off-the-shelf technologies that are affordable, adaptable, and align well with the capacity of the local participants or the resources in the local context. It is designed to be easily adopted and involves basic and uncomplicated solutions that integrate well with local, physical, or social infrastructure. This approach provides an alternative to conventional technocratic development models, where societies are expected to grow their capacity to absorb technology. *Technoficing* instead adapts technology to address societal issues and prioritize social objectives.

Social intermediaries play a crucial role in *technoficing* by engaging various stakeholders to adopt digital social innovation. In many societies, marginalized groups face several barriers to adopting digital social innovation (Bhatt et al., 2022; Qureshi et al., 2021d, 2023). By creating awareness, reducing barriers for marginalized groups to adopt digital social innovation, and ensuring equitable participation, social intermediaries improve the adoption of technoficed digital solutions (Qureshi et al., 2022b; Sutter et al., 2023). Social intermediaries use the implementation of digital social innovation projects as opportunities for creating dialogues across social groups and ensuring inclusive participation, which then helps ensure all the local skills and resources can be leveraged toward the success of technoficed digital solutions (cf. Qureshi et al., 2022b; Pereira Junior & Spitz, 2017; Sutter et al., 2023). Social intermediaries embedded in the community activities and engaged in improving their livelihood opportunities are essential in coordinating, collaborative information exchange among potential participants, and localizing technological interventions based on hyperlocal knowledge (cf. Qureshi et al., 2021d). Successful social intermediaries employ a mix of technology and social agency to facilitate the implementation of digital social innovations through a technoficing approach. This

collaborative approach and social embeddedness of social intermediary foster local ownership and ensure that technology aligns with the needs and capacities of the local community.

Technoficing can also promote social value creation through the exchange of ideas and knowledge within the community (Qureshi et al., 2018b, 2022b). By prioritizing simpler technological solutions that are affordable and adoptable, *technoficing* encourages the marginalized population to become innovative producers of products and services leveraging digital social innovation rather than mere consumers. This approach empowers the community and fosters a sense of ownership and agency in addressing their own problems. While it may take a long time to convince each social group in the heterogenous and hierarchical communities, the benefit of technoficed solutions implemented by social intermediaries lies in the long-term social, environmental, and economic benefits, which are inclusive, and sustainable.

Thus, *technoficing* presents a pragmatic and context-specific approach to technology development and deployment that prioritizes the use of off-the-shelf technology that is good enough for the purpose for it is being deployed. This approach can lead to greater accessibility, affordability, and sustainability of technology, particularly in resource-constrained contexts. By acknowledging the limitations of seeking cutting-edge technology and focusing on what is feasible and appropriate in the local context, *technoficing* offers a more realistic and effective approach to technology development and deployment. Social intermediaries play a crucial role in facilitating the implementation of *technoficing* by bridging marginalized contexts with formal markets, coordinating information exchange among various social groups to create awareness and localizing technological interventions. This approach empowers local communities, promotes social value production, and fosters sustainable and inclusive development.

3 Case Description

The study focuses on Digital Green (DG), a global not-for-profit organization that uses technoficed solutions to create social impact for marginalized farmers. DG aims to promote sustainable agriculture and development outcomes by leveraging technology and data to increase farmers' income, resilience, and agency. The organization is operational in several regions across South Asia and Eastern Africa, impacting over 2.3 million households where more than 75% of beneficiaries are women (Kementan, 2022; Digital Green, n.d.). DG operates in seven states in India and employs over 150 people in various verticals such as agriculture, public health, and market access (Kementan, 2022). DG utilizes several technological solutions, including Community Videos, Interactive Voice Response System (IVRS) support, market platform, and community-based organizations to improve the conditions of marginal communities. These solutions are employed in collaborative projects across states like Jharkhand, Odisha, Bihar, Andhra Pradesh, Telangana,

Chhattisgarh, Uttarakhand, and Assam in India. For purposes of this study, we focus on only their flagship project of Community Videos with IVRS and Short Messaging Service (SMS) support.

