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ORIGINAL PAPER

Transformative social innovation in developing and emerging ecosystems: a configurational examination

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Abstract

Despite the literature on social innovation (SI) in ecosystems growing considerably in recent years, what makes an ecosystem a facilitator for transformative SI remains unexamined, particularly indeveloping and emerging countries. Our research aims to fill this literature gap by determining which combination of characteristics—stemming from stakeholder theory and knowledge management–turns local smallholder coffee farmers in developing and emerging producing countries into autonomous and empowered partners and catalysts for spreading SI initiatives locally. We adopt a configurational approach using fuzzy-set qualitative comparative analysis of 18 SI projects that coffee MNEs, nongovernmental organizations, and institutions have undertaken to favor such an egalitarian value co-creation with local stakeholders. We demonstrate that stakeholder empowerment, cooperative strategic posturing, knowledge transfer, and local knowledge exchange are necessary conditions within the ecosystem to create local autonomy as an antecedent for transformative SI. The novelty in our approach lies in proposing a shift from a pure firm-centric perspective based on stakeholder dependence to a more participatory relational perspective that entails lower-power stakeholders' interdependence and collaboration for autonomous decision-making, thereby advancing fresh thinking on stakeholder and knowledge management applied to SI in developing and emerging contexts. We also propose practical suggestions to deal with stakeholder power's imbalances, which might limit the ecosystems' adaptation toward transformative SI.

Keywords Stakeholder theory · Knowledge management · Digitalization · Lower-power stakeholder · Social innovation · Developing and emerging contexts

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1 Introduction

Social innovation (SI) is a highly fragmented practice that can be explained through various theoretical angles and involves multiple groups of stakeholders with different levels of power and expectations (Moulaert et al. 2017). SI is intended as a new configuration of social practices prompted collectively and intentionally by a constellation of stakeholders in a certain environment to solve problems that would not be solvable effectively through traditional approaches or practices (Cajaiba- Santana 2014; Howaldt and Schwarz 2010). Rethinking and reconfiguring resources, relationships, and knowledge are two mainstream SI actions in an effort to find new methods to accomplish social goals, such as finding innovation sources and new key strategic partners to develop projects of social interest (Chesbrough 2006; Herrera 2015; MacCallum et al. 2009; Mirvis and Googins 2006). The context in which SI happens needs to support the transformative mechanisms behind SI. Scholars and practitioners commonly define such a context as an ecosystem (EU Commission 2015) or enabling ecosystem (Terstriep et al. 2020; Biggeri et al. 2017; OECD-LEED 2016).

The word *ecosystem*, which the *Oxford English Dictionary* defines as "all the plants and living creatures in a particular area considered in relation to their physical environment," reflects those characteristics of interaction and interconnection that are common in any SI initiative. In the SI field, an ecosystem is formed by the multiplicity of stakeholders involved in the initiative, their power, their relationships, the elements affecting their interactions, and any other condition impacting SI processes and outcomes (Terstriep et al. 2020; Bloom and Dees 2008). Therefore, the ecosystem framework perspective best fits the study of SI's transformative nature, providing the idea of continuous interaction among stakeholders and interconnection between stakeholders and the environment, allowing for movements and transformation in structural conditions (Carayannis et al. 2018; Scott et al. 2022). An ecosystem needs a combination of enabling and empowering elements to allow SI to grow effectively and elicit transformation (Terstriep et al. 2020).

Even though the literature around SI ecosystems has grown considerably in recent years in an effort to formulate adequate responses to social, economic, and environmental issues through a broader conceptualization of innovation (Domanski et al. 2020; Ziegler 2017), identifying which combination of enabling elements makes an ecosystem a facilitator of transformative SI remains unexamined, particularly in certain contexts, such as developing and emerging countries (Sept 2020; Terstriep et al. 2020; Voorberg et al. 2015; Rüede and Lurtz 2012; Murray et al. 2010). Developing and emerging contexts make a fertile field of investigation for transformative theories and approaches (Wright et al. 2005). That is because despite their common political instability and power imbalances among stakeholders, they present a situation of rapid co-evolvement of the economy and society that pushes organizations to increasingly pursue social and environmental goals locally, sometimes in a creative and yet worth to be analyzed manner.

Our research aims to fill this literature gap by trying to determine which combination of characteristics—stemming from stakeholder theory and knowledge

management—makes an ecosystem capable of facilitating transformative SI initiatives, particularly in developing and emerging coffee-producing countries where smallholder farmers (coffee producers) struggle with economic, social, and environmental issues. We decided to focus on the coffee supply chain because it is characterized by a high degree of complexity, an asymmetry of information among stakeholders, and huge disparities in market power that can hinder stakeholders' participation in SI initiative and prevent their success. Therefore, studying the mechanisms behind enabling ecosystems for transformative SI in such a challenging industry can provide novel insights to be replicated in more favorable contexts.

In the context of our research, we define *transformative SI* as initiatives that—despite being prompted by multinational enterprises (MNEs; in our case, coffee roasters) together with other partners, such as global and local nongovernmental organizations (NGOs) and institutions, in a logic to aid local coffee farmers' well-being and coffee sustainability—are undertaken to favor egalitarian value co-creation among local coffee farmers. The egalitarian logic, unlike the traditional paternalistic narrative (Civera et al. 2019) stems from an intrinsic stakeholder management model (Berman et al. 1999), where all stakeholders have a moral standing and need to be put in the position of expressing their voices with lower prioritization of interests compared to the paternalistic way. The egalitarian logic of stakeholder management requires, in this case, farmers to act not merely as objects of SI initiatives, but rather to become partners and co-designers of further local SI projects (Candelo et al. 2018, 2019; Civera et al. 2019). In other words, the egalitarian view entails alignment of all stakeholders' power to allow their participation and is a key antecedent to transformative SI. In this sense, it means reconfiguring stakeholder relationships in a participatory way to increase farmers' autonomous decision-making so that they can become catalysts of local SI themselves, with a strong motivation to cooperate and develop participation within their own ecosystems, as well as foster their local community's well-being and independence while attaining business sustainability.

Our study aligns with previous research in positing that innovative and transformative solutions within SI in complex scenarios need to be investigated through a multidisciplinary and interactive perspective (Kraus et al. 2018; Kumar et al. 2022; Mitleton-Kelly 2006; Scott et al. 2017; Woodside 2012).

This is why we observed the phenomenon under study through the theoretical lenses of stakeholder theory (ST) and knowledge management (KM). These best interpret such a transformation in an ecosystem in terms of relational drivers for redesigning fair, balanced, and trusting relationships (Cajaiba-Santana 2014; Greenwood and Van Buren III 2010; Howaldt and Schwarz 2010; Mirvis et al. 2012, 2016), and of critical mechanisms to transfer and exchange knowledge that can help solve problems, develop new ideas, or implement new practices or policies (Cummings 2004).

Through our theoretical analysis, we outline key constructs within ST and KM—which the literature views as relevant to allow for effective social transformations—that we summarize as five enabling characteristics (also viewed as initial variables): stakeholder empowerment; cooperative strategic posture; knowledge transfer; local

knowledge exchange; and engagement with digital transformation. These characteristics can be developed to a certain degree and implemented in a specific combination, differently impacting farmers' local autonomy in terms of transformative SI, which is the outcome that we aimed to test.

