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Disentangling tech-enabled system change in social enterprises: an empirical exploration of Ashoka fellows

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Abstract

Purpose – The complexity of contemporary societal challenges in emerging countries reanimates the necessity of collective action to resolve them. What is required is system change, namely, transformations in policy, practice, power relationships, market dynamics and social customs that underlie social and environmental issues. Technological innovations, paired with intentional social changes, might play a transformative role in this effort. This paper aims to investigate the relationship between the adoption of technologies in social enterprises (SEs) and their contribution to achieving system change. It also addresses the effects of their hybrid nature on this relationship.

Design/methodology/approach – The analysis relied on data collected through a survey of the global population of Ashoka fellows, which is largely based in emerging economies. Three models were developed concerning different pathways to achieve system change identified in the theoretical framework. These were tested using Probit regressions.

Findings – The investigation confirms that technology can support SEs in navigating complex pathways to achieve system change rather than merely enabling linear scaling operational strategies. The pursuit of economic value creation, in conjunction with a social mission, decreases the ability of SEs to achieve system change. This is because the scaling paths which hardly create revenues are neglected.

Originality/value – The study conceptualises a multifaceted model of system change. It tests the framework empirically to show that SEs can adopt technologies to unleash complex system change processes to generate societal impact, on top of merely demonstrating linear approaches to scaling or replication. The paper questions the capacity of SEs to facilitate system change without appropriate financial support and the inherent tensions between hybridity and the depth of system change dynamics.

Keywords Hybrid organisations, Sustainable development, System change, Technology adoption, Social enterprises

Paper type Research paper

1. Introduction

The magnitude of contemporary societal challenges reanimates collective efforts to resolve them, including the role of businesses. However, the complexity of these problems requires that the dynamics that govern human actions are altered deeply, to tackle their causes rather than

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provide provisional solutions to their symptoms. Indeed, all involved actors should aim to scale their social innovations up to the system change level (Batalla, 2022; Seelos and Mair, 2018). System change refers to any collective modification or transformation in policies, power relationships and structures, social customs and norms that underlie social and environmental issues (Gopal and Kania, 2015; Clarke and Crane, 2018). In this regard, the achievement of system change requires that actors mobilise heterogeneous resources and allies to change institutions, as widely discussed by institutional entrepreneurship literature (Battilana *et al.*, 2009). System change can be considered a subset of a broader conceptualisation of institutional change because it refers to different systemic areas that should evolve together towards the resolution of an existing societal problem (Teasdale *et al.*, 2023).

More recently, scholars (Scillitoe *et al.*, 2018; Monroe-White and Zook, 2018; Del Giudice *et al.*, 2019) have begun to explore the role of technological innovation in addressing so called wicked problems such as climate change, poverty, sanitation, pollution and sustainable cities (Elia and Margherita, 2018), which also leverage social entrepreneurial models. These problems lack a clear "stopping rule" (i.e. they lack a clearly defined problem and a subsequent solution state) and are often characterised by multiple explanations and unpredictability in their future developments. Moreover, even in local contexts, these problems often exhibit a high degree of "cognitive complexity" and irreconcilable differences in stakeholders' perspectives (Alford and Head, 2017; Lönngren and Van Poeck, 2021). This renders "purely state" and "purely market" solutions ineffective. In these contexts, social enterprises (SEs) can proactively contribute to novel potential solutions by acting as intermediaries that assemble widely heterogeneous actors, processes, ideas and objects (Teasdale *et al.*, 2023). This social innovative approach can lead to the generation of system change, defined as altering the defining routines, resources, authority flows and beliefs of the broader social system (Teasdale *et al.*, 2023).

In the field of social entrepreneurship, it is increasingly recognised that the adoption of innovative technologies can enhance the effectiveness of social interventions (Arena *et al.*, 2018; Alshawaaf and Lee, 2021; Torres and Augusto, 2020). Additionally, this adoption helps to broaden the societal legitimacy of these technologies by associating them with addressing unmet societal needs (Gerli *et al.*, 2021; Calderini *et al.*, 2023). This encompasses various types of technology, including adoption models for digital technologies designed to engage marginalised segments of the population or the development of proprietary technology that leverages Big Data to create inclusive and personalised digital social services. It can also involve the co-creation of appropriate technologies with communities and the development of affordable, frugal innovation artefacts using local materials (Franco and Arrobbio, 2022; Mishra, 2021).

On the other side, the relationship between technology adoption and the generation of societal impacts is complex, as the technological element might also create unintended consequences that hamper the generation of collective benefits in the field of social work (as limiting participation) or create novel forms of exclusion (Kanungo and Gupta, 2021), limiting rather than enabling system change. These potential negative impacts might be mitigated when technology is embedded in an organisation such as SEs which are driven by the intentional aim of developing innovative and effective solutions to existing societal issue (Desa, 2012; Haigh *et al.*, 2015; Margiono *et al.*, 2017; Zahra and Wright, 2016).

This paper investigates whether the adoption of technologies by social enterprises (SEs) correlates with their capacity to achieve system change. Additionally, we aim to explore how hybridity, defined as the combination of social and economic value creation (Battilana and Dorado, 2010; Pache and Santos, 2013), influences the relationship between technology adoption and the achievement of system change. This examination could shed light on the

discrepancies between the system change ambitions of social entrepreneurs and their actual "market-oriented" activities (Teasdale *et al.*, 2023). These activities may often be operationally less radical than expected in local contexts, leading to potential mission drift.

This research stems from a non-onerous collaboration between the authors and Ashoka, the most extensive social entrepreneurs' network worldwide with over 3,800 social entrepreneurs in 94 countries, to conduct the Ashoka Global Impact Fellow study. The paper, thus, uses a sub-set of the data collected through the survey which was jointly designed and delivered by the authors and Ashoka team to fellows affiliated with Ashoka. Ashoka fellows have already been widely used as a source of empirical analysis about SEs in other academic research (e.g. Lubberink *et al.*, 2018; Di Lorenzo and Scarlata, 2019; Turker and Ozmen, 2021; Duncan-Horner *et al.*, 2022).

Using a quantitative methodology grounded in descriptive statistics and probit regression analyses, the paper develops a model encompassing various system change dynamics and empirically examines the association between these dynamics and the adoption of technologies by SEs.

The analysis reveals that SEs adopting technologies are more likely to achieve the complexity necessary for system change. It identifies several modes in which SEs can exploit technologies to foster such transformations: carrying out communication and awareness campaigns; generating evidence to support policymakers; and improving the level of inclusiveness of market institutions. Results also indicate that SEs using technologies are more inclined to address market-related issues while partially neglecting less monetisable dynamics of system change.

Our results contribute to different literature streams. Firstly, the study adds to the growing literature on the scaling of impact by formalising and empirically investigating the difference between the linear and efficiency-oriented conceptualisation of "scaling" (which is often translated from the business world to frame the work of SEs), and the impact of holistic complexity of system change in solving pressing societal challenges (Islam, 2020a; Teasdale *et al.*, 2023). The paper conceptualises as well a multifaceted model of system change which expands the knowledge of SE scaling strategies, incorporates an institutional entrepreneurship perspective (Battilana *et al.*, 2009) and provides an empirical contribution on these topics (Teasdale *et al.*, 2023).

Secondly, the analysis identifies several technology- enabled actions that can support societal impacts on mindsets, institutions and markets. This empirically expands the understanding of social value creation processes in SEs (Weerawardena *et al.*, 2021). Thirdly, the adoption of technologies for societal aims in profit- and market-oriented social entrepreneurial organisations is investigated, expanding the research on hybrid organising (Battilana *et al.*, 2012).