Community Videos are produced in several verticals of DG, all of which function under the objective of improving the productivity of the farming community along with their social outcomes. The videos are produced by agricultural extension and frontline workers (FLWs) in a participatory manner with the productive farmers and disseminated in community gatherings. The extension workers are predominantly men, and women form the FLWs. The technology used for the production and dissemination activities includes basic off-the-shelf technologies such as digital cameras and Pico projectors. In special cases, remote dissemination of community videos takes place through WhatsApp messenger, which can also be supported with IVRS facilitation.

4 Field Observation

DG has implemented ICT solutions for development and has established a successful platform of interventions through a collaborative model of knowledge co-creation. For the purpose of this study, we direct our attention toward their most notable initiative, *Community Videos*, which incorporates IVRS and SMS support. Additionally, this intervention is positioned as a cross-cutting approach across multiple projects undertaken by DG.

4.1 Easy-to-Use *Solution: Implementing Digital Social Innovation*

As previously mentioned, Community Videos represent one of DG's most successful interventions, serving as a reliable source of information for agriculture and public health best practices through the creation and dissemination of localized videos. DG facilitates minimal capacity building in video production for community members, including agricultural extension workers and frontline workers (FLWs), utilizing basic off-the-shelf tools such as digital cameras for video recording. These videos are then shared with the wider community by screening them on walls using Pico projectors during Self-Help Group (SHG) gatherings, Farmer Producer Organization (FPO) meetings, and other panchayat activities. The contributors for these videos are mostly dominant or "progressive"[2] farmers, who have higher than

[2] Progressive here is used in the limited meaning of the term. We kept this term because it is commonly used by development professionals in India. A progressive farmer, as stated here, is one who due to the availability of resources is able to adopt a new practice before others. Also, due to sur-

average crop yields. They are not necessarily more literate and knowledgeable than other farmers. Still, sometimes they possess expertise in some farming activities and are willing to share their best practices, which are then captured in the video. The target audience for these videos is often other farmers in the vicinity, including marginalized groups, women, and marginalized castes, many of whom are illiterate farmers who face challenges in articulating and asserting their own knowledge (cf. Bhardwaj et al., 2021; Qureshi et al., 2022b). Recognizing this need in the rural contexts, DG leverages Community Videos to effectively articulate and disseminate knowledge, further strengthened by a robust IVRS and SMS service for warnings and reminders to reinforce the content and knowledge shared through the videos.

In contrast to adopting a technologically advanced platform for disseminating streaming videos to users' mobile phones, DG chose a simpler approach by utilizing portable battery-operated Pico projectors. This decision was in alignment with the rural remote infrastructure where the intervention was implemented, which faced challenges such as poor mobile reception, irregular electricity supply, and absence of broadband connectivity. Recognizing these limitations, DG opted for a practical and feasible solution that would overcome these infrastructural constraints and enable effective dissemination of the community videos. By using Pico projectors, DG was able to overcome the limitations of poor mobile reception and lack of broadband connectivity, allowing for wider access and viewing of the videos in the rural areas where the intervention was targeted. This decision highlights DG's strategic approach of considering the local context and leveraging technoficed solutions to ensure the effectiveness and sustainability of their interventions in rural remote areas.

Despite the utilization of a simple technology approach, the dissemination of knowledge through DG's technoficed approach, specifically the Community Videos using Pico projectors, has reportedly yielded significant positive outcomes. Productivity in farming communities has increased, indicating the effectiveness of this intervention in enhancing agricultural practices.[3] The content of the videos was reinforced by extension services such as weather forecasts and soil-related information, which are provided by extension workers and FLWs, further enhancing the knowledge-sharing process.

