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Understanding social innovation for the well-being of forest-dependent communities: a preliminary theoretical framework

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Abstract

The debate regarding social innovation (SI) has rapidly gained pace over the last decade. Considerable expectations exist for the potential of SI in addressing urgent societal challenges. Forests provide numerous benefits to people, and are vital for the well-being of forest dependent communities (FDC). However, the potential of forest communities to deliver multiple benefits has remained largely unexplored. We follow the approach developed in the Horizon 2020 project SIMRA (Social Innovation in Marginalised Rural Areas) and present an original definition of SI for marginalised rural areas, as well as a preliminary explanation of the SIMRA transdisciplinary framework for defining and understanding SI in FDC. The approach is informed by a set of social science theories to understand SI as the process of institutional change and socio-ecological transition that produce outputs, underpinned by novel ideas, which are transformed into products and services that meet social demand and potentially enhance social well-being. The emergence of SI is seen as a collective action, which is nurtured or constrained by its socio-economic and environmental context that frames the dynamics of changes. The paper particularly aims to: i) formulate a four-dimensional definition of SI in marginalised rural areas; ii) present a framework for understanding the relationships, factors and development trajectories of SI in marginalised regions; and iii) apply such relationships, factors and development trajectories of SI in FDC that are known for flexible institutional arrangements which address societal challenges via innovative actions.

Key words: social innovation, SIMRA transdisciplinary framework, social innovation factors, forest-dependent community

Understanding social innovation for the well-being of forest-dependent communities: a preliminary theoretical framework

1. Introduction

Over the last decade, the concept of social innovation (SI) has been increasingly discussed in the research and policy communities. An early understanding of the term considers SI as the capacity to create and implement new ideas that are likely to deliver societal value (Adams and Hess, 2010). SI is currently seen as novel social ‘practices’ that focus on ‘processes of change’ or an ‘idea’, ‘service’ or new ‘systemic’ transformations and outcomes (Sarkki et al., 2017, Van der Have and Rubalcaba, 2016, Baker and Mehmood, 2015, Bock, 2016, Haxeltine et al., 2016, Neumeier, 2017, Pol and Ville 2009,). SI are seen as one of the elements that underpin European policymaking aimed at enhancing the well-being of rural areas (e.g. European Commission, 2013). SI has been interpreted both as processes and outcomes that are tightly interwoven (Adams and Hess, 2010, Baker and Mehmood, 2015, Moulaert et al., 2017). Although the theoretical term ‘SI’ is extensively explored in the literature, the mechanisms of how SI interact within institutional change remains little understood (Haxeltine et al., 2017). A considerable gap also exists in understanding SI in rural areas - especially those which are marginalized (Jenson and Harrison, 2013, Moulaert et al., 2017, Price et al., 2017). These issues pose the question: what are the expectations that SI can address urgent societal challenges in marginalized rural areas?

Understanding the mechanism of institutional change and the potential of a community and other societal actors to initiate and develop activities to improve well-being are key objectives of The Horizon 2020 project Social Innovation in Marginalised Rural Areas (SIMRA www.simra-h2020.eu). The need for a common definition of social innovation for marginalised rural areas has been identified. Forest dependent communities (FDC) are considered those communities living in marginalized rural areas in close relationships with forests, which provide a variety of ecosystem services. The institutional mechanisms that enable the growth of such activities and advance the well-being of FDC is essential (Melnikovych et al., 2018, Muradian and Rival, 2012, Newton et al., 2016, Pulzl et. al, 2013).

A key question is why and how some FDC respond collectively to wider societal challenges such as global timber market pressures, climate change and related extreme climate events, ecosystem service provision and sustainability? Thus the focus of this paper is on the definition of SI for marginalised rural areas, and an analysis of the factors that lead to the diverging development of SI in FDC. In particular, the aim is to: i) identify mechanisms that enable efforts for SI in forest communities to emerge and develop; ii) present a transdisciplinary framework for understanding institutional relationships and SI development trajectories in marginalised regions; and iii) apply them in FDC.

The introduction considers the potential of SI to address societal challenges for marginalised rural areas. The second section explains the transdisciplinary approach. The third section explores the definition of SI, and the fourth section considers the understanding of FDC

in the transdisciplinary framework for SI. Section five underlines the main development trajectories of SI in FDC driven by formal and informal institutional mechanisms. The paper ends with a final sixth section comprising a brief summary and concluding remarks.

2. Transdisciplinary approach

This paper is based on a transdisciplinary methodology that follows the general methodological approach of knowledge co-production adopted by the SIMRA project (see Figure 1). A key challenge is to address SI understanding from the diverse perspectives of social life representatives, which include a diversity of stakeholders active in a particular innovation initiative of the wider public area concerned. Another challenge is to avoid weaknesses of the limited validity of single inductive or deductive approaches (Haxeltine et al., 2016, Moulaert et al., 2017) by integrating knowledge from various scientific and societal actors into the research development (Kozová et al., 2016, Lang et al., 2012, Kluvánková et al., 2017).

We use a two-tiered approach that involves expert and empirical knowledge. The expert knowledge displayed in Figure 1 in the right column is generated via engagement with the SIMRA Social Innovation Think Tank (SITT) members, which comprise EU and non-EU actors and experts in forestry, agriculture and rural development. They are involved via workshops (SITT personal consultations) and online surveys (SITT distance consultations). Expert knowledge has been employed to define and classify SI. SITT members especially participated in the design of a SI definition and a checklist to classify SI collected by the SIMRA project (Table 1). More details about involvement in SITT can be found in Kluvánková et al. (2017).