To investigate these characteristics, we analyzed 18 carefully selected SI initiatives to enhance local autonomy to transform the traditional SI nature and outcomes in a twofold way, involving multiple stakeholders in the coffee supply chain in various developing and emerging countries. First, we collected data and information through primary and secondary sources, tested each characteristic's degree of development within the cases through thematic analysis, and evaluated each enabling characteristic for each SI initiative. Second, we adopted a configurational methodological approach by performing fuzzy-set qualitative comparative analysis (QCA) (Woodside 2010; Ragin 2009; Drass and Ragin 1992). Such a methodology allowed us to provide several novel contributions to the literature of SI ecosystems and some implications for practitioners, which will be explained in depth at the end of the paper. First, we could suggest a combination of characteristics that can turn a firm-centric view based on stakeholder dependence into an egalitarian perspective of stakeholders' interdependence and collaboration, which appears to be highly replicable when applied to SI ecosystems in developing and emerging contexts (Sept 2020; Terstriep et al. 2020; Voorberg et al. 2015; Rüede and Lurtz 2012; Murray et al. 2010). Second, by applying fresh perspectives on stakeholder thinking to the SI literature we could discover a combination of characteristics that can uphold the effectiveness of SI ecosystems (Bridoux and Stoelhorst 2016; Civera and Freeman 2019; Dawkins 2014, 2015; Freeman et al. 2010; Greenwood and Van Buren III 2010; Jamali and Mirshak 2007; McVea and Freeman 2005; Strand and Freeman 2015). Third, by outlining a successful pathway for enabling ecosystems through ST and KM constructs—which entails empowerment, cooperative strategic posture, knowledge transfer and local knowledge exchange both highly, simultaneously, and necessarily entangled—we confirmed that a multidisciplinary and interactive perspective applied to the SI literature can respond to some unresolved open issues (Scott et al. 2017; Woodside 2012; Mitleton-Kelly 2006).

The remainder of the paper unfolds as follows. The background section includes a description of the main constructs of ST and KM that can enhance the effectiveness of Social Innovation initiatives in increasing value creation and co-creation in developing and emerging ecosystems. We then described the research context and the fsQCA methodology applied in terms of sample and data collection, description and evaluation of variables and, calibration. The data analysis and results section shows the complex solution that we have discovered, which is explained in the discussion section. Finally, in the last section, concluding remarks, implications and limitations of the study are reported.

2 Background

2.1 Social innovation from a stakeholder theory perspective

The essential argument of stakeholder theory (ST) (Freeman 1984) is the conceptualization of organizations and stakeholders as entities entangled in a complex ecosystem of relationships. What makes ST a breakthrough approach in business rhetoric is the acceptance of harmonization, cooperation, and joint-ness of interests among various stakeholder categories (Strand and Freeman 2015), as opposed to considering conflicts and competition as the main forces governing an ecosystem through a firm-based perspective (Porter 2008). According to stakeholder scholars, a firm-centric view based on transactions might overlook key factors, mechanisms, stakeholder identities, and needs that can enable greater stakeholder participation and proactive actions, as well as increase impacts from value co-creation (Bridoux and Stoelhorst 2016; Den Hond and de Bakker 2007; Rowley and Moldoveanu 2003). This is why fresh perspectives on stakeholder thinking posit that examining stakeholder relationships only from higher-power stakeholders' perspective (such as MNEs) might overlook the possibility of valuable collaborations for broader scopes with those groups of stakeholders that always have been viewed as less legitimate and less powerful (Derry 2012). Therefore, ST scholars posit that power and responsibilities should be spread among stakeholders at multiple levels to encourage joint value creation and better creative outcomes from SI (Civera and Freeman 2019; Dawkins 2014, 2015; Freeman et al. 2010; Jamali and Mirshak 2007).

Such a perspective fits with key SI objectives, which rely on collaborative engagements and creative reconfigurations of social relationships within ecosystems to address social issues (Chesbrough 2006; MacCallum et al. 2009; Mirvis and Googins 2006). Therefore, ST can aid SI in a twofold manner.

First, the issue of stakeholder power remains a huge barrier that limits SI initiatives' effectiveness because it prevents collaborative engagement (Montiel et al. 2012; Moulaert et al. 2017; Nicholls and Ziegler 2015). This is particularly true when MNEs establish relationships with stakeholders in contexts that can favor the spread of unfair practices, such as powerless communities in developing and emerging countries in which MNEs source key resources for their business activities. In this specific case, the relationships between the company and vulnerable stakeholders most likely are unbalanced and merely based on dependency. To this end, the latest ST research has applied the empowerment construct to lower-power and vulnerable stakeholders operating in developing and emerging contexts to increase their independent participation in social and business initiatives (Civera et al. 2019). Stakeholder empowerment (SE) has been conceptualized as a step-by-step process that aims to provide stakeholders with the right tools and knowledge to create awareness and influence over their decisions (Dawkins 2014, 2015), as well as increase their moral standing, autonomous voices, and proactive participation in social and economic initiatives (Dawkins 2015; Freeman et al. 2010; McVea and Freeman 2005). In this scenario, empowerment shifts from

mere economic support to vulnerable communities, altering lower-power stakeholders' business mindsets and strengthening their businesses' organizational structures to operate independently, leading to social and sustainable approaches locally (Civera et al. 2019; Crane and Ruebottom 2011; Fassin et al. 2017; Kumar and Pansari 2016).

Second, empowerment is understood as the main antecedent of the cooperative strategic posture needed to reconfigure stakeholder relationships and responsibilities effectively to enable stakeholders' participation in SI (Desai 2018; Shams 2016). Not by chance, social innovation is also a nodal current target of national and international policies, such as the United Nations' Sustainable Development Goals (SDGs—Cuntz et al. 2020) in the attempt to foster multi-stakeholder partnerships (see Goal 17) to reach sustainable performances that could not be reached by organizations in isolation. Developing a local cooperative strategic posture (CSP) (Ricciardi et al. 2021; Bouncken et al. 2015; Strand and Freeman 2015; Enright and Bourns 2010) entails that vulnerable and lower-power stakeholders are empowered enough first to establish fair and trusting relationships (Greenwood and Van Buren III 2010; Phillips 1997). Thus, stakeholders must perceive that the more powerful actors involved in the SI ecosystem act in an effort to meet their needs and rights legitimately without opportunistic behavior and through fair and transparent information-sharing mechanisms, communication, and two-way dialogue (Greenwood and Van Buren III 2010). Empowerment and trust then might lead to stakeholders becoming engaged with both SI ecosystem actors and their own local communities and resources. Despite being a multi-faceted construct, in this context, *engagement* is defined as a process of positive stakeholder involvement (Greenwood 2007) that is the result of powerful stakeholders' continuous commitment to lower-power and vulnerable stakeholders so that the latter develop consent to the organization's actions and behaviors, commitment, and alignment to the organizations' values and are inclined toward cooperating through a collaborative mentality (Freeman et al. 2010).