One notable advantage of the technoficed model is its low reliance on existing infrastructure, making it a cost-effective option. As the intervention utilizes off-the-shelf instruments and does not require advanced technological infrastructure such as broadband connectivity, it is affordable and feasible in rural remote areas where access to such infrastructure may be limited. This underscores the practicality and sustainability of the technoficed approach in addressing the knowledge dissemination needs of the target communities, while also taking into account the resource constraints and affordability considerations of rural areas. The positive outcomes

plus resources, a progressive farmer is willing to take risk. Most often progressive farmers belong to the dominant caste.

[3] An earlier study found that DG's approach is 10 times more effective than traditional training and visit approach (Gandhi et al., 2007)

achieved through this approach highlight the potential for leveraging technoficed solutions to achieve meaningful impact in rural development contexts.

In resource-constrained environments, it is important to use all the resources strategically, including technological ones. Thus, it is imperative for the social intermediary, DG in this case, to strategically utilize digital technologies to address challenges and bridge constraints faced by marginalized communities. In this scenario, where limited access to digital services, low literacy rates, and aversion to external intermediaries was prevalent, a low-cost technoficed solution was implemented to overcome these barriers. However, DG's role was crucial in overcoming the trust deficit, creating an inclusive environment, and removing apprehension about the technology. We discuss these aspects later in this findings section.

The solution DG chose leveraged digital cameras and Pico projectors, which were more cognitive in nature, and did not require extensive capacity building. This made it easier for the marginalized community to adopt without additional effort. The solution was designed to be user-friendly and accessible, taking into consideration the specific constraints of the resource-constrained environment. One key factor that contributed to the success of this intervention is the existing close-knit social groups within the community. Although social groups were initially antagonistic toward each other, they were socially cohesive within. These networks served as channels for spreading awareness and knowledge about the technoficed solution. The element of trust within the social groups played a crucial role in gaining acceptance and adoption of the solution. The familiarity of the technology, which was designed to be cognitively simple, also facilitated its adoption among the marginalized community.

The impact of this technoficed solution goes beyond addressing the immediate constraints of limited access to digital services, low literacy rates, and social barriers. It has the potential to empower the marginalized community by providing them with tools and resources to enhance their livelihoods, improve their economic opportunities, and strengthen within group linkages. By enabling the community to overcome its aversion to external intermediaries and take ownership of the solution, it fosters self-sustainability and resilience. Furthermore, the success of this technoficed solution in a resource-constrained environment highlights the potential of technology to be a catalyst for positive change, even in challenging contexts. It serves as a model for leveraging technology to address social and economic disparities and showcases how technology can be adapted and customized to suit the unique needs and constraints of marginalized communities.

Thus, the low-cost technoficed solution implemented by DG in the resource-constrained environment has been successful in bridging the constraints faced by the marginalized community. Through its user-friendly and cognitive nature and by leveraging existing cohesive groups, trust, and familiarity, the solution was able to overcome the challenges of limited access to digital services, low literacy rates, and aversion to external intermediaries. The eventual impact of this deployment goes beyond addressing immediate constraints and has the potential to empower the marginalized community, fostering self-sustainability and resilience. This successful

intervention serves as a model for leveraging technology in similar contexts, showcasing the transformative power of technology in addressing social and economic disparities (cf. Qureshi et al., 2018b).

4.2 Creating Linkages with Community Members

DG relies on existing village welfare institutions and their frontline workers, such as mediators, ASHA, and ANM workers, to create linkages within the community. Once these linkages are created, it helps record and disseminate videos for community welfare. The possession of technological tools, shared value of community welfare, and existing trust among community members empower workers to document, produce, and disseminate best practices. Feedback mechanisms, community gatherings, and SHG meetings further strengthen this endeavor. DG augments the existing cadre of FLWs and extension workers, providing them with a technoficed solution and capacity building to align institutional mechanisms with the community's social fabric.