Empirical knowledge (left column of Figure 1) is gathered by the SIMRA SI database, which contains over 300 entries with SI examples in marginalized rural areas of Europe and countries south and east of the Mediterranean (Bryce et al., 2017). Empirical knowledge validated check list and provided input for formulation of key factors and SI development trajectories. This was an open process through the SIMRA website, with all SI examples being collected by anybody wanting to contribute. All entries were classified across the SIMRA checklist (Table 1) resulting in 209 validated SI examples¹ in various thematic fields.

¹ by August 2018

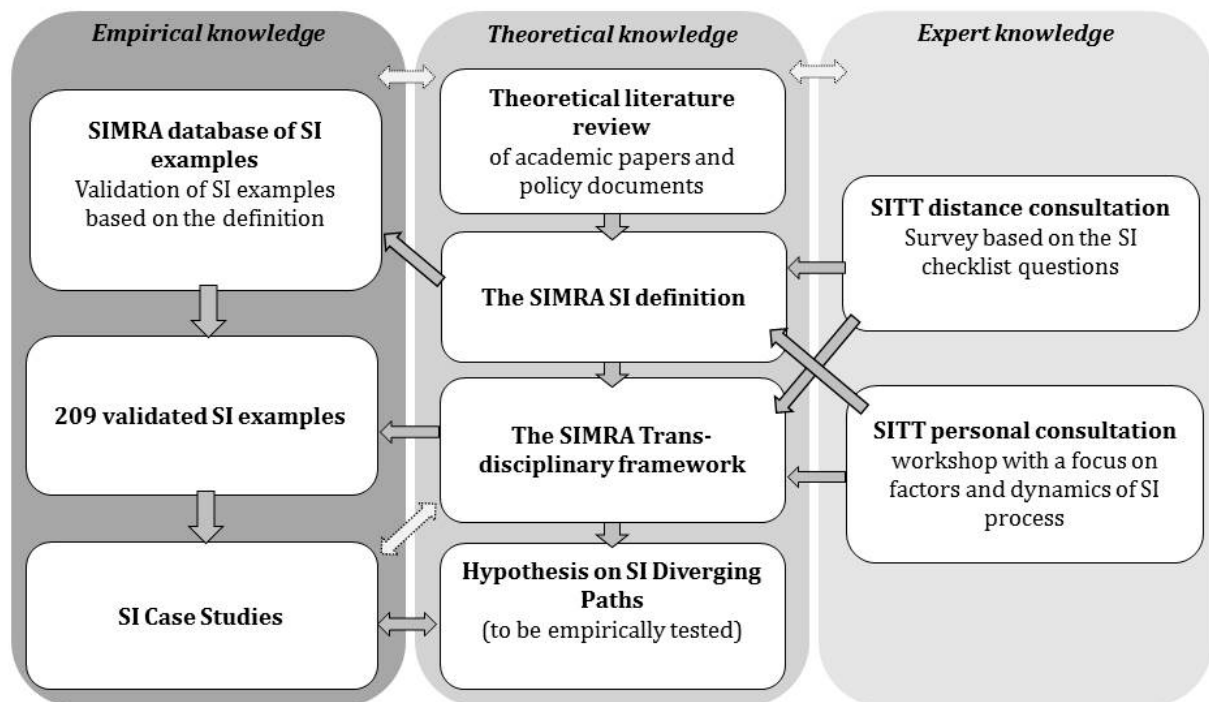


Fig. 1. Logic of SIMRA transdisciplinary knowledge co-production (own elaboration).

The transdisciplinary approach's strength has been promoted by theoretical knowledge (middle column in Figure 1) that provided a theoretical basis for SI definition discussions and formulation, as well as the creation of a SIMRA theoretical framework to understand SI and hypotheses of SI diverging paths.

3. What is social innovation?

A mutual understanding of the term 'SI' is important not only for scientists for the investigation of SI, but also for those involved in policy design and implementation. Bouchard et al. (2015) has described how most SI are not labelled as such, suggesting that the concept is often unclear to practitioners and researchers. Wider SI literature frequently alludes to the imprecision and ambiguity of definitions, hence it was essential for the project to arrive at an acceptable definition. The SIMRA project has developed its definition as a result of the co-production of theoretical and expert knowledge as demonstrated in Figure 1.

Early in the project the collection of SI definitions was firstly undertaken by the SIMRA research team and SITT via a survey. This was followed by face-to-face meetings, with key elements of the SIMRA definition being jointly determined with SITT members.