The remainder of the paper is structured as follows. Initially, an overview of the literature on scaling social impact is provided, emphasising the need for a holistic and comprehensive approach at the system level. This is followed by a theoretical discussion on the role of technology in facilitating the scaling of solutions that aim for system change. Subsequently, the research design is described, detailing a framework derived from social impact scaling literature as well as the methodology used for data collection and analysis. The results of this analysis are then presented, along with a discussion of their theoretical and practical implications. Finally, the paper concludes by proposing several directions for future research.

2. Literature review

This literature review focuses on two main topics. Firstly, it outlines the concept of system change and how it relates to the generation of societal impacts by SEs. Secondly, it discusses

the literature on technology adoption in SEs and its relationship to the creation of societal value at the systemic level.

2.1 Beyond scaling impact: achieving system change

One of the most critical criteria in judging the performance of SEs is their ability to respond coherently with the magnitude of societal challenges (Kruse *et al.*, 2023; Molecke and Pinkse, 2017). This effort is often referred to as "scaling social impact" (Dees, 2008; Bradach, 2010; Lyon and Fernandez, 2012; Palomares-Aguirre *et al.*, 2018). Even though scaling social impact is a popular research topic (Dees *et al.*, 2004; Bloom and Chatterji, 2009; Lyon and Fernandez, 2012; Vickers and Lyon, 2014; Desa and Koch, 2014; Dobson *et al.*, 2018), a level of ambiguity remains in its definition. Seminal studies (Bradach, 2010; Clark *et al.*, 2012; Davies and Simon, 2013; Lyon and Fernandez, 2012) offer a robust definition, stating that SEs follow principles other than those used by profit-oriented commercial organisations to increase the generation of societal value. Literature on non-profit and non-governmental organisations from the 1990's (Edwards and Hulme, 2000; Uvin and Miller, 1996) defines scaling as increasing "the outcomes the organisation has generated beyond just the organisation itself" (Clark *et al.*, 2012, p. 5). Recently, Islam provided an integrative interpretation of the concept as "an ongoing process of increasing the magnitude of both quantitative and qualitative positive changes in society by addressing pressing social problems at individual and/or systemic levels through one or more scaling paths" (Islam, 2020a, p. 2). Therefore, the ultimate objective of an SE is to address a problem on a systemic level, on top of catering to the well-being of individual beneficiaries. This conceptualisation is also consistent with the well-known study of the social innovation process as proposed by Murray *et al.* (2010); the last two stages of every socially innovative process are "scaling" and "system change". System change "usually involves the interaction of many elements: social movements, business models, laws and regulations, data and infrastructures, and entirely new ways of thinking and doing" (Murray *et al.*, 2010, p. 13).

System change is grounded in the concept of system where different components interact organically and depends on collective action. System change can be categorised into two types. The first, termed "first-order system change", is based on incremental improvements within existing practices. By contrast, the more radical "second-order system change" involves paradigm shifts that alter the overall framing of issues and problems, as described by Foster-Fishman *et al.* (2007). This entails changing the underlying social frameworks that shape our understanding of issues, as discussed by Newey (2018).

To fulfil scaling efforts completely, SEs should be able to generate large-scale paradigm and system change in social systems (Islam, 2020b; Teasdale *et al.*, 2021). However, the literature on social impact scaling (Bauwens *et al.*, 2020; Lyon and Fernandez, 2012; Vickers and Lyon, 2014; André and Pache, 2016; El Ebrashi, 2018) mostly examines breadth-oriented strategies that impact more individuals by expanding the organisation's activities and/or their scope, rather than aiming to "address the structural causes of market imperfections and social injustice, and aims at social transformation through community engagement and empowerment" (Desa and Koch, 2014, p. 149). Conversely, this research focuses on those paths labelled "depth scaling" (Heinecke and Mayer, 2012). These act at the systemic level by generating radical, "divergent" adjustments to laws, resource flows, cultural ideas and connections at many spatial or institutional scales (Islam, 2020b). SEs can be key contributors to achieving system change, thereby acting as "change agents" in their respective contexts. Specifically, the potential of SEs as change agents conceptually links "system change" to an institutional entrepreneurial perspective. Like institutional entrepreneurs, SEs, as "system changers", leverage resources to create new institutions and transform existing ones, as

argued by Maguire *et al.* (2004). According to Tiberius *et al.* (2020), as agents of "system change", they intentionally disrupt old institutions. They furthermore function both as initiators and implementers of diverse change pathways, as detailed by Battilana *et al.* (2009).

2.2 Paths to achieve system change

This section delineates various avenues that SEs can follow to achieve system change, which are derived from the extant literature on scaling impact. The system change paths used in this research are outlined in Figure 1.

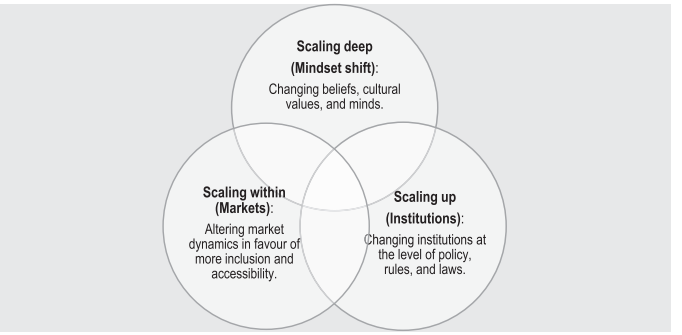
The first path is referred to as "scaling deep". It concerns impacting cultural roots, and alters relationships, cultural values and beliefs. The societal mindset shift path (Hubert, 2010; Nicholls and Murdock, 2012; Fisk *et al.*, 2019) seeks to modify individual and collective mindsets to enable system change (Fisk *et al.*, 2019).

The second path is "scaling up". It entails initiatives to impact regulation and policy and changing institutions and codifying innovative approaches at the level of policy, rules and laws. Indeed, to embed mindset shifting into dominant thinking, it is necessary to act on the institutional and legislative sphere by aiming to alter laws, rules and policies. Public policy interventions can play a critical role in the diffusion and deepening of social innovation and the societal impacts of SEs. In the absence of a favourable institutional context and the presence of institutional barriers, SEs are motivated to scale up their efforts to challenge the broader institutional rules that created the problem (Uvin and Miller, 1996; Westley *et al.*, 2014). As such, acting on existing policies, regulations and institutional frameworks is necessary to achieve system-wide scaling (El Ebrashi, 2018).

Lastly, the concept of altering market dynamics by SEs was introduced within the conceptualisation of system change, represented by the third path "scaling within". Changes in market-based economic systems encapsulate the notion of market-shaping, which is the process by which the deliberate actions of market actors construct or transform market systems (Kullak *et al.*, 2022; Lyon and Fernandez, 2012). Market shaping through social innovation refers to how organisations might intentionally establish or modify markets for objectives other than economic growth (Nenonen *et al.*, 2019).