The role of a social intermediary in creating linkages within communities is crucial for implementing digital social innovation with a *technoficing* approach. Digital social innovations are designed to address social challenges and create positive social change. Thus, it is imperative for a social intermediary to create linkages within the marginalized communities to understand their concerns ad requirements, which then informs *technoficing* approach to digital social innovation. Technoficing requires the infusion of technology into existing social practices and structures. A social intermediary acts as a facilitator, enabler, and implementer, bridging the gap between the community's expectations and digital social innovation using *technoficing* approach.

One of the key roles of a social intermediary is to establish and maintain linkages within communities. This means building strong relationships with community members; understanding their needs, challenges, and aspirations; and gaining their trust. By being embedded within the community, a social intermediary can better understand the social dynamics, cultural norms, and local context, which are critical factors for implementing digital social innovation effectively through *technoficing* approach. The social intermediary acts as a mediator between the community and the digital solution, translating the needs of the community with a good enough technology. Social intermediaries can translate technical jargon into accessible language that community members can understand. They can also provide education and training to build digital literacy skills among community members, enabling them to effectively utilize digital technologies for social innovation. This includes providing guidance on how to access and use digital tools, navigate various solutions, and understand the implications of using technology in their social context.

Furthermore, the social intermediary plays a vital role in identifying relevant digital technologies and integrating them into existing community practices. This involves understanding the unique needs of the community and identifying

appropriate digital solutions that align with their goals and aspirations. The social intermediary can also facilitate co-creation and co-design processes, involving community members in the design and development of digital solutions to ensure that they are contextually relevant and meet the community's needs. In addition, the social intermediary can help in building partnerships and collaborations between different stakeholders, such as community organizations, technology providers, policymakers, and researchers. These partnerships can leverage the collective knowledge, expertise, and resources of various stakeholders to support the implementation of digital social innovation initiatives. The goal is to keep technology as simple as possible and root it in the social context. Having strong community linkages helps achieve this goal. The social intermediary can also advocate for the needs and interests of the community, ensuring that their voices are heard and considered in the decision-making processes related to digital social innovation.

Overall, the role of a social intermediary with linkages within communities is crucial for implementing digital social innovation with a technoficing approach. By building relationships, translating technical concepts, facilitating co-creation, and fostering collaborations, the social intermediary can bridge the gap between technology and communities and ensure that digital social innovation initiatives are contextually relevant, inclusive, and sustainable.

4.3 Familiarity with Activities

In the context of digital social innovation implemented with a technoficing approach, familiarity with the activities for which the innovation is being implemented plays a crucial role. Trust and familiarity are important factors in ensuring the success and impact of the initiative. The FLWs (Frontline Workers) and extension workers helped DG gain familiarity with communities, as they were already embedded in the community and trusted by the community members. This helped bridge the gap of distrust that may have existed toward external intermediaries (cf. Qureshi et al., 2018b). This familiarity made the process of introducing and adopting technology solutions simpler and less aversive to the wider community.

The knowledge providers who produce the content for the digital social innovation initiative were the more productive community farmers who were familiar with the other farmers, who were shown these videos. This familiarity helped in capturing the nuances of the agricultural process and presenting it in a way that appealed to most audiences. The use of community videos with easy-to-adopt information provided by familiar farmers ensured better dissemination of information and understanding among the community members.

The weekly meetings of FLWs and extension workers with the community, which involved multiple screenings of the videos, provided opportunities for all to learn new techniques. The group meetings held for the screening process further enhance familiarity with the content and process. A robust feedback mechanism facilitated by the FLWs and extension workers, who were familiar with the

community members, helped in addressing issues and requesting clarifications in multiple iterations. The use of multiple iterations at the beginning of other videos for dissemination of important information ensured reinforcement of the information.

The familiarity of a social intermediary with the activities for which digital social innovation with a technoficing approach is being implemented is of utmost importance. It enables the social intermediary to better understand the specific needs, challenges, and nuances of the activities or practices being addressed, in this case, agricultural practices, to effectively design and implement digital solutions that are contextually relevant and impactful. There are several key reasons why familiarity with the activities is important for a social intermediary implementing digital social innovation with a technoficing approach.