Spreading power and favoring a cooperative strategic posture can help redesign relationships interdependently (Bouncken et al. 2015; Freeman et al. 2010). The idea is that once power is redistributed (thanks to virtuous organizations' efforts within the SI project), and relationships among stakeholders are redesigned in a fairer way, responsibility shifts to stakeholder categories previously viewed as lower-power, vulnerable, and dependent, creating fertile ground for further actions to boost SI's transformative impacts.

2.2 Social innovation from a knowledge management perspective

Knowledge management (KM) scholars agree that establishing knowledge-based relationships through knowledge transfer (KT), local knowledge exchange (LKE), and engagement with digital transformation (EDT) can enhance mutual learning interactions and the chance to co-create value in the interest of social, economic, and environmental outcomes within SI (Wood and Bischoff 2019; Jali et al. 2017;

Avelino et al. 2019; MacCallum et al. 2009; Peloza and Falkenberg 2009; Usoro et al. 2007).

KM is a set of valuable ways to collect knowledge accumulated in an ecosystem in its technological, social, environmental, and business strategies using procedures that allow for retrieving, reviewing, and updating it dynamically at any time (Davenport and Prusak 1998). KM's success depends on ensuring that both explicit and implicit knowledge forms are detected and developed (Frappaolo 2008). This happens to the extent that the intangible assets' dimensions (human, organizational, and relational capital) interact synergistically (Janz and Prasarnphanich 2003). In recent decades, there has been growing awareness that a large part of an ecosystem's development depends on its intangible factors, i.e., human capital's creativity, unpredictability, and emotional intelligence (Lazovic 2012). Continuous learning processes based on localization and "cross-fertilization" between different experiences and stakeholder categories create new skills and make existing ones evolve, increasing the chances of spreading SI in the ecosystem (Dahiyat 2021).

Innovation management, starting in the 1990s, ceased to be a rigid and engineer-oriented process exclusively and started to coordinate and enhance knowledge heritage toward complexity and development (du Plessis 2007). The valorization of knowledge is achieved only when knowledge sharing occurs between people within an ecosystem (Cabrera et al. 2006; Feser 2022; Wang and Noe 2010). In referring to local communities of vulnerable and lower-power stakeholders in developing and emerging countries, this can happen because of *knowledge transfer*, which is defined as the act of moving knowledge among different entities or organizations (Szulanski et al. 2004). According to Wang and Noe (2010), sharing knowledge can encourage intra-stakeholder collaboration to solve problems, develop new ideas, or implement new projects (Albort-Morant et al. 2018; Ritala et al. 2016; Cummings 2004). However, it does not deliver results if stakeholders are not keen on absorbing new knowledge (through knowledge transfer from more powerful actors) and searching for extra information, inputs, and learning, i.e., *knowledge-seeking*. Such a process is defined as *knowledge exchange* and implies both the intention (as a starting point) and act of sharing knowledge, as well as the act of seeking new knowledge to create innovative solutions.

Clearly, in a context of lower-power and vulnerable stakeholders, the presence of an empowering culture favors, even more than within an organization, a knowledge enhancement culture and motivation, creating a virtuous circle (Caniëls et al. 2017). It already has been demonstrated in various contexts that digital innovation within KM practices can enhance such a virtuous circle when accompanied by a high-engagement, cooperative strategic posture, with all stakeholders involved in the digitalization strategy (Candelo et al. 2021; Bouncken and Kraus 2021; Troise and Camilleri 2021; Ricciardi et al. 2021; Roig-Tierno et al. 2018).

In this sense, KM makes technology, culture, business, and social processes collaborate on an equal level: New technologies offer the opportunity to increase interactions between people within an ecosystem while simultaneously reaching many interlocutors and accelerating the processes of sharing new ideas and information. Therefore, even though the interactions between the SI's social layer and technology's role are very complex to detect (Meijer and Bolívar 2016), digitalization

strategies and technological transformations can be viewed as social actors increasing active participation and multi-stakeholder inclusion in social change, even in contexts—such as developing and emerging countries—where ethical issues related to the spread of technology and the lack of resources make digitalization processes harder to be implemented (Kar et al. 2019; Bock 2016; Townsend et al. 2015). Digital transformation can impact how stakeholders interact within an ecosystem and make decisions by favoring faster communication through interactive dialogue, sharing good practices, transparency and trustful relationships, and the possibility of developing new capabilities through faster local knowledge dissemination (Jafari-Sadeghi et al. 2021; Tödtling and Trippl 2018).

Our literature review points out that specific characteristics within ST and KM—i.e., stakeholder empowerment (SE—Dawkins 2014, 2015), cooperative strategic posture (CSP—Desai 2018; Shams 2016), knowledge transfer (KT—Wang and Noe 2010), local knowledge exchange (LKE—Cabrera et al. 2006; Feser 2022), and engagement with digital transformation (EDT—Jafari-Sadeghi et al. 2021; Candelo et al 2021)—might be pivotal in creating an enabling ecosystem that favors transformative SI. This raises our research question: Which combination of the main ST and KM characteristics—such as stakeholder empowerment, cooperative strategic posture, knowledge transfer, local knowledge exchange and engagement to digital transformation—makes an ecosystem a facilitator of transformative SI in developing and emerging markets?

3 Research context

Our research focuses on lower-power and vulnerable stakeholders who are coffee smallholder farmers owning key resources such as the coffee producing lands (Hwarng et al. 2005; Civera et al. 2019). This specific industry has been chosen because of its supply chain complexity, and the peculiar situation of inequality linked to the geographical context where coffee is extracted and produced (Mongelli and Rullani 2017), in this specific case developing and emerging countries and markets.

In these countries, such a group of stakeholders commonly is characterized by low income (Ahen 2017); inequality in business power (Dawkins 2014, 2015); vulnerability and unfairness in relationships with other stakeholders, meaning that, for instance, the price bargaining with local intermediaries can turn to be unfavorable for farmers who are not fully aware of the quality of their products (Candelo et al. 2018; Dawkins 2015); less power in decision making (Dawkins 2015); lack of capacity to replicate business rules and models on the local territory and exert influence (Greenwood et al. 2010); marginalized and vulnerable conditions (Derry 2012); poorer structural conditions (Mena et al. 2010); less access to basic needs (Mena et al. 2010); occasional denial of human rights (Mena et al. 2010); inability to develop whatever they think is valuable autonomously; and inability to transform ideas into successful business, social, and environmental practices (Greenwood et al. 2010).