2.3 The role of technology in system change achievement

The literature has examined the role of technology in scaling, particularly its role in reaching larger audiences (Kedmenec *et al.*, 2019; Spear and Chan, 2019; Maiolini *et al.*, 2016;



Source: Authors' own work

Figure 1. Conceptual model of system-change

Millard and Carpenter, 2014). In particular, the current academic discourse identifies many technological functions in scaling the generation of social value (Kedmenec *et al.*, 2019). The most frequently mentioned technological function is to educate the public about the social issues that a given social initiative aims to address, with technological tools being used to disseminate information and spur public interest. In favouring dissemination, technology can act as a catalyst for raising awareness, and can foster the replication of a given social innovation or social business model (Cuéllar-Galvez *et al.*, 2018). Moreover, when SEs leverage technological capabilities to capture network benefits, they can scale out from one place to many new geographical locations (Alijani and Wintjes, 2017). Equally frequent is the administrative role played by technology. It is used to facilitate communication and the organisation of information, both within and outside SEs, allowing other actors to replicate the social innovation more easily. In this sense, Gupta *et al.* (2020) argue that technology is fruitful for scaling purposes as it allows actors to develop a common language and common tools to collaborate with, which is necessary for scale. Although the technology has been used for replication (which is well evidenced in the current literature (Mulgan, 2021), its scaling impact on SEs extends beyond replication. As mentioned, SEs should embrace a broader perspective to achieve system change (Barinaga, 2012; Islam, 2020a), altering systemic dynamics that govern human action. Although replicability, dissemination, organic growth or affiliation (Dees *et al.*, 2004; Heinecke and Mayer, 2012) are all compelling scaling strategies, focusing on these linear operational strategies risks diverting attention from broader systemic impact or system-wide scaling. Therefore, analysing the role of technology merely in terms of replicability is not exhaustive.

From another perspective, the adoption of technologies within the boundaries of SEs can also jeopardise their depth and comprehensive transformative nature. Firstly, leveraging emerging and innovative technologies in SEs may lead to the creation of novel forms of exclusion by developing a technological divide between new technology-users and non-users, between those able to use the technologies and those unable to (e.g. elderly citizens and low technologically literate users) (Kanungo and Gupta, 2021, on fintech organisations). Secondly, adopting technologies and substituting human capital with more "technology-intensive" approaches may negatively impact the relational and participatory dynamics that are inherent to many forms of social work carried out by SEs. Technological automation, standardisation and top-down approaches in adopting technologies may contribute to making beneficiaries more passive and less actively involved in those collective and systemic transformational processes that are needed to solve societal challenges (Sareen, 2021; Darcy *et al.*, 2021). This is why open, crowd-oriented approaches are pivotal in the technological development of SEs (Sareen, 2021). The relationship between the adoption of technologies and the achievement of system change is therefore complex and multifaceted, and has not yet been empirically explored.

2.4 Hybridity in scaling social impact

A related factor that might influence the relationship between the adoption of technologies and the achievement of system change is the hybrid nature of SEs. Indeed, SEs can adopt a social entrepreneurial configuration, leveraging forms of commercial entrepreneurship and trading to provide solutions to wicked problems (Margiono *et al.*, 2017). SEs use a market-oriented business model to create societal benefits rather than being merely non-profit organisations. Mixing commercial activities and social purpose, SEs are characterised by the dynamic co-existence of two different principles; market logic and social welfare logic (Smith *et al.*, 2013). This positions them as hybrid organisations (Doherty *et al.*, 2014). These hybrid organisations combine social and economic value creation into one

entrepreneurial and organisational model (Battilana and Lee, 2014; Santos *et al.*, 2015). A few studies (Dobson *et al.*, 2018; Kannothra *et al.*, 2018; Pache and Santos, 2010; Tasavori *et al.*, 2018) attempt to analyse the impact of SE scaling challenges through the lens of hybridity. However, none of them consider technology adoption. On the one hand, the hybrid nature of the SE might enable or ease the adoption of technology to reach system change because the adoption of technologies can satisfy the SEs' need for capital (Arena *et al.*, 2018) that may be acquired through their commercial activity. On the other hand, this, coupled with potentially larger economic sustainability margins enabled by technologies, may amplify the trade-off between the creation of social value and economic sustainability (Grassi and Toschi, 2021; André and Pache, 2016) bringing about managerial tensions, ethical challenges and potential mission drift (Battilana and Dorado, 2010; Smith *et al.*, 2013; Pache and Santos, 2013; Battilana *et al.*, 2022). Indeed, such tensions may be mirrored in a shift towards market-client based perspectives within SEs, where beneficiaries are increasingly perceived as passive "clients" leading to a reduction in active participation (which is counterproductive for system change) (Darcy *et al.*, 2021; Teasdale *et al.*, 2023).

Battilana (2018) notes that the literature has not yet fully explored whether the inherent coexistence of social and economic objectives in SEs either facilitates or complicates the role of technologies in enabling system change.

2.5 Literature gap and research questions

To conclude, the literature review identifies two primary, interconnected gaps. Firstly, existing research has insufficiently examined the impact of technology adoption on the capacity of SEs to achieve system change. This departs from a linear, business-centric view of scaling social impact, which is typically biased towards replication strategies and neglects the radicalness of system change. Secondly, while some research has explored the relationship between hybridity and scaling social impact (André and Pache, 2016), this topic has not been specifically studied in the context of technology-enabled social value creation. Therefore, this study aims to address the following research questions:

RQ1. Is the adoption of technologies in SEs linked to the achievement of multifaceted system change? If so, how does this occur?

RQ2. How does hybridity influence the relationship between technology adoption and system change achievement in SEs?

3. Research design

This section describes the components of the research design necessary to address the research questions. Broadly speaking, the study adopts a positivist perspective, as evidenced by the formalisation of its framework and the choice of the empirical methodology. Despite this approach, it integrates elements that permit an open interpretation of the results. In attempting to model and simplify the intricate interactions between system change, SEs and technology adoption, the research model's hypotheses preserve a notable degree of flexibility. This flexibility is pertinent to the direction and specific manners in which diverse technologies interface with the changemaking activities of SEs. From this perspective, this empirical endeavour seeks to identify and explore specific areas of enquiry within system change dynamics. These areas are appropriate for analysis in subsequent studies that are more processual and interpretive in nature, following the approach outlined by Sanchez *et al.* (2023).

3.1 Research model

Building on the gap in the literature in identifying the relationship between technology and system change and given the presented framework, two main hypotheses were established to guide the empirical analysis:

H1.1 The adoption of *technology* in SEs is associated with the achievement of *system change* in terms of *mindset shift [scaling deep]*.

H1.2 The adoption of *technology* in SEs is associated with the achievement of *system change* in terms of *modifying laws, policies and institutions [scaling up]*.

H1.3 The adoption of *technology* in SEs is associated with the achievement of *system change* in terms of *addressing market dynamics [scaling within]*.

H2. The relationship between the use of technology and the achievement of system change is negatively affected by the *hybrid nature* of SEs when they adopt the three different system change pathways: *scaling up [HP2.1]; scaling deep [HP2.2]; scaling within [HP2.3]*.

Three different statistical models were developed to examine each research hypothesis (HP), within the three different paths used by SEs to achieve system change as outlined in Section 2.2 of the literature review chapter. The operationalisation of three main paths to achieve system change (scaling deep, scaling up, scaling within) includes different modes that were analysed separately.

The main variables used to analyse the relationships of interest are listed in Table 1.

Model 1 was constructed using dependent variables related to the scaling deep path. Model 2 concerned the change in terms of scaling up. Lastly, Model 3 related to scaling within activities. As part of the scaling deep model, the potential for a mindset shift related to societal and cultural norms was analysed. This included indicator variables concerning the use of communication strategies as well as mobilising people behind a certain vision through activities undertaken to gain support for and acceptance of new routines. Secondly, regarding scaling up, institutional questions concerning regulatory and legislative initiatives came into focus. The changes achieved by SEs (from their ability to provide advice and previously missing evidence to policymakers, convincing governments to allocate funds for specific causes and realising legislative change) were assessed. Finally, concerning scaling within, the focus was on the ability of SEs to affect market-based economic systems. The analysis covered four indicator variables related to the ability to achieve increased market transparency and accessibility, as well as achieving change in industry rules and creating new sources of income for marginalised social groups. An overview of the models can be found in Table 2.