Secondly, a classification checklist for SI has been developed, based on taking a broad theoretical approach to innovation - we followed the range of social science theories which inform the analysis of SI. *Innovation theory* concerns innovations as market, institutional or social drivers applied at the business level (Asheim and Isaksen, 2002, Porter, 1990, Rogers, 2003). *Regional geography* sees innovations as a product of social and economic interactions

between actors at a regional level (e.g. Camagni, 1995, Myrdal, 1957, Storper, 1995). *Rural sociology* follows the idea of endogenous or neo-endogenous development (Cloke et al. 2006, Van der Ploeg and Long, 1994). *Social capital* outlooks highlight the outlook and role of informal institutions, trust and social network robustness (see Baker and Mehmood, 2015, Bourdieu, 1990, Coleman, 1988, Fukuyama, 2000, Granovetter, 1985, Portes, 1998, Putnam et al., 1993) while *social entrepreneurship* schools (Leadbeater, 1997, Lettice and Parekh, 2010) apply this to formalised organisational structures. Finally, *transition literature* (Geels, 2011, Ostrom, 2009, Piattoni, 2010, Van der Have and Rubalcaba, 2016) embeds the development of SI into the systematic processes of social (Cools et al., 2017) or socio-ecological changes (Fischer-Kowalski and Huttler, 1999, Melnykovich et al., 2018) of diverse systems such as those of a business, city, economy, ecosystem, or eco-region. Consideration was given to its essential characteristics, and used a set of stepwise questions in which distinctions are made between process, product and outcomes, and the level of requirement to be classified as SI examples. Questions were developed by the SIMRA research team, and consulted and verified by the SIMRA Social Innovation Think Tank (SITT) with an online survey. The final checklist version is illustrated in Table 1. Finally, a checklist was applied to validate SI examples that had been initially submitted to SIMRA (Bryce et al., 2017) as described in the previous section and Figure 1.

Table 1. Checklist for classifying SI

SI as a process	Level of requirement
Is there a process of reconfiguration of social practices (e.g. relationships, collaborations, networks, institutions and governance structures) in response to societal challenges, which seeks to enhance outcomes on societal well-being?	Necessary
Does the novelty/reconfiguration take place in new geographical settings or contexts, or in relation to previously disengaged social group(s)?	Possible but not necessary
Does the process of novel reconfiguration involve civil society members as active participants?	Necessary
Does the process of reconfiguration result in new social practices that increase the engagement of civil society actors?	Necessary
Does SI arise as a result of a crisis or apparently intractable problem?	Possible but not necessary
Can a public agency be the initiator and/or driver of SI?	Possible but not necessary
Can SI be initiated by a private sector agency?	Possible but not necessary
Is the SI process driven by certain values and ethical positions?	Possible but not necessary

SI as output	
Do new social practices engage voluntary civil society actors (in relationships, collaborations, networks, institutions and governance structures) as a result of SI?	Necessary
Outcomes/impacts arising from SI	
Do these reconfigurations seek to enhance outcomes on societal well-being, i.e. in relation to society, economy, environment or any combination thereof?	Necessary
Are trade-offs between types of benefit or beneficiaries likely to arise as a result of SI?	Possible but not necessary

Source: Kluvánková et al., 2017, Polman et al., 2017, and SITT consultation in July 2017

Following theoretical, empirical and expert co-production, the SIMRA project defines SI as “*the reconfiguring of social practices, in response to societal challenges, which seeks to enhance outcomes on societal well-being and necessarily includes the engagement of civil society actors*” (Polman et al., 2017).

There are four systematic elements of SI’s definition that have developed based on theoretical knowledge (Kluvánková et al., 2017, Polman et al., 2017), and verified empirically in the SIMRA database (Bryce et al., 2017) and are explained below.

First, a **reconfiguration of social practices** is seen as the centre of SI whereby collective and collaborative action results in novel products and/or involves the creation of new formal or informal institutions e.g. the networks, governance arrangements, and values in which civil society actors choose to engage.

Second, SI are responses to **societal challenges**. Thus SI are to a considerable extent demand-led and problem-oriented collective actions - driven by societal needs, failures of existing systems, or crises that create a trigger event (Murray et al., 2010, Nicholls et al., 2015). Some SI may be an expression of particular values or attitudes of civic society actors (Nijnik et al., 2018). The scope of addressed challenges can be very diverse - from very local issues such as public or private service changes, to global ones such as climate change and extreme events such as storms fires, that result in decreasing environmental quality, market pressure, or increased social inequalities.

Third, while SI seek to enhance outcomes on **societal well-being**, the focus of collective actions may nevertheless go beyond the social field. Evidence has been provided that these novel configurations can enhance well-being (Kluvánková et al., 2017), including the reduction of social exclusion, enhanced empowerment of local communities, and improving environmental quality. SI’ impacts and subsequent outcomes vary. It may focus on vulnerable groups or result in increases in civil society actors’ capacity to act (Sarkki et al., 2017). However, hoped-for positive impacts and outcomes may necessitate trade-offs - either in benefits accruing to different groups, or in benefits arising in the social, economic or environmental arenas. Win-win outcomes of SI are desirable and possible where SI results in system efficiency gains;

but in many cases trade-offs with disbenefits are likely to impact some groups of people (Baker and Mehmood, 2015, Kozová et al., 2016, Ostrom, 2005, Poteete et al., 2010).

Fourth, active **civil society engagement** is seen as a necessary element of SI, although the degree of civil society engagement varies. There is a general consensus that SI requires the voluntary engagement and collaboration of citizens (Bock, 2016, Neumeier, 2017) rather than top-down introduced rules, regulations or policies. While not excluding public actors and authorities from being the driving force of SI, the participation of civil society actors is nevertheless seen as essential.

4. Understanding SI in FDC

4.1. SIMRA case studies in FDC

We are incorporating empirical evidence of the 21 forest SI examples extracted from all 209 validated examples of SI from the SIMRA database (Bryce et al., 2017). Selected examples are located in and connected with forests in European and Mediterranean countries as illustrated in Figure 2. Forests are providers of multiple goods and ecosystem services, which deliver benefits that address FDC collective and individual needs; thus they contribute to FDC' well-being, especially in marginalized rural areas (Polman et al., 2017, Price et al., 2017).