First, contextual understanding helps a social intermediary become familiar with the activities or practices being addressed through digital social innovation and thus can help them better understand the context in which those activities take place. They can grasp the intricacies, complexities, and nuances of the activities, including the social, cultural, economic, and environmental factors that influence them. This deep contextual understanding allows the social intermediary to design and implement digital solutions that are well-aligned with the needs and realities of the activities, making them more effective and sustainable.

Second, familiarity with the activities enables the social intermediary to conduct a comprehensive needs assessment. They can identify the specific challenges, gaps, and opportunities associated with the activities and determine how digital technologies can best address them. This involves engaging with the stakeholders involved in the activities, such as the community members, practitioners, and other relevant actors, to understand their perspectives and gather insights. A thorough needs assessment is critical for developing targeted, contextualized, and relevant digital solutions that leverage *technoficing* approach and can have a meaningful impact on the activities.

Third, familiarity with the activities also facilitates meaningful co-creation and co-design processes. Co-creation requires involving the community members and other stakeholders in the design and development of digital solutions, while co-design entails collaboratively designing the solutions with their input. In DG's case, the farmers were involved as content creators, and local community members were involved as mediators for the dissemination of videos. When the social intermediary is familiar with the activities, they can engage in more meaningful and participatory co-creation and co-design processes. They can work closely with the stakeholders to co-create solutions that are tailored to the unique needs, preferences, and aspirations of the activities, resulting in solutions that are more likely to be accepted, adopted, and sustained by the community.

Fourth, digital social innovation with a technoficing approach aims to create solutions that are contextually relevant and sustainable. When the social intermediary is familiar with the activities, they can ensure that the digital solutions are designed in a way that is sensitive to the local context, culture, and practices. This includes factors such as language, literacy levels, accessibility, and usability of digital solutions. By ensuring local relevance, the social intermediary can increase the

likelihood of adoption and success of the digital social innovation initiatives, as they are better tailored to the needs and realities of the activities.

Finally, familiarity with the activities also helps build trust and credibility among the community members and other stakeholders. When the social intermediary demonstrates an understanding of the activities and their nuances, it establishes a level of trust and credibility, as the stakeholders perceive the social intermediary as someone who understands their context and is genuinely invested in addressing their needs. This trust is critical for effective engagement, collaboration, and co-creation processes, as it enables the social intermediary to build rapport, establish meaningful relationships, and create a conducive environment for implementing digital social innovation initiatives that utilize a *technoficing* approach.

Thus, the familiarity of a social intermediary with the activities for which digital social innovation with a technoficing approach is being implemented is of significant importance. It allows the social intermediary to have a deep contextual understanding, conduct needs assessments, facilitate co-creation and co-design processes, ensure local relevance, and build trust and credibility. All these factors contribute to the effective design and implementation of digital solutions with *technoficing* approaches that are contextually relevant, impactful, and sustainable, ultimately leading to positive social change.

4.4 Awareness of Marginalization and Social Stratification

The technoficing approach in digital social innovation, as exemplified in the case of DG, has shown how technology can empower marginalized groups, specifically women and marginalized castes, and address issues of inequalities and intersectionality. One key aspect is the use of inclusive technology that provides access to information and knowledge addressing specific challenges faced by women. These platforms offered by DG have helped women in farming communities to overcome the gender divide in access to farming and related practices. Through community gatherings facilitated by DG, women are provided with a forum to acquire knowledge, voice their views, and actively contribute to decision-making processes that were previously dominated by men. This has resulted in women gaining agency, leadership skills, and negotiation abilities, which are crucial for their empowerment in the institutional structure of their communities.