In particular, despite generally emerging and developing countries respond to different stages of cultural, social and economic development (Dawkins 2015), for the purpose of our research both the two contexts present similar characteristics as for the nature and content of SI initiatives enacted by the MNEs locally as well as for the local stakeholders' power imbalances compared to the MNEs (Civera and Freeman 2019; Civera et al. 2019). Therefore, the choice of the context has been based on three main reasons, as follows. First, considering that SI is "often highly contingent and context-sensitive" (Nicholls et al. 2015, p. 22), contextualization helps identify key mechanisms for improving SI impacts. Second, developing and emerging contexts are full of paradoxes, particularly in terms of stakeholder power and culture. Studying a possible enabling ecosystem for SI in these contexts can help overcome the issue of stakeholder power, which can limit SI effectiveness (Sept 2020; Lannon and Walsh 2019; Nicholls and Ziegler 2015; Moulaert et al. 2017). Third, within SI practices, analyzing how to boost autonomy among lower-power stakeholders who always have been underestimated (Dawkins 2014, 2015) can change stakeholders' mindset, allowing for adoption of a new perspective on social transformation. Such a mindset change can be challenging and fruitfully applied in developing and emerging contexts in which we are accustomed to witnessing a traditional firm-centric view, i.e., firms imposing social changes through SI initiatives involving powerful stakeholders. This attitude needs to be reconsidered to open new challenges for lower-power stakeholders so that they are no longer passive actors in SI projects and become active cooperators and catalysts to elicit greater SI impacts (Jamali and Mirshak 2007; Civera et al. 2019; Khavul and Bruton 2013; Muthuri et al. 2012).

4 Method

To examine the simultaneous combination of characteristics that make an ecosystem a facilitator of transformative SI, we used fuzzy-set qualitative comparative analysis (fsQCA) as our main method. Fuzzy-set QCA is a research paradigm (Mellewigt et al. 2018) that suits our investigation in three ways.

First, it strengthens new knowledge generation through a continuous dialogue between theory and case studies, and favors learning processes among different theoretical perspectives applied to SI (Kraus et al. 2018; Iannacci and Kraus 2022).

Second, it goes beyond mere cause-and-effect statistical analyses by focusing on a joint causal system that allows for interaction effects among each characteristic within a case and permits the study of complex and new phenomena within a constantly evolving ecosystem (Iannacci and Kraus 2022; Kumar et al. 2022; Woodside 2012). FsQCA allows for simultaneous examination, based on asymmetric linkages (Ragin 2009), of all possible interactions between a set of initial variables (in our case, "characteristics") of the phenomena under investigation and the relevant outcome (in our case, "local autonomy for transformative SI"). Essentially, fsQCA focuses on combined effects from causal conditions (initial variables) because it assumes that causation is complex, intertwined, and holistic.

Third, it is ideally applicable to a small-to-medium number of cases (Woodside and Baxter 2013; Woodside 2010), requiring familiarity for exploratory investigations (Trueb 2013).

We used Podsakoff et al.'s (2012) list of principles to correct estimated values to minimize common method bias. For the same reason, we also worked separately, made independent judgments on case studies, then agreed to evaluate each characteristic in a final set of discussions.

4.1 Sample and data collection

Our sample of case studies comprised 18 SI projects that focused on enhancing local farmers and their families' livelihood conditions, knowledge about coffee-producing methods and sustainable practices, and capacity to establish local and global relationships of value, with the overall outcome of increasing their decision-making power for autonomous business and social choices, as well as designing SI initiatives locally. These projects were developed by coffee MNEs and their foundations, global and local NGOs, global and local research institutes and foundations, regional governments, the International Coffee Organization (ICO), and field project officers operating in Brazil, India, Tanzania, Ethiopia, Uganda, Haiti, the Dominican Republic, Colombia, Trifinio Region (between El Salvador, Guatemala and Honduras), Indonesia, Peru, and Vietnam.

We selected the SI projects that, to date, have concluded at least their initial phases and produced measurable results. Furthermore, the ICO's secretary has provided us with guidance during several interviews conducted between January and April 2016 (identification phase), helping us identify coffee-related SI projects that could be global benchmarks in illustrating the characteristics of enabling ecosystems for transformative SI.

To develop the case studies, we collected data respecting triangulation (Yin 2013) and gathered information from multiple sources of complementary evidence, including the systematic literature review, semi-structured interviews (Bernard 1988) with 30 main stakeholders involved in the SI projects, and content analysis of reports on each project.

First, the literature review allowed us to delineate the five enabling characteristics used as the configurational analysis variables, whose degrees for evaluation will be described in the next section.

Second, the semi-structured interviews were conducted both face-to-face and through virtual meeting platforms with the following stakeholders: MNE 1 chief sustainability manager; MNE 1 chief sustainability manager's Collaborator 1; MNE 1 chief sustainability manager's Collaborator 2; MNE 2 corporate affairs director; MNE 1 green coffee purchasing manager; MNE 1 foundation secretary; International Coffee Organization (ICO) secretary; project manager at a global NGO (1) in Haiti and the Dominican Republic; project manager at a global NGO (2) in Uganda; project manager at a global NGO (3) in Brazil; consultant at a global NGO (4) in Germany dealing with projects in Trifinio Region; project manager at a local NGO (5) in Colombia; project manager at a local NGO (6) in India; project manager at a

local NGO (7) in Ethiopia; project manager at a local NGO (8) in Indonesia; project manager at a local NGO (9) in Vietnam; project manager at a global foundation (1) in Peru; member of Peru's Regional Government; representative of the local coffee research institute in Tanzania; and 11 field project officers from MNE 1 in all countries.

The interviews were based on a questionnaire containing open questions that aimed first to discuss the SI initiative's content and main aims. Second, they aimed to investigate each initiative against the five enabling characteristics outlined in the literature. In particular, interviewees were asked to describe in detail the enacted process of stakeholder empowerment and its stage of development locally (SE); the evaluation of stakeholder engagement and the detection of trustful relationships that favor cooperation locally (CSP); the capacity to move knowledge from higher-power stakeholders to local farmers (KT); the ability to exchange knowledge by sharing, seeking, and generating new innovation and information sources locally (LKE); and the degree of local digital implementation and contamination, as well as local autonomous use and understanding of technology for designing innovative solutions in the economic, social, and environmental spheres (EDT).

Each researcher independently cross-interviewed each participant in a reiterative process (i.e., both Researchers 1 and 2 personally interviewed MNE 1 chief sustainability manager on different occasions). Some key stakeholders were interviewed at least twice to monitor the projects' evolution during its different phases. Altogether, 58 interviews were conducted, recorded, and transcribed verbatim and kept secure in a folder on the researchers' laptop PCs.

We eventually consulted available descriptive documents and reports, including each project's impact evaluations.

All data and information were gathered on multiple occasions over a time span of about five years, starting in January 2016.

Table 1 provides the full description of each SI project included in our sample regarding the country where each SI initiative was undertaken, the project's purpose and the key stakeholders interviewed.

4.2 Description and evaluation of variables

Using the systematic literature review, we constructed initial characteristics to operationalize the constructs within ST and KM relating to our research question. As the two initial variables to clarify ST and its constructs applied to SI, we used stakeholder empowerment (SE) and cooperative strategic posture (CSP). As the three initial variables to clarify KM and its constructs applied to SI, we used knowledge transfer (KT), local knowledge exchange (LKE), and engagement with digital transformation (EDT). The variables emerged from the literature review as main constructs of ST and KM to uphold the effectiveness of SI and each enabling variable or characteristic was evaluated using a Likert scale ranging from 1–5, with 1 meaning the absence of the characteristic and 5 meaning full presence, development, or implementation of the characteristic.