1. Public–private partnership to carry out a forest programme
2. Collective action of FDC for multiple agriculture and forest conservation
3. Community woodland network
4. Community leasing agreement to support tourism in a forest
5. Policy scheme to support FDC
6. Network promoting forest fire control
7. FDC project promoting mycological resources
8. Network promoting forest fire control
9. Polycentric network for forest fire prevention and control
10. Association of FDC to promote sustainable forest management
11. Knowledge-sharing and synergies in the forestry sector
12. Common pool resource regime for community well-being
13. Common pool resource regime for carbon-smart forestry
14. Forest biomass heating systems in FDC
15. Cultural ecosystem services of woodlands
16. Adaptive governance in common pool resource regime
17. FDC' network for sustainable forest management
18. Forest micro-enterprises for sustainable forest management
19. Participatory approaches to forest management
20. FDC social enterprises for vulnerable groups
21. Network of territories promoting forest landscape models in the Mediterranean area

Fig. 2. SIMRA SI examples in forest-dependent communities (own elaboration based on the SIMRA database; Bryce et al., 2017).

The well-being of FDC - described in more detail in Appendix A - is directly and positively dependent on forestry sustainability. FDC respond to a diverse range of societal challenges such as environmental sustainability, climate change, market inefficiencies, and limited labour opportunities. Forests enable FDC to realize numerous economic and social activities, and thus increase the well-being of marginalized and socially-excluded people, as well as to intensify sustainable forest management practices that result in healthy, resilient and multifunctional forests. The identified SI primarily seek to improve environmental quality, sustainability, fire protection, forest multi-functionality and resilience. In several examples, the inclusion of socially vulnerable groups (unemployed, young or disabled) and the re-connection of urban people to the rural environment through employment opportunities and knowledge-sharing are being considered. An important factor for FDC in realizing these SI activities - in seeking to enhance their communities' collective well-being - is improved access to forest resources.

Although the term 'FDC' derives from the natural resource-dependent communities concept, Kusel (1996) has broadened the idea of FDC to include those involved in tourism, and even where forest and woodlands provide core symbolic capital and a sense of place. The economic dependence of FDC in Europe can be seen in a range of multiple activities in tourism and recreation, bio-energy production, and the diversification of agricultural production that

seeks to increase the well-being of FDC economically and socially (Melnykovich et al., 2018, Newton et al., 2016, Pulzl et al., 2013). The prevalent types of governance systems in FDC are market or hybrid arrangements, such as common pool resource regimes, cooperatives and social enterprise. Such regimes are frequently characterized by robust institutional structures that can craft their own rules to address resource management problems, and seen as sufficiently adaptive to cope with societal challenges without external authorities and even without any external financial incentives (Berkes and Folke 1985, Cárdenas and Carpenter, 2008, Ostrom, 1990, Poteete et al., 2010).

However, the institutional mechanisms that enable the growth of such activities which advance the well-being of FDC must be understood (Melnykovich et al., 2018, Muradian and Rival, 2012). Hence the selected FDC play a crucial role in analysing SI development, and empirically determining the prevalent factors crucial for SI development in the forestry sector.

4.2. *Transdisciplinary Framework to Understand SI in FDC*

The transdisciplinary framework is built on the co-production of theoretical-expert-empirical knowledge, and enables collaborative analyses of processes that lead to an understanding of SI. Institutional and ecosystem interconnection introduced under the concept of *socio-ecological systems* underlines system dynamics that lead to the transition of a socio-ecological system via institutional-ecosystem interactions (Young, 2002), and results in novel practices and arrangements (Holling, 2004). So FDC can be seen as typical examples of socio-ecological systems (Melnykovich et al., 2018). The framework aims to integrate an action arena that determines the institutional and ecosystem interconnection in FDC, as well as the system dynamics of the process of SI development based on diversified factors.

4.2.1. *Action Arena for FDC*

The central part of the SI transdisciplinary framework is the **action arena** as illustrated in Figure 3, where particular manifestations of biophysical and institutional factors interact with actors to trigger behavioural change and initiate institutional change (Bache and Flinders, 2005, Biermann et al., 2012, McGinnis and Ostrom, 2014, Newig and Fritsch, 2009, Ostrom, 1990, Paavola et al., 2009). Such are seen as pivotal for the emergence and development of SI that jointly affect innovation outcomes in FDC.

Resource systems describe the conditions of natural, human, economic and technological resources available for the community in a particular geographical unit. In FDC, forests by definition are the main natural resources in marginalized mountainous and arid areas in Europe and Mediterranean countries in relation to SIMRA (Price et al., 2017), although the nature of the forest resource and the wider suite of natural resources is subject to a high degree of geographical variability.

Governance systems include social and institutional arrangements such as the rules in use - understood as rules that are practices in real situations, norms, and relevant governance structures closely interlinked with actors. In terms of FDC, collective management and governance regimes are prevalent as described in the previous section.

Actors include active FDC participants such as collective members of commons, land owners, actors in networks such as forest commissions, NGOs, research centres, regional development agencies or municipalities, and national park representatives. The ways in which actors engage may be many and varied, from informal institutions to active participation in formal institutions - such as interest groups, collaborative engagements or social enterprises.