In all models, control variables were added to test for the effect of other variables on the relationship under investigation ("Control variables"):

(1) Firm-specific effects
- urban or rural setting of activity;
- number of employees;
- number of volunteers;
- reduction in funding due to COVID-19; and
- reduction in revenue due to COVID-19.

Table 1. Main variables

Variable name	Type	Description
Technology use in SEs	Dummy/ independent	The SE was asked whether it adopts technology (as defined by the authors in the survey based on Gupta *et al.*, 2020; Kline, 1985; Scillitoe *et al.*, 2018). SEs include not for profit, hybrid or for profit legal and organisational structures (Moroz and Gamble, 2021; Weerawardena *et al.*, 2021)
Technology use and hybrid nature	Dummy/ independent	The organisation, as well as adopting technology, has a hybrid nature that is profit-oriented as well as socially oriented (Ismail *et al.*, 2012; Grassi and Toschi, 2021) In a specific survey question, SEs were asked whether they have a not for profit, hybrid or profit legal and organisational structure. Hybrid SEs include only those reporting a hybrid or for profit legal and organisational structure
Scaling deep	Dummy/ dependent	The SE adopts a mindset-shifting stance Two *modes* were outlined in the survey: 1. solutions based on *campaigns and other communication strategies* aimed at reaching large numbers of people (Kedmenec *et al.*, 2019); 2. *mobilising people* behind a certain vision through activities undertaken to gain others' support for and acceptance of new routines (Battilana *et al.*, 2009)
Scaling up	Dummy/ dependent	The SE acts on the institutional and/or legislative sphere. In particular, this refers to actions including creating an enabling policy environment, convincing governments to allocate financial resources towards social and/or environmental causes, building partnerships and collaborations involving public bodies aimed at addressing social and/or environmental causes (Murray *et al.*, 2010; Nicholls and Murdock, 2012; Westley and Antadze, 2010; Uvin, and Miller, 1996) Four *modes* were outlined in the survey: 1. *advisory activities* to policymakers as an expert; 2. *providing evidence* and/or previously missing data to policymakers to inform the development of legislation; 3. *convincing governments to allocate funds* to a specific cause; 4. *influencing legislative change* or government policy
Scaling within	Dummy/ dependent	The SE adopts a market-shaping stance (Kullak *et al.*, 2022; Lyon and Fernandez, 2012; Nenonen *et al.*, 2019) Four *modes* were outlined in the survey: 1. solutions that aimed at *improving market transparency* by, for instance, reducing information asymmetries (e.g., price information, products information…); 2. solutions that aimed at *improving market accessibility* by guaranteeing trade opportunities to marginalised groups; 3. solutions that led to *changes in the conduct of a large organisation or industry* to better respond to societal and environmental changes; 4. solutions that generated *new income sources for marginalised groups*

Source: Authors' own work

Table 2. Models explained

Model	Dependent variables	Independent variable
Model 1	*Scaling deep* – Use of communication strategies – Mobilise people behind a certain vision	*HP1*: technology use in SEs *HP2*: hybrid nature
Model 2	*Scaling up* – Provided advice to policymakers – Provided previously missing evidence to policymakers – Convinced governments to allocate funds – Achieved legislative change	*HP1*: technology use in SEs *HP2*: hybrid nature
Model 3	*Scaling within* – Increased market transparency – Increased market accessibility – Achieved industry policy change – Created new sources of income	*HP1*: technology use in SEs *HP2*: hybrid nature

Source: Authors' own work

(2) Country-specific effects
   - number of countries of activity; and
   - continents of activity.

(3) Sector-specific effects
   - economic development;
   - human rights;
   - climate and planet;
   - gender equality;
   - education;
   - civic participation;
   - ageing;
   - tech for good;
   - health care.

Source: Author's own work

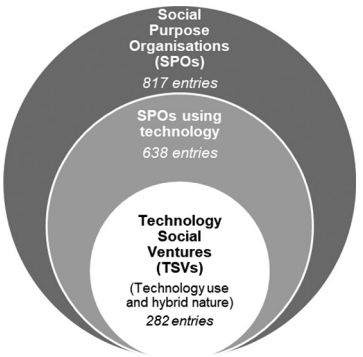
The first controls were related to firm-specific effects, including the main operational context (be it urban, rural or both), as well as the number of employees [1] and volunteers [2] of the organisation, and the impact of the COVID-19 pandemic on the organisation's revenue and funding. The second cluster of controls was concerned with country-specific effects, including the number of countries in which the social purpose organization (SPO) operated [3] in and its continent of origin. Both national and continental fixed effects were examined in the various estimations (Monroe-White and Zook, 2018), capturing the systemic aspects that characterise a territory and affect innovativeness, thus highlighting the unique nature of local systems. Finally, the models were controlled for sector-specific effects, spanning nine different sectors of operation, namely, economic development, human rights, climate and planet preservation, gender

equality, education, civic participation, ageing, tech for good and health care. By accounting for the main area of the organisation's impact, the concept of "industry" mentioned in the literature on technology adoption could be approached (Engelstätter and Sarbu, 2013).

3.2 Population and sample description

The data source of the study is the population of organisations affiliated with the Ashoka network. Ashoka is an international foundation that provides social innovators and entrepreneurs with means of improving their problem-solving roles in society (Lubberink *et al.*, 2018). Ashoka was a fruitful source of data for the purposes of this study as it is an internationally recognised non-profit organisation and it has been pioneering in the field of social innovation since 1980. About 4,000 fellows have participated in Ashoka to date in 95 countries globally. Due to its size, recognition and global outlook, Ashoka fellows have frequently been used as a source of data and analysis for extensive academic research throughout the years (Duncan-Horner *et al.*, 2022; Di Lorenzo and Scarlata, 2019; Lubberink *et al.*, 2018; Turker and Ozmen, 2021). The data was ideal for the intentions of this study. All Ashoka fellows successfully went through a rigorous selection process at Ashoka, which required them to generate a novel solution to a problem that could have a significant impact on society.

Data were collected through a survey administered to those 3,109 Ashoka fellows from the salesforce list of all fellows ever elected, excluding deceased fellows, fellows with unknown status, people whose fellowships were terminated or fellows who graduated inactive. Therefore, the population includes SEs that were both not-for-profit organisations (form a legal and organisational standpoint) and limited liability companies (Moroz and Gamble, 2021; Weerawardena *et al.*, 2021). The analysis considered 817 SEs which responded to the survey. Using the survey responses, two types of SEs were discerned from among the 817 respondents; those SEs (638) that developed and deployed technologies as a core element to accomplish their social value proposition, and SEs (282) where the adoption and usage of innovative technologies in the core of the social value proposition was accompanied by a hybrid business model which was oriented to the market in addition to their primary pursuit of social value (Figure 2). Only these hybrid SEs were analysed to



Source: Authors' own work

Figure 2. Survey respondents infographic (numbers of entries refer to the number of organisations in that category responding to the survey)

answer the second research question concerning how hybridity influences the relationship between technology adoption and system change achievement.

Furthermore, the population was highly heterogeneous. Table 3 shows the composition in terms of geography. Africa (excluding North Africa), MENA, Asia and Latin America collectively made up over 70% of the entire population. In terms of type of problems addressed, education represented the primary area of impact for fellows, followed by health, economic development and climate and planet protection. The least diffused concerns were gender equality and diversity and ageing. This level of heterogeneity made the Ashoka fellows population a reliable data source to represent the phenomenon of social entrepreneurship.