Furthermore, the use of technology, such as mobile devices, has facilitated virtual networking and engagement for women. Women who have gained access to technology through DG's initiatives are able to participate actively in virtual networks, which can provide them with additional avenues for learning, collaboration, and empowerment. The impact of this digital social innovation with a technoficing approach goes beyond just addressing gender inequalities in farming and related practices. It also has positive externalities in other areas, such as public health. For instance, men who may not traditionally participate in women-centric gatherings facilitated by DG about healthcare can still access information and knowledge

through videos provided by DG. This has helped men to learn and incorporate the knowledge gained into their responsibilities, including those related to reproductive health, leading to positive changes in the patriarchal mindset and contributing to better reproductive health outcomes for women.

The technoficing approach in digital social innovation, as demonstrated in the case of DG, highlights the potential of technology to bridge gender gaps, empower marginalized groups, and contribute to positive social change, if designed correctly with understanding marginalization issues. It underscores the importance of social intermediaries, such as DG, having awareness of the specific challenges, needs, and dynamics of the communities they work with, including issues of marginalization and social stratification. This awareness allows them to design and implement initiatives that are inclusive, participatory, and tailored to the context, leading to more impactful and sustainable outcomes.

The awareness of marginalization and social stratification in the social context where digital social innovation with a technoficing approach is being implemented is crucial for a social intermediary. It enables them to understand and address the complex social dynamics and power relations that may affect the implementation of digital solutions and to ensure that the innovation efforts do not inadvertently perpetuate or exacerbate existing inequalities. Here are some key reasons why awareness of marginalization and social stratification is important for a social intermediary implementing digital social innovation with a technoficing approach.

First, understanding marginalization and social stratification in the social context helps the social intermediary in conducting a comprehensive needs assessment and targeting the most vulnerable or marginalized groups. It enables them to identify the specific challenges and barriers faced by these groups in accessing and benefiting from digital solutions. This information is critical for designing targeted interventions that are tailored to the unique needs and realities of these groups. By taking into consideration the social dynamics of marginalization and social stratification, the social intermediary can ensure that the digital solutions are designed to reach and benefit those who need them the most and not further exclude or disadvantage marginalized populations.

Second, marginalization and social stratification are pervasive issues in many communities, with certain groups facing systemic disadvantages and discrimination based on factors such as caste, gender, ethnicity, socioeconomic status, and more. Social intermediaries who are aware of these inequalities can design and implement digital social innovation initiatives that specifically target and address these disparities. Most often a technoficed solutions it more aligned with marginalized communities as they lack resources to participate in digital social innovations that apply advanced technologies. By recognizing the unique challenges faced by marginalized groups, social intermediaries can develop solutions that are more inclusive, equitable, and responsive to the needs of these communities. Digital social innovation with a technoficing approach aims to create positive social change by leveraging digital technologies. However, if the social intermediary lacks awareness of marginalization and social stratification, there is a risk that the digital solutions may not be inclusive and may further marginalize already

vulnerable groups or exacerbate existing social disparities. Awareness of marginalization and social stratification allows the social intermediary to intentionally design digital solutions that promote equity, inclusion, and social justice. It helps them identify and address potential biases, discriminatory practices, and power imbalances that may arise during the implementation of technoficed digital social innovation initiatives.

Third, marginalized groups often face barriers to accessing and benefiting from digital technologies and social innovation initiatives. These barriers can be technological, financial, educational, cultural, or social in nature. Social intermediaries who are aware of marginalization and social stratification can identify these barriers and work toward overcoming them through properly structuring their technoficed digital social innovation. For example, they can develop strategies to bridge the digital divide, provide training and support for marginalized groups to build digital skills, or develop culturally relevant approaches to engage with communities that may have different social norms or practices. This awareness allows social intermediaries to proactively address barriers and ensure that digital social innovation initiatives are accessible to all members of the community, including marginalized groups.

Fourth, awareness of marginalization and social stratification also empowers the social intermediary to actively involve marginalized groups in the digital social innovation process. It allows them to create opportunities for meaningful participation and engagement of these groups, giving them a voice in decision-making, co-creation, and co-design processes. This empowerment can help marginalized groups gain ownership, agency, and a sense of belonging in the digital social innovation process, leading to more sustainable and impactful outcomes. By actively involving marginalized groups in *technoficing* approach, the social intermediary can also foster empowerment and social inclusion, contributing to the overall well-being and resilience of the community.