The type of **knowledge** thus determines the character of actors and their actions. In particular we see a difference in the use of internal community indigenous knowledge and external expert, academic or policy-derived knowledge. While the first mainly uses informal institutions of social practices built on interpersonal trust, the latter include the diversity of formal institutions to guide participatory and collaborative actions towards social practice.

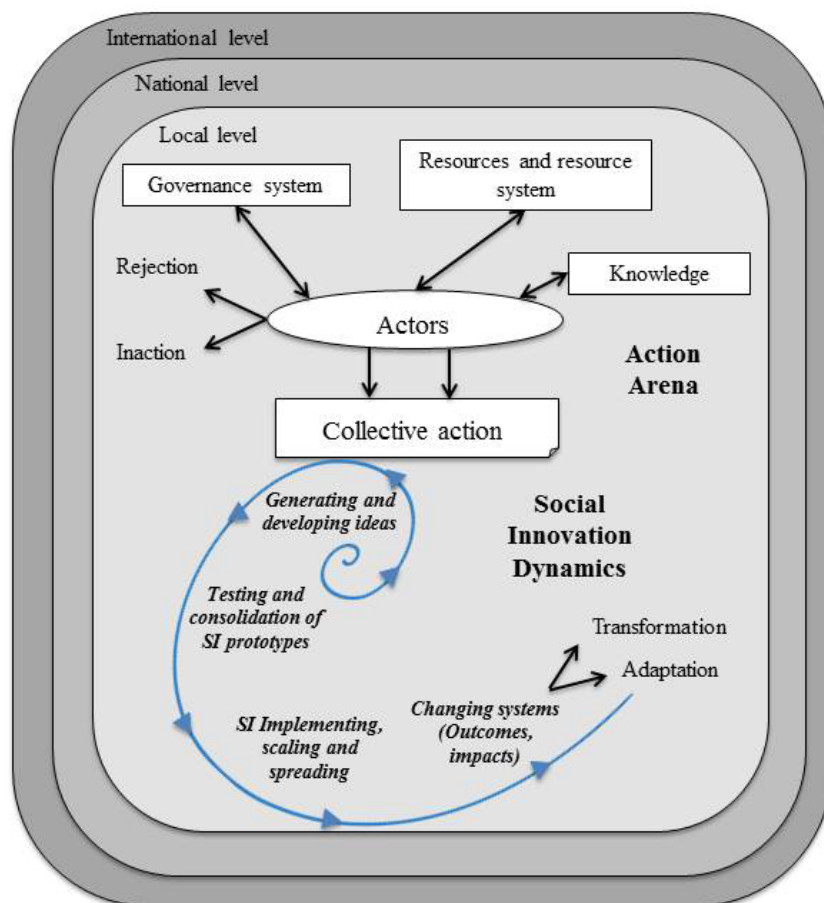


Fig. 3. Transdisciplinary framework to understand SI (own elaboration).

4.2.2. Dynamics of SI in FDC

The framework in the lower part of Figure 3 illustrates the dynamics of SI as an institutional and ecosystem interconnection (Barnet and Anderies, 2014, Berkes and Folke, 1985, Ostrom, 1990, Ruiz-Ballesteros and Brondizio, 2013). The mechanism of social practice reconfiguration, which underlies the central role of institutional change, is linked to

transformative SI theory - shaping and accelerating development trajectories in social and socio-ecological transition (Haxeltine et al., 2017).

The complex system dynamics of SI assumes cyclical mechanisms of change that result in both fast- and slow-moving actions in the system, which has consequences for interactions and SI transition dynamics. SIMRA's transdisciplinary framework (Klůvánková et al., 2017) considers **SI dynamics** in four possible stages that were identified based on theoretical knowledge (Klůvánková et al. 2017, Polman et al., 2017) and verified empirically in the SIMRA database using SI examples (Bryce et al., 2017):

- i) ***Generating and developing ideas*** - The first stage implies the emergence of SI from the ideas of groups or individuals, which can then be developed and implemented into collective action. The rejection of novel ideas occurs when conditions of SI growth are absent. If actors are insufficiently active or powerful, then a novel idea may result in inaction. If SI dynamics is present, then collective action is very likely to enhance the development of SI.
- ii) ***Growing, testing and consolidating of SI*** - Following the emergence of novel ideas, SI can grow into prototypes or pilot cases, and develop and stabilise. Some SI will evolve quickly - such as in response to political, economic and social crises - whilst others will develop slowly - such as cultural norms, responses to natural crises, indigenous knowledge for participatory engagement (see Bromley, 2006, Holling, 2004, Klůvánková-Oravská et al., 2013, Leach et al., 2013, Roland, 2008), and beliefs and values (Moore et al., 2012, Nijnik et al., 2018).
- iii) ***Implementing and spreading of SI*** - The incorporated feedback paths suggest that the consequences of action situations such as the prototype may spread out from the place of origin, consolidating to ensure more robust and stable practices, sometimes with the potential to create systemic change.
- iv) ***Changing system*** - Systemic changes are characterised by the reconfiguration of social practices such as the rebuilding of institutions, managerial rules, and new governance arrangements such as the outcomes of collective action with potential effects or impacts on the well-being of the community. We recognised two major actions that lead to system change: adaptation and transition. At the local level adaptation is prevalent where novel practices become part of an existing system. Transition requires a substantive change in the innovation system structure, and results in a system modification that may scale out of the place of origin.