Moving to the distribution in our sample of the analysed variable, namely, the use of technology and hybridity, out of the 775 organisations that responded to the question on the use of technology, 638 (82%) of SEs reported affirmatively. Of the 817 organisations surveyed, 282 reported using technology and having a hybrid nature simultaneously. These organisations represented 35% of the sample. It is also possible to describe the sample based on how tech adopting SEs achieved system change leveraging on the different modes defined above. Regarding the first system change path (*HP1.1*, *HP2.1*), scaling deep, a large majority (88%) of SEs (which remained consistent between organisations that used and did not use technology) responded that they aimed to mobilise people to support a specific vision. This is in stark contrast to a weaker proportion that based their solutions on communication strategies to reach many people. However, among the latter group, technology-using SEs dominated with 46% compared to 28% for non-users. The scaling up dimension (*HP1.2*, *HP2.2*) shows a progressively lower rate of affirmative responses when moving along the continuum from effective policy advice to actual policy implementation, including the provision of previously missing evidence to policymakers and the actual allocation of government funds to social causes. In each of these variables, however, SEs that used technologies performed significantly better than those that did not. Finally, concerning the scaling within figures (*HP1.3*, *HP2.3*), an even dispersion among the answers given by the SEs was found, with a slightly lower affirmative rate for the organisations' ability to foster greater market transparency in their market of interest (40%). Once again, the SEs adopting technologies outperformed those that did not use technology in each of the affirmative responses for the variables under consideration.

3.3 Data collection

This study relied on primary data collected through a survey under the initiative of the Ashoka Global Impact Fellow study. Specifically, the authors supported the Ashoka team to

Table 3. Ashoka fellows population (as of March 2021)

Population	Share (%)
Africa (except NA)	*13.5*
MENA	*3.6*
Asia	*29.2*
Europe	*17.5*
Latin America	*26.5*
North America	*9.7*

Source: Authors' own work

structure the survey they usually administer biannually to investigate the impact achieved by their affiliated fellows. The project of drafting, delivering the survey and analysing the data was a non-onerous collaboration between the authors and the Ashoka team. The former were in charge of drafting the structure and questions of the survey based on an appropriate theoretical background and of analysing the data collected. The latter contributed the specific knowledge of its fellows population and its worldwide network of local branches and staff to refine and administer the questionnaire (for example each local branch was in charge of translating the survey in the local language while the overall translation process was supervised by the authors to ensure consistency). At the end of the survey submission, the authors received the raw questionnaire responses which were used for the analysis. Ashoka granted the authors the permission to use the data collected through the survey. Ashoka Fellows represent a unique population of SEs given the population's size, heterogeneity (in terms of sectors and geographies) and the acknowledgement of their effort in achieving system change. Among the several topics addressed by the survey which included around 70 questions, the authors decided to focus on a specific theme: the role of technology in the change-making activities of fellows. The questions which probed this relationship were purposefully included in the survey and were based in the theoretical framework presented above.

Fellows were asked to declare whether they used technology in their change-making activities. Specifically, technology referred to hardware and artefacts manufactured by humans, embedding knowledge, know-how and enabling systems for their usage (Kline, 1985). The definition of technology adopted in the survey referred to advanced, cutting-edge, "hi-tech" technologies, but also to "low-tech", simple, artisanal do-it-yourself artefacts, including even "retro-innovations" in intermediate and appropriate technology approaches (Franco and Arrobbio, 2022; Kaplinsky, 2011), which may be traditional or non-mechanical in character (Scillitoe *et al.*, 2018). The survey did not include the ordinary use of widespread "over-commodified" technologies such as computers and mobile phones for generic managerial and operational activities unrelated to the specifics of the social purpose.

Concerning social impact and change, the fellows were asked whether their idea had achieved change in market systems (scaling within), in public policy (scaling up) or focused on mindset shift (scaling deep). They could select one or more modes (coherently with the broad perspective offered by institutional entrepreneurship) as explained in "Control variables" or none of them if they had not achieved any change in that specific area. Respondents were also questioned on the implementation of the activities and their results by providing practical examples that attested to the pursuit of system change through one or more modes. Such examples were then verified by the authors on a sample basis to increase the objectivity of the reporting and mitigate perception-related interpretations, which are a methodological drawback of surveys.

The survey was administered to 3,109 Ashoka fellows in an online format through the Qualtrics platform between March and April 2021 and was made available in a wide range of languages, in line with its global outreach. The population targeted by the survey was well-specified but the questionnaire was then filled anonymously. One week after the initial email, the research team sent a second email to all opted-in fellows through Dotmailer (a software used to send emails to large groups of recipients). Several reminders via email were sent out every two weeks. The survey collected 817 responses, with an overall response rate of 26.3%.

Ex post, to avoid bias, the authors performed several checks of the representativeness of the sample respondents compared to the population of Ashoka fellows that received the survey. Firstly, the authors checked the composition of respondents in terms of geography,

gender, societal issues addressed and year of election as Ashoka Fellow compared to the population. Secondly, to define a satisfactory size of responses, a margin of error of ±3% was set with a 95% confidence level, which is considered above the acceptable threshold for similar empirical efforts. Thirdly, a check for the nonrespondent bias was performed by comparing early respondents to late respondents. In this case, early respondents were comprised 19% of responses collected after the first email was sent via Qualtrics; while late respondents comprised the remaining 81% of responses collected following reminders. No statistically significant difference was detected.

3.4 Data analysis

The three models presented in Section 3.1 were tested using Probit regressions. The survey responses initially took the form of nominal categorical variables, which were subsequently encoded into indicator variables in most instances to facilitate regression analysis. Given the categorical and dichotomous nature of the variables involved, the empirical estimation method used in this study was a Probit regression model (Blydenburgh, 1971). The survey was constructed with the final purpose in mind, rather than a purpose-neutral survey, which accounts for the choice not to conduct a PCA to select variables used in the paper.

The models were tested on a 0.1%, 1% and 5% significance level and all of them were tested based upon the goodness of fit. Tables 4–7 show the coefficients that emerged from the analysis and the related interpretations are presented in the next Section 4.1.

Table 4 displays the significant coefficients of the technology adoption variable in the first model.

As for the second model, the analysis demonstrated a weak, yet statistically significant correlation. However, non-significant coefficients were detected in the scaling up paths 2.3 and 2.4 as shown in Table 5.

Furthermore, the control variables in Models 1 and 2 did not yield any statistically significant outcomes.

As for the last model related to the first set of hypotheses, significant coefficients were found in paths 3.1, 3.2 and 3.3 as shown in Table 6.

Table 4. HP1.1: technology use in SEs at scaling deep level (with selected controls)

	Model 1 – Scaling deep [4]	
	Path 1.1 *Based on communication strategies*	Path 1.2 Mobilising people
Technology use in SEs	0.496*** (0.15)	0.062 (0.18)
Firm-specific effects		
Number of employees	−0.000 (0.00)	0.001 (0.00)
Country-specific effects		
Number of countries	0.003 (0.00)	0.003 (0.01)
Sector-specific effects		
Climate and planet	−0.428 (0.41)	0.236 (0.59)
Constant	−0.077 (0.42)	1.278* (0.59)
Observations	638	638

Notes: Significance levels: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own work

Table 5. HP1.2: technology use in SEs through scaling up (with selected controls)

	Model 2 – Scaling up			
	Path 2.1 Advised policymakers	Path 2.2 Provided evidence	Path 2.3 Convinced govs to allocate funds	Path 2.4 Achieved legislative change
Technology use in SEs	0.321 (0.17)	0.398* (0.16)	0.233 (0.16)	0.224 (0.15)
Firm-specific effects				
Number of employees	0.000 (0.00)	−0.001 (0.00)	0.000 (0.00)	0.000 (0.00)
Country-specific effects				
Number of countries	−0.004 (0.00)	−0.004 (0.00)	−0.000 (0.00)	0.001 (0.00)
Sector-specific effects				
Climate and planet	0.358 (0.55)	0.145 (0.59)	−0.001 (0.71)	0.270 (0.47)
Constant	0.504 (0.57)	0.439 (0.61)	0.403 (0.73)	0.425 (0.47)
Observations	586	584	576	618