Table 1 Sample description

Projects of Social Innovation	Country	Project purpose	Key interviewed stakeholders
Coffee resilience	Brazil—Minas Gerais	The project aims at contributing to the increase of incomes of small scale coffee farmers in Southern of Minas Gerais through the quality market access adding value and increasing the resilience of their production systems to climate change	Project manager at the global NGO 3; MNE 1 chief sustainability manager; MNE 1 chief sustainability manager's collaborator 2
Sustainable coffee production—Brazil	Brazil—Lambari	The project aims training on good agricultural practices; improving coffee quality; improving techniques to face climate change; improving organizational skills; implementing the "Farmer Field School" Methods; Providing soil analyses services; Quality Contest	Project manager at the global NGO 3; Consultant at the global NGO 4; Field project officer
Sustainable coffee production—India	India—Sakleshpur and Mudigere	The project aims at improving the living conditions of the smallholder households through the production of sustainable coffee. Empowering the MAS company which ensures the delivering of services and supporting programmes for its members	Project manager at the local NGO 6; Consultant at the global NGO 4; MNE 1 chief sustainability manager; Field project officer
Supporting youth in coffee producing regions	India—Calcutta	The project "EveryOne" aims at combatting child mortality; support to a project in favour of marginalised youth in Calcutta	MNE 1 chief sustainability manager; Secretary at the MNE 1's Foundation; Field project officer; Project manager at the local NGO 6

Table 1 (continued)

Projects of Social Innovation	Country	Project purpose	Key interviewed stakeholders
Sustainable coffee production I phase—Tanzania	Tanzania—Kilimanjaro	The project aims at improving the production systems of 5,000 coffee farmer households in Tanzania within 3 years in order to maximize income, cash flow, asset growth, food security and nutrition in a sustainable way	Secretary at the MNE's Foundation; Field project officer; Representative of the local coffee research institute
Sustainable coffee production II phase—Tanzania	Tanzania—Kilimanjaro	The project aims at setting up of 28 Farmer Field Schools; setting up of producers'companies trading coffee; product and quality management; saving programs alternative to loans	MNE 1 chief sustainability manager; Field project officer; Representative of the local coffee research institute
Coffee Farmer Alliance in Tanzania	Usa River/ Mbeya, Tanzania	The project aims at giving technical assistance to farmers through the Coffee and Climate Methodology; providing support to existing organisations (Shiviwaka and Tanzania Coffee Farmers Alliance) and to integenerational and gender challenges; providing support to the development of relationships with other local actors	Field project officer; Secretary at the MNE's Foundation; Representative of the local coffee research institute
Ethiopia C.A.F.E	Ethiopia—Amaro and Amhara	The project aims at improving coffee producing techniques and management skills; improving the product quality through sustainable techniques, aimed also at coping with climate change; improving gender balance within families and empowering women in the household management; in partnership with Slow Food working on food security through crop diversification	Field project officer; MNE 1 chief sustainability manager's collaborator 2; Project manager at the local NGO 7

Table 1 (continued)

Projects of Social Innovation	Country	Project purpose	Key interviewed stakeholders
Technology transformation for coffee	Colombia	The project aims at establishing the IT infrastructure to guarantee that high speed internet allows constant interaction among local and foreign stakeholders, engagement of young generations for facilitating the emergence of creative solutions, exchange of technical skills needed by different teams and exchange of real time feedbacks on smart agricultural practices as well as access to a central database of technical information	Field project officer; Project manager at the local NGO 5; Secretary at the MNE 1's Foundation; MNE 1 chief sustainability manager; Consultant at the global NGO 4 in Germany
Carcafé—Colombia -Meta	Colombia	The project aims at enhancing product quality and quality consistency through training sessions and investments in infrastructures and in reserach and development to sequence the Arabica coffee genoma in order to enhance the coffee quality to cope with climate change and disease and infection of plants as well as increase the antioxidant effects of coffe	Field project officer; Project manager at the local NGO 5; MNE 1 chief sustainability manager's collaborator 1
Sustainable Coffee Program—Uganda	Uganda	The project aims at strengthening the implementation of the national coffee strategy, supporting financially farming households with holistic and innovative strategies that will make a long-term and sustainable impact on the productivity and quality of Uganda's coffee	Project manager at the global NGO 2; Secretary of the ICO (International Coffee Organization); MNE 1 chief sustainability manager's collaborator 1; MNE 2 corporate affairs director

Table 1 (continued)

Projects of Social Innovation	Country	Project purpose	Key interviewed stakeholders
Building Coffee Farmers Alliances—Uganda	Uganda—Kasese	The project aims at supporting and consolidating the activities already implemented by the existing Producers organizations; supporting the coffee re-planting initiative; supporting the organizations in the relations with financial institutions	Field project officer; Project manager at the global NGO 2; MNE 2 corporate affairs director
Café Hispanola	Haiti and Dominican Republic	The project aims at improving coffee productivity and empowering small-holder farmers, especially women. It is addressefd to transfer agricultural know-how and promote cooperation as well as improve the coffee purchasing and selling systems	Field project officer; Project managerat the global NGO 1
Verdad y Vida	Guatemala—San Lucas Chiacal, San Cristòbal Verapaz	The project aims at supporting the production of coffee by a group a 20 indigenous women victims of the past civil conflict. It aims at enhancing their technical (e.g. organic fertilizers), organizational and administrative capacities	Secretary of the ICO; Field project officer
Coffee development—Trifinio	Trifinio (Guatemala- Honduras-El Salvador)	The project aims at developing managerial skills; technical assistance to farmers through the Coffee and Climate methodology; supporting thr managing of intergenerational and gender changes; developing relations with other local actors and projects	Secretary at the MNE's Foundation; Field project officer

Table 1 (continued)

Projects of Social Innovation	Country	Project purpose	Key interviewed stakeholders
Promoting Organized Farmers	Peru	The project aims at increasing the flow of income to improved livelihoods of smallholder farmers in the provinces of Lamas, Moyobamba y Rioja in the department of San Martin, Peru	Field project officer; Project manager at the global foundation 1 in Peru; Member of the Regional Government
Strengthening the smallholder Robusta sector in Sumatra	Indonesia	The project aims at collecting, consolidating and disseminating best practices for adaptation in the project regions. The coffee farmers take part in hands-on training activities, assisting them to find strategies which suit their needs. Coffee farmers have access to an online platform, the c&c toolbox	Secretary of the ICO; Field project officer; Project manager at the local NGO 8
Coffee environmental sustainability	Dak Lak- Vietnam	The project aims at improving production techniques efficiency in order to reduce the carbon foot print amd enhance the environmental practices through training on climate change	MNE 1 chief sustainability manager's collaborator 2; Field project officer; Project manager at the local NGO 9

For SE, the more advanced the empowerment actions (5 on the Likert scale), the greater the chance for the SI initiative to favor cooperation. Otherwise, when empowerment actions are addressed just to cover local basic needs (1 on the Likert scale), the project is viewed as more paternalistic than transformative.

For CSP, the stronger the local farmers' trust and engagement, both toward the project and other local and international social and business actors, the greater the cooperative strategic posture they can develop to cooperate locally (5). Otherwise, the lower the engagement and the trust, the lower the chances of developing the cooperative strategic posture needed (1).