The reconfiguring of social practices is thus seen as part of the transition or adaptation process that produces novel institutional arrangements, such as new social relationships and collaborations (i.e. networks, institutions, and governance structures) with civil society actors as central nodes. Our focus is necessarily on the processes which reconfigure social practices and seek to enhance outcomes on societal well-being.

4.2.3. *Factors affecting SI dynamics*

The dynamics of SI processes are influenced by a variety of **factors** essential for the success of the innovations. Bekkers et al. (2013) distinguish between: i) SI environment; ii) innovation as a learning process; iii) innovation as an adoption mechanism. Baker and Mehmood (2015) argue that the emergence of SI reinforces three societal functions: i) basic individual and collective needs; ii) relations with the SI environment; iii) capabilities to influence SI adoption. Neumeier (2017) distinguishes between: i) determining factors for the SI actor network; ii) factors influencing the participation process; ii) factors influencing the success of the SI.

Many factors pertaining to SI dynamics were developed in the co-production of theoretical and expert perspectives during the face-to-face consultation at the SITT workshop in 2016 (Klůvanková et al., 2017, see also Figure 1 and SITT workshop report, 2016) followed by an inductive meta-analysis of the full dataset of SI examples (Bryce et al., 2017). The SIMRA framework comprises four groups of factors that influence the four stages of the SI framework (Figure 3). The factors are explained in Table 2 and listed below:

- i) ***Exploratory factors of individual and collective NEEDS or TRIGGERS*** are important for the emergence of SI. They reflect the emergence of SI that mainly originate from global external drivers such as socioeconomic crises, demographic change, value systems and beliefs, forest ecosystem services, natural shocks such as wind storm, bark beetle infection, drought, flood, or other climate change related events.
- ii) ***Exploratory factors important for the GROWTH of SI*** reflect internal drivers for the growth of SI in FDC socio-ecological systems such as institutional maturity, capacity of social network, as well as market failure, policy failure, regime failure, etc.
- iii) ***Conceptual factors influencing ACTION-LEARNING PROCESSES of the community*** enhance the consolidation and durability of long-lasting institutions. These factors may affect the internal deliberative, participatory movement of the FDC based upon the building of trust, participation, knowledge exchange, and self-organising activities that mature into social capital.
- iv) ***Conceptual factors determining sustainability AND SYSTEM CHANGE*** reflect the impacts and outcomes that concern the processes and responses that address the adaptive or transformative system change of SI and its transfer outside the area of emergence. There it is accommodated in specific spatial and temporal contexts of FDC, such as novel forms of partnerships and networks, entrepreneurship, resilience self-organised regime, etc.

These four groups of factors are closely linked to the four stages of SI dynamics. Factors of individual and collective needs usually represent key triggers or motivation for generating and developing innovative ideas, the context of internal system factors seems important for the further development of the SI, factors of action-learning contribute to SI stabilisation and the transfer of successful SI outside the place of origin, and factors of sustainability and system changes characterize the long-term impacts on community well-being. Hence SI factors are likely to influence the future divergence and convergence of SI paths.

Table 2 shows the most prevalent factors that determine SI development in FDC, based on 21 cases identified in the SIMRA SI database.

Table 2. Factors for FDC as identified in the SI database.

Categories of factors	Prevalent factor in FDC
<i>Individual and collective needs (triggers)</i>	<i>Motivation: well-being, income, philanthropy</i> <i>Demographic change: population change</i> <i>Need to adapt: survival after natural event</i> <i>Need to adapt: survival after social event</i> <i>Problem coordination: global coordination problems</i> <i>Environmental quality - change in environmental quality</i>
<i>Growth of SI</i>	<i>Resources: environmental, technological, financial</i> <i>Institutional diversity: flexibility of rules</i> <i>Traditions: norms, customs, habits</i> <i>Governmental support: EU, regional, national, local</i>
<i>Action learning and spreading</i>	<i>Knowledge exchange/social learning</i> <i>Participation: collective action of individuals and the community</i> <i>Self-organizing activities of indigenous or community actors</i> <i>Capacity building: existing skills and process of enhancing skills</i> <i>Leadership: ability to lead and guide</i>
<i>Sustainability and system change</i>	<i>Cooperation: capacity of the community to cooperate and develop collective action,</i> <i>Self-organization: e.g. long-lasting institution</i> <i>Education/skills of FDC</i> <i>Social inclusion: capacity of SI to include vulnerable groups</i> <i>Novel property rights and regimes</i> <i>Coordination of power and interests</i> <i>Resilience</i> <i>Competitiveness: on global and local markets</i>

Source: Own elaboration

4.3. Application to SIMRA SI examples in FDC

The SI factors indicate the main development trajectories of SI in 21 FDC examples of the SIMRA database. Graphical visualisations of the SIMRA framework for SI understanding are

presented for two selected examples in Figure 4. The figure describes particular actions in an action arena, system dynamics (the spiral), and key factors that influence SI dynamics.

In the example of a self-organized forest commons regime in the Nízke Tatry National Park (Figure 4a), a forest-dependent community suffered a strong windstorm in 2007 followed by bark beetle infection that destroyed a significant part of the forest. As a result of the well-established adaptive management and robust regime (Kluvánková, Gežík, 2016, Brnkaľáková, 2016), the community rapidly reconfigured their forest management practices and adapted to the shock under a financial cost that was lower than the surrounding forest under a different management regime. Carbon smart practices as a novel strategy to increase competitiveness are now considered to enhance well-being and forest resilience (Kluvánková et al, in review). In the second example (Figure 4b), the Aguiar Floresta Association has introduced a target for forest grazing in the municipality of Vila Pouca de Aguiar in order to reduce fire risk through adaptation. The idea has expanded into the network of local shepherds, with research organizations and regional entities involved in the parish council.