Notes: Significance levels: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own work

Table 6. HP1.3: technology use in SEs through scaling within (with selected controls)

	Model 3 – Scaling within			
	Path 3.1 Improved transparency	Path 3.2 Improved accessibility	Path 3.3 Led to industry policy change	Path 3.4 Generated new income sources
Technology use in SEs	0.593*** (0.17)	0.523** (0.17)	0.469** (0.17)	0.242 (0.17)
Firm-specific effects				
Urban/rural	−0.136 (0.07)	−0.089 (0.07)	−0.135 (0.08)	−0.214** (0.07)
Covid funding reduction	0.249 (0.14)	−0.030 (0.14)	0.036 (0.15)	0.345* (0.14)
Country-specific effects				
Continents	0.006 (0.04)	−0.030 (0.04)	−0.103* (0.04)	−0.094* (0.04)
Sector-specific effects				
Economic development	1.026 (0.53)	1.177* (0.51)	0.795 (0.48)	1.317* (0.51)
Climate and planet	0.697 (0.54)	0.729 (0.52)	1.080* (0.50)	0.902 (0.51)
Constant	−0.703 (0.54)	−0.078 (0.52)	0.596 (0.50)	0.074 (0.52)
Observations	584	573	618	611

Notes: Significance levels: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source: Authors' own work

In this case, the analysis identified statistically significant results with some of the control variables, even if the coefficients were relatively weak.

As for the second set of hypotheses, the investigations did not reveal significant correlations for *HP2.1* and negative correlations for *HP2.2*, while the coefficient presented in Table 7 suggest mixed results for the *HP2.3* as discussed in the following section.

4. Results

In this section, we outline the results of the analysis organised according to the two main research hypotheses investigated by the paper: whether the use of technology by SEs was

Table 7. HP2.3: hybrid SEs' activity through scaling within (with selected controls)

	Model 3 – Scaling within			
	Path 3.1 Improved transparency	Path 3.2 Improved accessibility	Path 3.3 Led to industry policy change	Path 3.4 Generated new income sources
Tech use + hybrid nature	0.392** (0.13)	0.366** (0.14)	0.238 (0.15)	0.176 (0.13)
Firm-specific effects				
Urban/rural	−0.155* (0.07)	−0.100 (0.07)	−0.135 (0.08)	−0.212** (0.07)
Covid funding reduction	0.252 (0.14)	−0.030 (0.14)	0.004 (0.15)	0.331* (0.14)
Country-specific effects				
Continents	0.013 (0.04)	−0.026 (0.04)	−0.094* (0.04)	−0.093* (0.04)
Sector-specific effects				
Economic development	0.976 (0.53)	1.156* (0.52)	0.935* (0.45)	1.387** (0.49)
Human rights	0.633 (0.54)	0.599 (0.52)	0.771 (0.46)	1.038* (0.50)
Climate and planet	0.654 (0.54)	0.743 (0.52)	1.232** (0.47)	0.973* (0.49)
Civic participation	0.400 (0.54)	0.271 (0.52)	1.147* (0.48)	0.305 (0.49)
Constant	−0.349 (0.54)	0.186 (0.51)	0.687 (0.45)	0.126 (0.48)
Observations	282	282	282	282

Source: Authors' own work

associated with system change achievement (*HP1.1*, *HP1.2* and *HP1.3*); and whether the hybrid nature of SEs − balancing societal goals with market-driven profits − affected these dynamics (*HP2.1*, *HP2.2* and *HP2.3*).

4.1 The role of technology in scaling deep, scaling up and scaling within

The three models were analysed to test the effect of technology (independent variable) on system change achievement. The first model evaluated *HP1.1* to ascertain if the adoption of technology influenced the achievement of system change in terms of scaling deep. The findings indicated a correlation between technology adoption in SEs and the goal of effecting a shift in social mindsets. This supports the widely acknowledged notion in existing literature that technology possesses an inherently disseminative role in initiatives aimed at systemic change. Technologies can propagate initiatives capable of altering mindsets through various communication types, including campaigns and social media, as highlighted by Kedmenec *et al.* (2019). However, the analysis did not find statistical significance for the impact of technology use on another aspect of mindset shift, specifically advocacy actions. Such actions are deemed crucial for encouraging the acceptance of new routines and enabling individuals to become active agents of change, as discussed by Battilana *et al.* (2009).

Concerning *HP1.2*, which examines the relationship between technology adoption and institutional change (scaling up path), the results suggest the capacity of SEs in adopting technology to furnish policymakers with the necessary evidence for policy formulation. The mildly positive and significant correlation implies that SEs using technologies were more likely to offer evidence-based policy suggestions. However, an aspect not captured in the data is the subsequent phase in the public policy development process, namely, the implementation of the policy changes. Relative to SEs that did not use technology, there was no increased likelihood of influencing the enactment of new policies or modifying existing ones to support social issues, nor was there a significant impact on directing public funding towards social causes.

The last statistical model was designed to test *HP1.3*. It primarily examined the relationship between the use of technology in SEs and the operationalisation of system change focusing on the capacity to enhance the inclusiveness of traditional market structures (referred to as scaling within). The analysis identified significantly positive correlations between the adoption of technology by SEs and their effectiveness in providing solutions that could modify the prevailing dynamics of market transactions. This confirms that SEs using technology were more likely to increase market transparency and accessibility for groups that were previously marginalised, compared to their non-technological counterparts.

The results of the third model proved to be weakly affected by some contextual and organisational factors such as geographical area and scope of operation, as well as the adverse effects of the COVID-19 pandemic, particularly in relation to creating new income opportunities for previously marginalised groups. More pronounced correlations were observed with the type of activity realised by the SE, especially for those addressing economic development, and environmental issues related to climate and the planet.

4.2 The role of hybrid nature

The second proposition was concerned with the effects of coupling technology adoption by SEs with hybridity. In hybrid models, social value creation is supported by commercial activities able to generate market revenues and profits. Hybridity is a key feature of several social entrepreneurial models that may affect the generation of system change "turning rebellion into money" (Teasdale *et al.*, 2023).

A specific group of SEs that clearly displayed a hybrid nature were the focus of this part of the study, and three hypotheses were examined relating to how hybridity influences the relationship between technology adoption and system change achievement along the three different paths:

H2.1 Suggested that there exists a link between the hybrid nature of these SEs and how they adopt technology to scale deep. This hypothesis could not be confirmed as there was no significant correlation found.

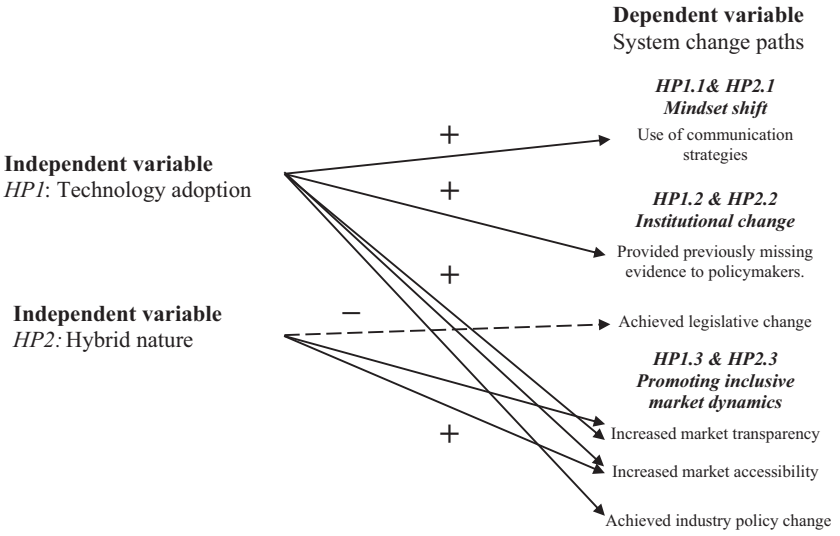
H2.2 Considered the impact of the hybrid nature on the relationship between technology adoption and scaling up. This was confirmed, as a statistically significant negative correlation was found between the activities of hybrid SEs and the achievement of legislative changes.