The more the training is tailored to local farmers' need for KT, the more effective the transfer of knowledge (5). Otherwise, the mere knowledge assessment among existing and potential partners in the project reflects only an initial intention to transfer knowledge (1).

For LKE, the more effective the sharing of knowledge, the greater the chances of the local proliferation of knowledge-sharing behaviors (5). Otherwise, local knowledge awareness reflects a situation in which local farmers might want to seek knowledge, but do not yet implement knowledge-sharing behavior (1).

For EDT, the stronger the presence of solid partnerships and innovation in local services, the greater the engagement with digital transformation (5). Otherwise, the lower the capacity to partner with local stakeholders and disseminate the information digitally, the lower the engagement with digital transformation (1).

4.3 Fuzzy-set calibration

Before running fsQCA, a calibration process was conducted to transform the original Likert scale into a continuous value range of 0–1 (Ragin 2009; Woodside 2010). This includes identifying breakpoints that allow for the option to assign membership of set cases. All the enabling characteristics were converted into fuzzy-set continuous values (Fiss 2011) by applying the "direct calibration method" approach to coding (Ragin 2009). This method relies on identifying specific anchors for each attribute. The anchors were chosen based on a technical (relying on percentile distribution related to the sample properties) and qualitative (relying on theoretical expertise and qualitative knowledge) assessment (Greckhamer 2015).

Specifically, to simplify the analysis without losing model significance, our original degrees on the Likert scale were transformed into a final scale of five categories: 0.95 (corresponds to 5, fully present/developed/implemented); 0.76 (corresponds to 4, highly present/developed/implemented); 0.5 (corresponds to 3, the point of maximum ambiguity, in which we viewed it as equally probable to represent a low or high development of that condition); 0.25 (corresponds to 2, low presence/development/implementation); and 0.05 (corresponds to 1, not present/developed/implemented).

For the "local autonomy for transformative SI" outcome, we employed a fuzzy logic, assuming three degrees of the outcome: high; medium; and low. High means that the project succeeded in generating local decision-making autonomy, and the farmers already have implemented some local social and business cooperation initiatives. Medium means that the project partially succeeded in creating local

autonomy on decision-making, but mostly for autonomous decisions regarding the business (e.g., farmers deciding to offer local tourism activities with few social and environmental impacts). Low means that the project successfully supported local activities and societies, but that farmers' autonomy in decision making has not been achieved, though it is being considered. Therefore, by adopting the same "direct calibration method" as before, projects with high outcomes received a 0.95, projects with medium outcomes received a 0.5, and projects with low outcomes received a 0.05. Tables 2 and 3 provide the initial values and fuzzy-set scales for each enabling characteristic and outcome.

5 Data analysis and results

First, we analyzed all collected data through ATLAS.ti software for qualitative analysis, data management, and coding. By following thematic analysis principles, ATLAS.ti supported our investigation by confirming the enabling characteristics, highlighting the emergence and frequency of keywords that identify the characteristics of all the degrees of implementation for each considered SI initiative, and confirming whether each project's outcome was high, medium, or low. We conducted axial coding (Eisenhardt 1989; Strauss and Corbin 1998) and double-checked the keywords that emerged from our theoretical understanding. These keywords emerged from the analysis of the lexicon adopted in primary and secondary sources. We personally ranked each characteristic's degree of implementation or development based on a previously agreed-upon keyword-building system for qualitative evaluation, corresponding to the literature background.

One example of keyword building and coding was when respondents described the SI project in Brazil against stakeholder empowerment this way: "In this initiative, we act as a sort of business incubator, supporting the creation of the organizational structure for farmers' cooperative, and we design training courses (for) farmers around the mechanism of governance to support their greater autonomy" (NGO 3 project manager), which we coded as "strengthening of governance and creation of organizational structures to favor cooperation" (fuzzy-calibrated at 0.95), thereby illustrated as "high SE."

This phase ended with a collaborative discussion among the researchers, during which they agreed on the evaluation of each enabling characteristic for each SI project, as well as on the evaluation of each project's outcome (high, medium, or low) (see Appendix 1 for the fuzzy-calibrated data set). Altogether, six projects out of 18 reached a high outcome, nine out of 18 reached a medium outcome, and three out of 18 reached a low outcome.

Second, we performed the fsQCA using FSQCA 3.0 software based on Drass and Ragin's (1992) theoretical background by employing a combination of intermediate and complex solutions (in our case, they coincided), including all counterfactuals related to core and complementary characteristics (Greckhamer 2015).

We set a consistency threshold of 0.90 for necessary and sufficient conditions to ensure high model reliability and robustness, and we conducted the analysis separately based on Schneider and Wagemann (2010). We found that the following four

Table 2 Initial values and fuzzy set calibration—characteristics

Original Likert values	Calibration	SE	CSP	KT	LKE	EDT
1	0.05	Addressing basic needs and upholding human rights	Absence of trust, no engagement	Knowledge assessment among potential partners	Knowledge awakeness	Absence of partnerships, no digital contamination, no product and service innovation
2	0.25	Sustaining income	Low trust, low engagement	Traditional training	Knowledge seeking	Weak partnerships, low digital contamination, poor product and service innovation
3	0.5	Enhancing business and negotiation skills	Initial trust, low engagement	Supporting structures and infrastructures locally	Knowledge sharing intention	Infancy of partnerships, medium digital contamination, low innovation of products and services
4	0.75	Supporting business creation and entrepreneurial innovation	Trustful relationships and initial engagement	Favouring a culture of openness and accessibility of information	Intention to encourage knowledge sharing	Strong partnerships, initial digital contamination, initial innovation of products and services
5	0.95	Strengthening of governance and creation of organizational structures to favour cooperation	Trustful and long term relationships and effective engagement	Training tailored on local needs	Knowledge sharing behaviours	Strong partnerships, high digital contamination, full products and services innovation

Table 3 Initial values and fuzzy set calibration—outcome

Original Likert values	Calibration	Outcome: local autonomy for TSI
Low	0.05	Local autonomy is in its discussion and initial phase
Medium	0.5	Medium local autonomy with business orientation
High	0.95	High local autonomy for transformative SI for social, environmental and economic impacts

Table 4 Analysis of necessary conditions

Outcome variable: out

Conditions tested:

	Consistency	Coverage
SE	0.956522	0.736059
~SE	0.309179	0.703297
CSP	0.963285	0.710114
~CSP	0.252174	0.659091
KT	0.944928	0.638381
~KT	0.197101	0.761194
LKE	0.963285	0.805982
~LKE	0.389372	0.715808
EDT	0.761353	0.975248
~EDT	0.620290	0.647177

initial variables were individually necessary and sufficient for reaching the set outcome (local autonomy for transformative SI), as reported in Table 4 below: SE; CSP; KT; and LKE.

Our analysis suggests that necessary conditions greatly affect the outcome, as the absence of one of these characteristics will prevent SI initiatives from having a high outcome—in our case, reaching the absence of local autonomy for transformative SI.