Fifth, digital social innovation with a *technoficing* approach raises ethical considerations related to data privacy, surveillance, consent, and power dynamics. Awareness of marginalization and social stratification helps the social intermediary navigate these ethical considerations with sensitivity and critical reflection while implementing technoficed digital social innovation. It allows them to carefully consider the potential impacts of digital solutions on marginalized groups and to ensure that ethical principles, such as fairness, accountability, and transparency, are upheld throughout the technoficed digital social innovation process. This awareness helps prevent unintended negative consequences and promotes responsible and ethical use of technology in the context of digital social innovation.

Sixth, ultimately, the awareness of marginalization and social stratification contributes to the creation of more sustainable and just outcomes in the implementation of digital social innovation initiatives. It helps the social intermediary consider the broader social context, power relations, and structural inequalities that may influence the outcomes of the innovation efforts. By addressing these issues, the social intermediary can work toward more equitable and inclusive outcomes that benefit all members of the community, particularly those who are

marginalized or disadvantaged. Social justice is a fundamental principle of social innovation. Being aware of marginalization and social stratification allows social intermediaries to critically reflect on the power dynamics, social norms, and systemic issues that contribute to inequalities in the community. This awareness enables them to work toward more just and equitable outcomes by advocating for social changes, challenging discriminatory practices, and promoting social cohesion and harmony within the community.

Thus, the awareness of marginalization and social stratification in the social context where digital social innovation with a technoficing approach is being implemented is essential for social intermediaries. It allows them to design and implement initiatives that are inclusive, equitable, empowering, and socially just. By addressing these issues, social intermediaries can contribute to positive social change and foster sustainable and impactful outcomes in the context of digital social innovation. It also helps them navigate ethical considerations and quandaries.

5 Discussion

In this case study, we examined a case of a social intermediary that implemented a digital social innovation using a *technoficing* approach to create social impact in a marginalized community. It relied on deploying an easy-to-use solution, creating linkages with the community members, leveraging its familiarity with the agriculture practices, and showing an awareness of marginalization and social stratification. The case aimed to demonstrate how a technoficing model, aligned with the Gandhian framework, can be used by a social intermediary to effectively address social challenges. Despite the resource constraints, the simplicity of the digital social innovation made it easily adaptable and contributed to the community's self-reliance through efficient information delivery. This study contributes to the literature on social entrepreneurship, *technoficing*, and Gandhian concepts of village development and self-reliance.

The existing literature on social entrepreneurship has mainly focused on the effectiveness of technological innovation in providing simple ICT solutions to address societal issues. Digital intermediation is widely seen as a way to tackle societal problems, but there are limited examples of how social innovation drives such efforts. The findings of this study shed light on an example where a technoficed solution was deployed to maximize social impact and how it aligns with Sustainable Development Goal (SDG) through improved agricultural extension services. The study also highlights how the technoficed model offers an alternative pathway to sustainable development in marginalized contexts, as it avoids some of the challenges associated with the horizontal scaling of social organizations.

Furthermore, this study contributes to Gandhian literature by showcasing how technoficing aligns with the Gandhian concept of minimalist technology use. *Technoficing* is in sync with the Gandhian approach of technology being affordable, easy to adopt, and applicable in resource-constrained contexts, that is, the

technology of the marginalized and poor. The technoficed intervention also leverages technology while accommodating cultural diversity, fostering participation and social inclusion. It demonstrates how village self-reliance can be achieved without significant strains on meagre resources and limited technology skills, aligning with Gandhian principles of democratized development.

Additionally, this case study exemplifies how existing resources, skills, and networks can be leveraged to form innovative collaborations and implementation. The findings also highlight how the social intermediary addresses multifaceted societal issues with uncomplicated solutions, particularly in making digital social innovation more inclusive. This aligns with existing literature on social sustainability and environmental sustainability. These findings also contribute to Gandhian studies by expanding the concept of Sarvodaya, where marginalized communities possess agency and become more confident and self-sustained.