In both these cases the motivation for innovative approaches was similar. Both communities are aiming to reconfigure existing practices to establish resilient forest management as a reaction to natural disturbances, and thus contribute to enhanced community well-being. In Slovakia the community confronts strong winds and storms, in Portugal it faces a high risk of fires. In both case studies, the internal knowledge of local actors was an important factor for SI development. Whereas in Slovakia the community members could effectively adapt their forest management practices to social challenges, in Portugal this bottom-up initiative was already a step further, enabling them to establish a formalized network for forest fire protection with the involvement of actors external to the FDC and so transform the existing system.

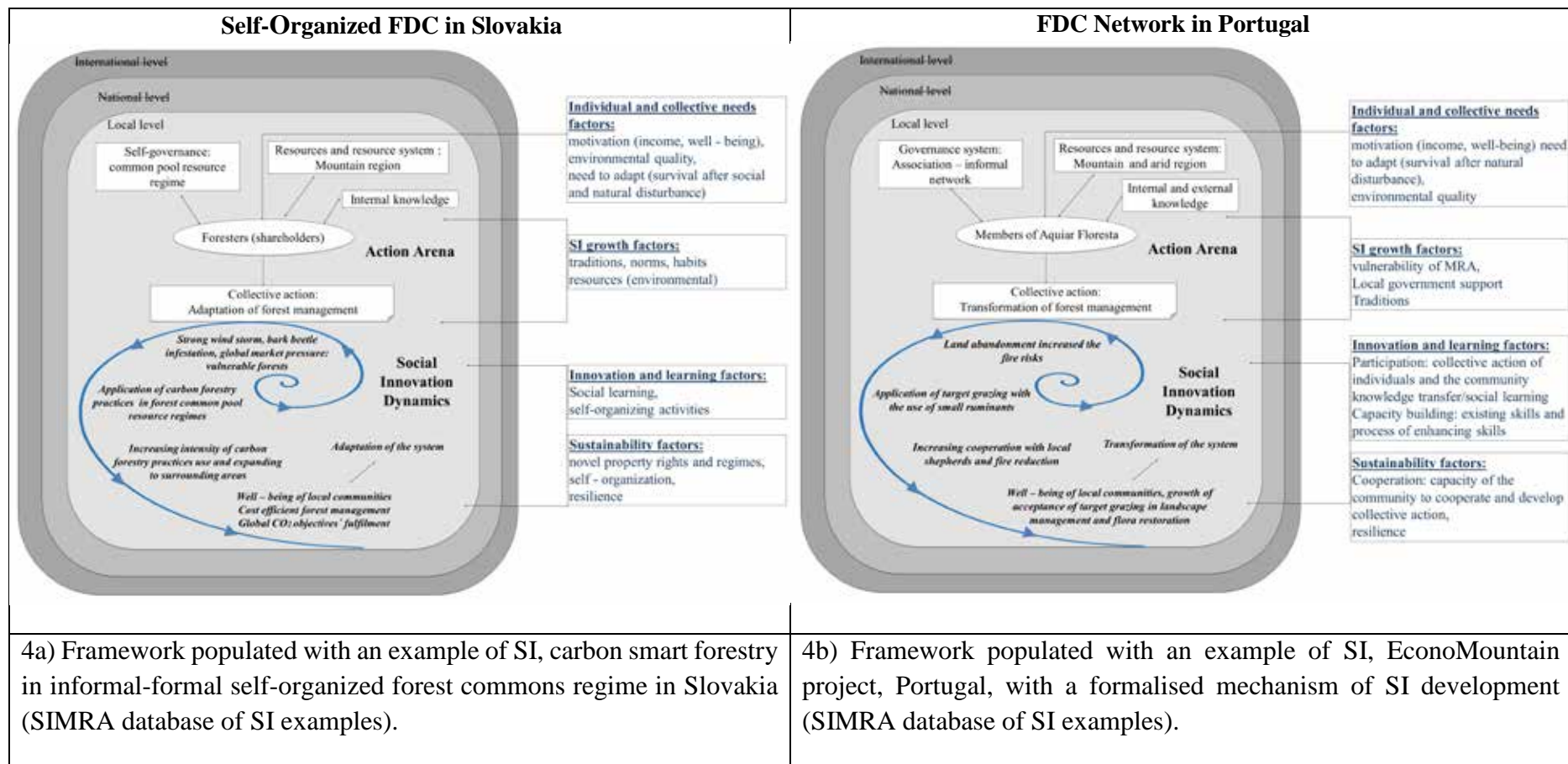


Fig. 4. Application of the SIMRA transdisciplinary framework in FDC (own elaboration based on Kluvánková et al., 2017, Bryce et al., 2017).

5. SI development trajectories in FDC

Considering the co-production of theoretical-expert-empirical knowledge, preliminary premises have been derived of SI development as possible institutional mechanisms that enable efforts for SI in FDC to emerge and develop. Three characteristics determine each mechanism and can combine different development trajectories: type of actors in an action arena; type of knowledge that initiate and develop innovation; and the character of social practice reconfigurations.