As for the remaining characteristic, we obtained a Truth Table Algorithm to distinguish the configurations of conditions that were subsets of the outcome from those that were not. This evaluation was made using the set-theoretic consistency measure reported in the consistency raw, and we selected only the potential configurations falling under Consistency 1.

The final examination comprised the Truth Table analysis on the remaining characteristic that was not necessary (EDT), which, combined with the other four necessary conditions, covered 76% of the sample in reaching a high value of the outcome. Using standard analysis to derive intermediate and complex solutions (Ragin 2009), we observed whether each initial characteristic's condition contributed to the outcome when the characteristic was either present or absent. As stated, we only selected the configurations with a raw consistency greater than 0.9 to improve our model's robustness (Ragin 2009).

Table 5 Complex solution

Model: Out = f(EDT) Algorithm: Quine-McCluskey			
— COMPLEX SOLUTION—frequency cutoff: 4 consistency cutoff: 0.975248			
	Raw coverage	Unique coverage	Consistency
EDT	0.761353	0.761353	0.975248
Solution coverage: 0.761353			
Solution consistency: 0.975248			

Therefore, as reported in Table 5 below, we obtained a final complex solution that included the configuration of the necessary conditions with EDT, as per the following:

$$\text{SE} * \text{CSP} * \text{KT} * \text{LKE} * \text{EDT} \leq \text{High Out}$$

In this solution, we can observe that high stakeholder empowerment was combined simultaneously with high cooperative strategic posture, high knowledge transfer, and high local knowledge development, which is a necessary and sufficient configuration for reaching the outcome. If one of the characteristics is missing, no outcome is possible. EDT is not a necessary condition, only sufficient, but combined with the other four, it covers 76% of the sample. However, having EDT is not necessary to obtain a high outcome.

6 Discussion

Our results indicated that the following four out of five characteristics identified through ST and KM literature applied to SI's need to be present and interlinked in the ecosystem to allow for transformative SI by creating local farmers' autonomy: high stakeholder empowerment; high cooperative strategic posture; high knowledge transfer; and high local knowledge exchange.

This result suggests that ST and KM constructs are intertwined in a virtuous process that begins with stakeholder empowerment to enhance local knowledge exchange, creating the conditions for further empowerment and mutual learning interactions within groups of local stakeholders and higher-power ones, confirming what KM scholars posited (Wood and Bischoff 2019; Jali et al. 2017; Avelino et al. 2019; MacCallum et al. 2009; Peloza and Falkenberg 2009; Usoro et al. 2007). We confirmed that in the context of lower-power and vulnerable stakeholders, the presence of an empowering culture favors, even more than within an organization, a knowledge enhancement culture and motivation in a virtuous circle (Caniëls et al. 2017). This indicates that for an ecosystem to develop and facilitate social change, it needs to rely on diverse, intangible factors to reconfigure relationships (Bridoux and Stoelhorst 2016; Civera et al. 2019; Freeman et al. 2010; Lazovic 2012). We

confirmed that "cross-fertilization" between different experiences and stakeholder categories creates new skills and makes existing ones evolve, increasing the chances of spreading SI in the ecosystem (Dahiyat 2021).

Our results also strengthened the interrelationship between stakeholder theory (ST) and knowledge management (KM) in explaining and interpreting the transformations happening in an SI ecosystem in terms of both relational drivers for redesigning relationships (Mirvis et al. 2016; Mirvis et al. 2012; Cajaiba-Santana 2014; Greenwood and Van Buren III 2010; Howaldt and Schwarz 2010), outlining that these relationships are key to transferring and exchanging knowledge that can help solve problems, develop new ideas, or implement new practices or policies (Cummings 2004).

Our ultimate complex solution points out that to facilitate transformative SI and create local autonomy, an ecosystem of stakeholders carrying out SI initiatives needs to combine the four necessary characteristics through engagement with digital transformation (EDT), demonstrating a successful outcome with this combination in 76% of our cases. Such a complex solution suggests that all the characteristics identified in the literature need to be enacted simultaneously and together in an interlinked evolutionary path toward transformative SI.

Most of our projects indicated an advanced stakeholder empowerment strategy with initiatives to support business creation and entrepreneurial innovation, strengthen governance, and create organizational structures to favor cooperation. For instance, the "sustainable coffee production" initiative in India entails helping local stakeholders develop and strengthen the MAS company, an organization that provides technical and commercial services to its producer members. This strategic choice within the SI initiative reflects the will of MNEs, NGOs, and institutions to increase local stakeholders' independent decision making and influence over their decisions and participation (Civera et al. 2019; Dawkins 2014, 2015).

In an interdependent and virtuous circle, high stakeholder empowerment becomes the antecedent for collaborative engagement within SI initiatives (Desai 2018; Montiel et al. 2012; Moulaert et al. 2017; Nicholls and Ziegler 2015; Shams 2016). Indeed, the CSP characteristic was evaluated highly in 15 projects out of 18, i.e., empowerment was key in facilitating the spread of trusting relationships both in the community and among all higher-power and lower-power actors in the ecosystem, as reported in the literature (Greenwood and Van Buren III 2010; Phillips 1997). Our respondents pointed out that their positive involvement in the projects through on-site visits and constant dialogue with local stakeholders was fundamental to creating local stakeholder engagement, a sense of affiliation (confirming Freeman et al. 2010; Greenwood 2007), and the culture to absorb knowledge and replicate it locally (Cabrera et al. 2006; Caniëls et al. 2017; Feser 2022; Wang and Noe 2010).

Therefore, most of our SI initiatives were evaluated with a high knowledge-transfer capacity, i.e., the more powerful stakeholder groups were engaged in passing knowledge to local stakeholders by favoring a culture of openness and information accessibility, and tailoring local training needs (Dahiyat 2021). For instance, our respondents highlighted that within sustainable coffee production SI initiatives in Tanzania, 30 farmers' field schools were set up with a dual intent: 1. to provide ad hoc technical training on the local environmental and sustainable issues to maintain

and increase coffee quality, and 2. to advise on how to set up financial aid programs that served as alternatives to loans, given the local financial threat created by farmers' frequent use of loans.

Highly effective knowledge transfer appears to have facilitated heavy high local knowledge exchange, as the literature indicated (Wang and Noe 2010), by spreading key tailored knowledge and making local stakeholders more empowered and inclined to collaborate and seek and share new knowledge. This process increased the chances of developing new ideas and implementing new projects (Albort-Morant et al. 2018; Cummings 2004).

Thanks to the "Training the Trainers" program within the SI initiative in Haiti and the Dominican Republic, the aim of which was to train farmers on becoming trainers themselves, some groups of farmers started training other local farmers autonomously to improve their production methods' adaptation to climate change.

Our findings indicate that the EDT characteristic is the least impactful on outcomes, possibly because in the analyzed SI initiatives, farmers just recently developed the virtuous circle that ST and KM proposed, and now they aim to increase its impact through digitalization, which is very complex to achieve (Meijer and Bolívar 2016). Eventually, although EDT is an unnecessary, but sufficient, condition within our complex solution, its inclusion in the configuration can boost active participation and multi-stakeholder inclusion in social change (Bock 2016; Bouncken and Kraus 2021; Kar et al. 2019; Roig-Tierno et al. 2018; Scott et al. 2022; Townsend et al. 2015).