H2.3 Was partially confirmed. The study found a significant positive correlation between the hybrid nature of SEs and two out of four factors related to making market dynamics more inclusive: improved transparency and accessibility. This was particularly evident in SEs focused on economic development, human rights, climate preservation and civic participation. These SEs appeared to be more likely to drive change through softer regulations, like codes of conduct, or by influencing large organisations and industries to adapt their business models to address societal and environmental issues.

The results of the analysis concerning the different research hypotheses are summarised in Figure 3. In the figure, only the relationships among variables that proved to be statistically significant are shown. The continuous line represents positive correlations, and the dotted line indicates negative correlations.

To summarise, the first HP is verified as a positive correlation was found with each of the three system change paths: scaling deep, scaling up and scaling within. However, the analysis revealed that SEs adopting technologies achieve system change by exploiting only a few of the different modes included in all the three paths of scaling deep, scaling up and scaling within.

The analysis supported *HP2* showing that when hybridity is considered along with technology adoption, there is a reduced intensity in the likelihood of achieving system change. This suggests that certain system change dynamics may conflict with the hybrid nature of SEs.



Source: Authors' own work

Figure 3. Summary of significant results related to research HPs

5. Discussion

This paper aimed to explore the extent and ways technology adoption influences the attainment of system change by SEs, and how hybrid nature impacts this relationship. It addresses two hypotheses: firstly, whether SEs that use technology are more likely to achieve system change through different pathways; and secondly, whether the relationship is adversely affected when technology-adopting SEs also exhibit a hybrid model.

The findings of this study contribute to a broader understanding of the scalability of social impact. They achieve this by expanding the concept of scaling to include system change, as discussed in previous research (Kannothra *et al.*, 2018; Palomares-Aguirre *et al.*, 2018; Seelos and Mair, 2014). Traditionally, the literature on scaling has predominantly focused on product dissemination or replication (Alvord *et al.*, 2004; Bloom and Dees, 2008; Scheuerle and Schmitz, 2016; Uvin *et al.*, 2000), or on examining scaling processes up to the level of individual or community impact (Islam, 2021). However, as highlighted by Murray *et al.* (2010), to engender enduring systemic changes that address the root causes of societal issues, SEs must adopt a holistic approach. This approach involves reforming business models, laws and regulations, as well as innovating in data and infrastructure management, and cultivating new mindsets and practices. The results stress that adopting technologies can enable SEs to move beyond the mere, linear operational strategies of scaling, such as organic growth or model replication (Ismail *et al.*, 2012; Gerli *et al.*, 2021), and can maximise the impact of their social innovations by affecting institutions and markets to solve societal challenges (Murray *et al.*, 2010).

Although the analysis confirms the significance of technology as a field-level condition fostering institutional change (Battilana *et al.*, 2009), the emerging picture is multifaceted when considering how this occurs. The multifaceted model of system change underpinning the study stems from the literature on scaling impact strategies and the study's findings can feed the debate on the linkage between scaling strategies and scaling performance (Bi and Yu, 2022) by considering the role of technology as moderator of this relationship.

The study's result confirms the relevance of knowledge dissemination strategies as the most effective driver of scaling performance, as suggested by Lyon and Fernandez (2012) and tested by Yu and Bi (2023). Indeed, the first mode SEs achieve system change leveraging technology involves carrying out communication and awareness-raising activities. Raising awareness is crucial for triggering widespread, in-depth transformations that facilitate transitions to more desirable futures where institutions and markets address societal challenges. Communication enabled by technologies can promote these transitions, assigning technology a purposeful educational role (Chatzistamoulou and Tyllianakis, 2022). Secondly, the findings highlight technology's role in enabling SEs to generate evidence that assists policymakers in developing evidence-based policies. This introduces the concept of "data for good". Purposefully used big data, guided by an intentional societal mission, can contribute to creating a "good digital society". In such a society, big data aids in fostering a positive collective sociotechnical imaginary led by social entrepreneurial organisations, countering the trend towards "surveillance capitalism" as described by the Zuboffian perspective (Zuboff, 2019; Susser, 2022). In addition, Yu and Bi (2023) found a non-significance effect of the capacity-buildings scaling strategy on scaling performance. This finding might suggest an interpretation of the non-significant correlation among the use of technology and the other system change paths such as mobilising people and directly advising and influencing policymaker.

Lastly, technology enhances market inclusivity by increasing transparency and accessibility, and by changing industry rules to include marginalised groups. This aligns with discussions on the relationship between technology, inclusive innovation and economic development. The adoption of technologies by SEs can help mitigate the unintended effects of technological innovation and maximise their positive societal and individual impacts, thus enhancing inclusiveness and making technological patterns more need- and demand-driven (Gerli *et al.*, 2021). SEs often involve marginalised groups in their daily operations and governance (Bock, 2016; Pinch and Sunley, 2016) and can be geographically inclusive, addressing the needs of communities in neglected and marginalised areas (Steiner and Teasdale, 2019).

The second objective of the study deep-dives into the role of hybridity. The presence of tensions raised by the hybrid nature of SEs in the scaling path have been acknowledged (Davies *et al.*, 2019) but still scarcely investigated by scholars (Ciambotti *et al.*, 2023). The research found that when an organisation's use of technology aligned with its hybrid nature, achieving system change became less likely. Hybridity diminished the importance of "scaling deep" dynamics and negatively impacted "scaling up" efforts. One explanation for this could be that hybridization, which is business orientated, leads SEs to prioritise economic sustainability. As a result, activities like advocacy or advisory work, which are challenging to monetise, are often neglected in favour of more profitable pursuits such as process optimisation (Dohrmann *et al.*, 2015). The findings of the present analysis are coherent with the idea that "introducing additional benefit or completely new social impact activities" (Ciambotti *et al.*, 2023, p. 41) very likely requires to search for additional funding that, if not secured, would challenge the SE's economic sustainability. Thus, the analysis confirms the relevance of access to financial resources as a determinant of the scaling performance. Moreover, the relevance of the "scaling within" path echoes idea that SEs tend to reinforce their market orientation to overcome the dual mission tensions (Ciambotti *et al.*, 2023).

Moreover, this focus on hybridisation provides insight into how SEs can shape markets. Kullak *et al.* (2022) observed that market actors can deliberately construct, alter or manipulate market systems (Nenonen *et al.*, 2019). Such processes often involve modelling and reconfiguring market systems achieved through "purposive actions by a focal firm to change market characteristics by redesigning the content of the exchange, reconfiguring the

network of stakeholders involved, and reforming the institutions that govern the behaviours of all stakeholders in the market" (Nenonen *et al.*, 2019, p. 618). In reshaping markets, organisations with a hybrid nature might prioritise increased revenue streams to support their economic sustainability, potentially at the expense of their social mission.