The strategic utilization of digital technologies by social intermediaries in resource-constrained environments, such as DG in this case, is crucial for addressing challenges and bridging constraints faced by marginalized communities. DG's low-cost *technoficing* approach, which utilized user-friendly and cognitive technologies like digital cameras and Pico projectors, successfully overcame barriers of limited access to digital services, low literacy rates, and aversion to external intermediaries. The solution was tailored to suit the specific constraints of the resource-constrained environment, showcasing its potential to empower the marginalized community and foster self-sustainability and resilience. This serves as a model for leveraging technology to address social and economic disparities in similar contexts, demonstrating the transformative power of technology.

The role of a social intermediary in creating linkages within communities is crucial for implementing digital social innovation with a *technoficing* approach. Social intermediaries need to establish and maintain strong relationships with community members; understand their needs, challenges, and aspirations; and gain their trust. By being embedded within the community and understanding the local context, social intermediaries can effectively implement digital social innovation through *technoficing*. They act as mediators, translating technical concepts into accessible language for community members, providing education and training to build digital literacy skills, identifying relevant digital technologies, facilitating co-creation and co-design processes, and building partnerships and collaborations between stakeholders. The goal is to keep technology simple and rooted in the social context, and strong community linkages help achieve this goal. The social intermediary also advocates for the needs and interests of the community, ensuring that their voices are heard in decision-making processes related to digital social innovation.

In the context of implementing digital social innovation with a *technoficing* approach, social intermediaries must be aware of marginalization and social stratification to ensure that the innovation efforts do not perpetuate or exacerbate existing inequalities. This awareness is crucial for several reasons. First, it enables social intermediaries to conduct a comprehensive needs assessment and target the most

vulnerable or marginalized groups, designing interventions that are tailored to their unique needs and realities. Second, awareness of marginalization and social stratification allows for the development of solutions that specifically address systemic disadvantages and discrimination faced by marginalized groups, leading to more inclusive and equitable outcomes. Third, it helps identify and overcome barriers to access and benefit from digital technologies and social innovation initiatives, such as technological, financial, educational, cultural, or social barriers. Fourth, it empowers social intermediaries to actively involve marginalized groups in the innovation process, giving them a voice in decision-making and co-creation processes. Fifth, awareness of ethical considerations related to data privacy, surveillance, consent, and power dynamics allows for responsible and ethical use of technology in the context of digital social innovation. Last, awareness of marginalization and social stratification contributes to the creation of more sustainable and just outcomes by considering the broader social context, power relations, and structural inequalities that may influence innovation efforts. Ultimately, this awareness enables social intermediaries to design and implement initiatives that are inclusive, equitable, empowering, and socially just, fostering positive social change and impactful outcomes in the context of digital social innovation.

6 Conclusion

In conclusion, the strategic utilization of digital technologies by social intermediaries in resource-constrained environments, exemplified by DG's low-cost *technoficing* solution, has shown to be crucial for addressing challenges faced by marginalized communities. By tailoring interventions to suit the specific constraints of the environment, social intermediaries can empower marginalized communities, foster self-sustainability, and bridge social and economic disparities. The role of a social intermediary in creating strong linkages within communities is essential for implementing digital social innovation with a technoficing approach, including translation of technical concepts, building digital literacy skills, facilitating co-creation processes, and advocating for community needs. However, social intermediaries must also be aware of marginalization and social stratification to ensure that their efforts are inclusive, equitable, and socially just. This awareness allows for targeted interventions, overcoming barriers to access, empowering marginalized groups, considering ethical considerations, and creating sustainable outcomes. Overall, leveraging technology through social intermediaries in resource-constrained environments has the potential to drive positive social change and transformative impacts through digital social innovation.

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