Both Colombian SI projects, which fall under the successful pathway of facilitating ecosystems for transformative SI, demonstrate coffee-growers proactively participating in collective local social and economic initiatives to strengthen the area's coffee sector and participate in educational processes and technical advisory efforts. Local farmers autonomously created working groups to strengthen and share educational processes, thanks to a higher level of ICT adoption and the possibility to access training remotely. Furthermore, these groups have formed online communities of local citizens to attract younger generations to the plantations and include them in technical and social processes to improve crop cultivation.

7 Concluding remarks, implications, and limitations

This study demonstrated that a specific combination of characteristics drawn from ST and KM literature can make an ecosystem capable of facilitating the rise of transformative SI in developing and emerging contexts. In outlining the successful pathway for enabling ecosystems, we discovered that high stakeholder empowerment, high cooperative strategic posture, high knowledge transfer, and high local knowledge exchange are necessary conditions within the ecosystem for obtaining a transformative SI outcome, such as local autonomy among farmers that allows them to take independent actions locally and increase SI's impact. We demonstrated that such necessary conditions are interlinked and happen simultaneously in a virtuous circle, and that if any of them is missing in the ecosystem, the SI initiative will not reach the expected outcome (local autonomy for transformative SI).

7.1 Theoretical contributions

We provided three main contributions to the literature of SI ecosystems by filling a major gap that scholars have identified in the absence of studies that spot which combination of enabling elements makes an ecosystem a facilitator of transformative SI, particularly in certain contexts, such as developing and emerging countries (Sept 2020; Terstriep et al. 2020; Voorberg et al. 2015; Rüede and Lurtz 2012; Murray et al. 2010). In suggesting a combination of enabling characteristics we did not only respond to the above, but also highlighted that the combination of those characteristics can turn a firm-centric view based on stakeholder dependence into an egalitarian perspective of stakeholders' interdependence and collaboration, contributing to further the debate about the need of balancing stakeholder power in SI ecosystem (Civera et al. 2019; Crane and Ruebottom 2011; Fassin et al. 2017; Kumar and Pansari 2016). Second, we demonstrated that fresh perspectives on stakeholder thinking uphold the shift from traditional to transformative SI (Bridoux and Stoelhorst 2016; Civera and Freeman 2019; Dawkins 2014, 2015; Freeman et al. 2010; Greenwood and Van Buren III 2010; Jamali and Mirshak 2007; McVea and Freeman 2005; Strand and Freeman 2015) contributing to enrich the debate about what makes an ecosystem an enabler of SI in a transformative way (Bouncken and Kraus 2021; Scott et al. 2022; Terstriep et al. 2020). Third, we confirmed that fsQCA methodology, because of its multidisciplinary and interactive perspective can best suit research on SI and provide responses to some unresolved open issues in the field of SI within complex ecosystems, for instance such as that of power imbalances among stakeholders (Kumar et al. 2022; Woodside 2012; Mitleton-Kelly 2006). Therefore, by outlining a successful pathway for enabling ecosystems through ST and KM constructs—which entails empowerment, cooperative strategic posture, knowledge transfer and local knowledge exchange both highly, simultaneously, and necessarily entangled—we proved that the open issue of power imbalances between MNEs and local lower-power stakeholders can be tackled more effectively through various, connected and, interactive research streams (Scott et al. 2017; Fassin et al. 2017).

7.2 Social and practical implications

In terms of social implications, by examining the combination of characteristics within an enabling ecosystem for SI, we advanced some arguments around the issue of stakeholder power within SI initiatives in developing and emerging countries, which the literature identified as a factor that limits SI effectiveness locally (Sept 2020; Lannon and Walsh 2019; Nicholls and Ziegler 2015; Moulaert et al., Moulaert et al. 2017). We demonstrated that enhancing lower-power stakeholders' autonomy can initiate the process to change the mindset and adopt a new perspective of social transformation that eventually might include engagement with digital transformation as a social factor to boost transformative SI outcomes only when and if the virtuous process (a combination of the necessary characteristics) is activated.

From a practical perspective, we advise SI practitioners (MNEs, NGOs and, local and global institutions) to initiate a process based on the following:

- Local farmers' empowerment through the creation and strengthening of organizational structures and governance. This process might be enacted by MNEs and NGOs in cooperation at first;
- Establishing constant two-way communication among MNEs representatives, NGOs, local institutions and farmers by also strengthening the MNE's local presence;
- Co-designing training activities for farmers that are tailored to local needs and favor replication. This process might be enacted by local NGOs and MNEs representatives after conducting an assessment of the current knowledge availability among farmers;
- Supervising behaviors enacted by farmers locally to share knowledge acquired to keep track of outcomes. This process is the MNE's responsibility by adopting digital tools that favour interaction;
- Establishing partnerships with local service providers to enhance digital dissemination of knowledge and provide online training activities to foster new knowledge seeking and sharing habits wherever possible. This process is conducted by MNEs and NGOs in cooperation with local farmers' representatives (perhaps after a cooperative has been formed).

Our study ultimately suffers from the limitations of analyzing the issue only from the perspective of powerful stakeholders, who were the catalysts for the examined SI initiatives. Therefore, avenues for further research are wide open in terms of investigating the topic by involving the targets of SI initiatives' through field research directly with local stakeholders in developing and emerging countries. Future lines of research can be extended to gather farmers' perception about their power in making autonomous choices in SI initiatives or to the investigation of local SI projects conducted autonomously, without the involvement of the MNE. Furthermore, studies conducted on similar long and complex supply chains, such as cocoa, gum and tea are welcome, whether they adopt the MNEs or the local stakeholders' perspective.

Appendix 1: Fuzzy calibrated data set

Project	SE	CSP	KT	LKE	EDT	Out
1	0.76	0.95	0.95	0.76	0.5	0.5
2	0.95	0.95	0.95	0.95	0.76	0.95
3	0.95	0.95	0.95	0.5	0.5	0.5
4	0.5	0.5	0.5	0.25	0.05	0.05
5	0.5	0.76	0.76	0.76	0.25	0.5
6	0.95	0.76	0.95	0.76	0.5	0.5

Project	SE	CSP	KT	LKE	EDT	Out
7	0.95	0.95	0.76	0.95	0.5	0.95
8	0.76	0.76	0.95	0.76	0.5	0.5
9	0.95	0.95	0.76	0.95	0.95	0.95
10	0.95	0.95	0.95	0.95	0.76	0.95
11	0.5	0.76	0.76	0.5	0.5	0.5
12	0.95	0.76	0.76	0.76	0.5	0.95
13	0.76	0.76	0.95	0.5	0.25	0.5
14	0.5	0.5	0.95	0.5	0.05	0.05
15	0.76	0.76	0.95	0.76	0.25	0.5
16	0.76	0.76	0.76	0.5	0.25	0.5
17	0.5	0.76	0.95	0.76	0.76	0.95
18	0.5	0.5	0.76	0.5	0.25	0.05

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