In summary, the need for SEs to be economically sustainable often takes precedence, which can undermine the achievement of holistic system change. This leads to an efficiency-driven approach to scaling, favouring only certain dynamics that promise greater profitability, while neglecting activities essential for systemic or "institutional" change that are not easily monetisable. This may hamper the transformative character of system change facilitated by SEs (Newey, 2018).

6. Theoretical and practical implications

The research holds significant implications for three different streams of literature: scaling social impact (Islam, 2021), hybrid organising (Battilana, 2018) and socio-tech entrepreneurship (STE; Gerli *et al.*, 2021).

Firstly, the study fits into the broader literature on SE as a form of institutional entrepreneurship (Battilana *et al.*, 2009), and the subset stream on their scaling effort, by providing further understanding of the neglected notion of system change. In this regard, the results offer a novel empirical and quantitative investigation into how SEs, as a distinct group of system change actors, operationalise their collective action in various directions. This complements and expands upon the existing literature on system change (Teasdale *et al.*, 2023; Snow and Ketchen, 2014). Specifically, the insights address this issue empirically by focusing on two previously unexplored aspects: the role of technology and the potential effects of hybridity in mitigating the radicalness of system change paths.

The research also expands to the specific stream investigating the relationship between scaling strategies and scaling performance by exploring the role of technology in different scaling paths led to system change (Bi and Yu, 2022). Through the investigation, different patterns of system change were analysed as strategic performances of social entrepreneurship, which coherently take over from the findings of Teasdale *et al.* (2023). Our research contributes to the field of strategy in social entrepreneurship by examining how technology influences the relationship between scaling and social performance.

The research also contributes to the literature on hybrid organisations and dual, social and economic, value creation by identifying the hampering effect which hybrid nature might have on system change achievement, and thus, empirically testing the managerial tensions and potential mission drift inherent in SEs' scaling effort (Battilana, 2018; Smith *et al.*, 2013; Pache and Santos, 2013; André and Pache, 2016). This study underscores the need for a deeper understanding of how technology influences the pursuit of these joint goals (Battilana, 2018). Contrasting our results, Alshawaaf and Lee (2021) found that digitisation processes enabled art museums to achieve a balance between their social mission and trading activities (Alshawaaf and Lee, 2021, p. 606).

Lastly, Leitão *et al.* (2024) recently reinforced the need to further explore the concept STE as a unique entrepreneurial genre to better understand the peculiarities of this emerging organisational form at the intersection of social and technological innovation. Socio-tech entrepreneurship, promoting the power of technology for social benefit, distinguish from SEs for its replication capacity and the continuous need to balance technology adoption and social value generation (Leitão *et al.*, 2024). Ultimately, our research builds on the claim by Leitão *et al.* (2024) that STE achieves higher social impact through "cheaper and faster replication" by broadly examining the scaling process of STE. Analysing different scaling processes helps to determine if and how technology, while facilitating "scaling wide"

(measured by the number of individuals and the geographical area served), might impede the deep scaling dynamics necessary for generating systemic change in emerging contexts. Consequently, we empirically investigate a key aspect of STE as stressed by "Balanced tech adoption and social value generation" (Leitão *et al.*, 2024).

The research also offers relevant contributions to social entrepreneurs and managers, as well as to policymakers. Indeed, it legitimises the need to support the technological development of SEs if appropriately governed and addressed. SE practitioners should engage in developing technology-embedded social value propositions, rather than considering technology as a mere enabler of processes that would have taken place anyway, albeit on a different scale (Scillitoe *et al.*, 2020, on the difference between core and enabling technologies). On the other hand, policymakers should create an enabling environment to promote technology transfer processes for SEs.

An implication of the research is that neglected modes to achieve system change may require an additional level of support not met by SEs. This is the case for crucial activities such as advocacy within civil society and the provision of evidence-based recommendations to inform decision-making. Such additional support may necessitate a role for external stakeholders to provide the necessary subsidies that are missing from the work of SEs to ensure that the pursuit and achievement of system change is prioritised and addressed holistically (Agrawal and Jespersen, 2023; Arena *et al.*, 2018).

Policymakers engaged in facilitating the technological development of SEs should be aware of concurrently developing appropriate financial support for the technological change. SEs without appropriate financial support risk focusing their activity on economic sustainability and diverting attention away from transformative system change.

7. Conclusions and further avenues of research

The current research bridges the gap between studies on technology adoption and social innovation by investigating whether technology adoption helps SEs generate system change to solve grand challenges and the effects of adopting a hybrid business model on the achievement of such system change. The findings of the analysis confirm that technology might enable some scaling (such as those based on awareness campaigns, the generation of evidence for policymaking and making markets more transparent, accessible and inclusive for marginalised groups) to reach the magnitude needed for system change transformations. On the other hand, the hybrid nature of organisations poses some challenges for the achievement of system change. Therefore, how to balance social and profit imperatives deserves further investigation.

Overall, the paper's findings suggest two promising research avenues for scholars interested in understanding the social value creation and the potential for SEs to make change (Di Domenico *et al.*, 2010). Firstly, future research could explore how to integrate technology into SEs' social value propositions (Gerli *et al.*, 2021) and could identify the types of tensions and trade-offs that emerge. Secondly, research could delve into modes of system change (such as altering people's values and habits, modifying regulatory frameworks and generating income for marginalised groups) that are not necessarily enabled by technology adoption. It would be crucial to understand whether within these contexts, technology hinders rather than facilitates system change (Sareen, 2021; Darcy *et al.*, 2021).

Despite its implications and its potential, the paper has limitations which also raise a call for further research. The main variable adopted in the analysis relies on a self-assessment provided by SEs. In particular, the achievement of system change is assessed based on the obtained results as perceived by the respondents. To mitigate this issue, the respondents were asked to provide publicly available materials to underpin their statements, which were

checked ex-post by researchers to validate the self-assessment. Nevertheless, the research used a novel, unique and massive data set which addressed and enabled the joint analysis of several topics such as technology adoption, hybridity and impact measurement in social entrepreneurship (Rawhouser *et al.*, 2019).

The survey-based methodology of the analysis prevented the attribution of causal inference among the variables. This highlights the potential for further experimental or quasi-experimental studies aimed at unravelling the specific effects of adopted technologies in explaining the achievement of system change.

Lastly, the empirical and analytical potential of the analysis of organisations belonging to the global network of Ashoka should encourage other researchers to use this resource. Investigating organisations belonging to the Ashoka network enables a relevant degree of international standardisation and homogeneity (Lubberink *et al.*, 2018; Di Lorenzo and Scarlata, 2019) that is unique in the complex and contested field of SEs. Nonetheless, repeating this research with respect to other types of "recognised" and certified prosocial entrepreneurial organisations, such as the B Corps, would be of value (Tabares *et al.*, 2021).

The research explores directly on the achievement of system change as a final outcome, overlooking the analysis of the process and the mechanisms that link the usage of different technologies in SEs to such results. Thus, other scholars should endeavour to shed further light on these topics through qualitative, interpretive case studies analysing the local and organisational contexts where SEs change the "systems" using technology.

Lastly, based on our results regarding the relationship between technology, social entrepreneurship and system change, further studies should delve deeper into conceptualising the intersection of institutional and socio-technical entrepreneurship (Battilana *et al.*, 2009; Leitão *et al.*, 2024), and in empirically unravelling the value generation processes.

Notes

1. Average 39, standard dev. +115.
2. Average 434, standard dev. +3611.
3. Average 5, standard dev. +16.
4. The tables show the standard errors displayed in parentheses below the associated estimated coefficients for each variable. Standard errors are a measure of the uncertainty or variability in the estimated coefficients, indicating the average amount by which the estimated coefficients would vary if the analysis were repeated on different samples of data.

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