At the outset, SI may arise from *informal institutions* where personal individual leadership and self-organisation activities' actors in the local community enhance collective actions through developing ideas that lead to the reconfiguration of social practices that result in adaptation or system transition. Individual and collective skills, such as interpersonal trust and participation, are the main drivers - along with internal knowledge. An important aspect is that this development trajectory naturally grows from bottom-up, and is characterized by the high commitment and determination of FDC as illustrated in Figure 4a.

Formal institutions of cooperation, participation and capacity building are also related to the success of SI in the community. These result in networking and/or external knowledge transfer that refers to institutional arrangements typical of communities with formalised institutions for participation and collaboration that are embedded in social practice and a well-accepted legal framework, as illustrated in Figure 4b.

Evidence of these two development trajectories have been documented in our paper in empirical examples from FDC (Figure 2 and appendix). In most such cases, informal interactions between community members prevails and the innovation process is fully based on self-organization within the community. Several cases follow the Portuguese example, whereby the initiative has institutionalized new social practice into a formalized network of stakeholders including external actors and knowledge resulting in transformative change. Well-being as a motivation for SI emergence and resources in most cases have been determined to support SI to emerge and develop.

Finally, SI may also develop by **informal inclusion into the existing or novel formalized market or hybrid structures**, where participation and exchange of knowledge are also relevant (such as in social entrepreneurship), but so far little evidence has been available to verify this development path for FDC.

Our research-based findings are interim and await confirmation from the in-depth empirical analysis of SI in the SIMRA case studies.

6. Conclusions

The definition of SI developed by the SIMRA project and presented in this paper for FDC underlines four systematic elements. The process of **reconfiguration of social practices** was identified as being at the centre of SI driven by **societal challenges** resulting in the formation

of new formal or informal institutions. Evidence has been provided that these novel configurations have the capacity to enhance the **well-being** of FDC. The active involvement of **civil society actors** is essential to SI for demand-led and problem-oriented collective actions. Our multifactorial argumentation resulted in the final wording of the definition: “**SI refers to the reconfiguring of social practices - in response to societal challenges - which seeks to enhance outcomes on societal well-being and necessarily includes the engagement of civil society actors.**” We do not consider that our results are contingent on the definition used, which has thrown up a variety of development pathways for SI in FDC. Had we adopted another definition, it is most probable that the population of initiatives would have been largely unchanged, and that the same variety would have been encountered - both in factors initiating SI and in factors determining developmental pathways.

Transdisciplinarity, in the context of SIMRA, refers to an approach to engaging expert and empirical knowledge to develop and maintain systematic knowledge exchange. Experts represent the core actors in rural development, agriculture and forestry at the international, regional and national levels (SIMRA and SITT members). Engagement with SITT has been since an early project stage, and development of work in the SIMRA research activities has created a transparent and open-ended approach to problem framing. Empirical knowledge comes from SI examples across Europe and Mediterranean countries (Figure 2). This resulted in the co-production of an (theoretical-empirical-expert) understanding of SI in FDC (Figure 1). Integrating such knowledge helped to verify the key factors of SI definition and dynamics (Table 1 and 2, Figure 3 and 4). The dynamics evolve in four stages: i) **generating and developing ideas for SI**; ii) **growing, testing and consolidation of SI**; iii) **SI implementing, scaling**; and iv) **changing system**.

We have identified the possible **development trajectories** for FDC in marginalised rural areas. SI in FDC emerge and develop by *informal institutions* of the individual leadership and collective action of self-organised forest communities, building on interpersonal trust as the main driver of bottom-up process along with the indigenous knowledge and social capacity of a forest community as illustrated in Figure 4a. In some cases *formal institutions* of cooperation, participation and capacity-building may enhance the reconfiguration of social practice resulting in networking and/or external knowledge transfer. Legal and institutional support enhance the process as illustrated in the example in Figure 4b. In some cases, potential exists for a transformative change of the socio-ecological system and the possible scale out of innovated social practice from the area of origin. In other existing systems, new practises are adapted to the current institutional structure.

Finally, the divergence of outcomes can be foreseen due to the complexity of forest-related goods and services, their often public or common good status, the heterogeneity of interests, different capacities, and the differential drawdown of public sector support provided to distinctive FDC. A definition of SI for marginalised rural areas and findings on the mechanism that supports SI emergence and growth can contribute to the re-design of the EU’s Common Agriculture Policy when addressing the subsequent societal challenges facing the EU

community. We particularly see potential to institutionalise community support and the novel governance arrangement to support public private partnerships in mobilising actors, and the internal knowledge of FDC to redirect social practices to sustainability, climate change mitigation, or vulnerable groups' well-being. We also identify an opportunity to address our findings at the subnational level where instruments to enhance the cohesion of marginalised rural areas has to be implemented. The presented findings are preliminary - based on empirical evidence mapped onto the most relevant theoretical concepts. However, this does not exclude the possibility that some other actions may lead to successful SI. The conclusions derived are interim, and await confirmation from the in-depth empirical analysis of SI in the case studies.

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Appendix A. Overview of SIMRA SI examples in forest-dependent communities

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
1	Public–private partnership to carry out a forest programme (France)	Environmental quality and sustainability	Consortiums of local stakeholders and state agencies agreeing together to carry out a forest programme on a specific territory (create enhanced empowerment)	Local actors/state agencies – consortium; networking	External	Formal
2	Collective action of FDC for multiple agriculture and forest conservation (France - Guadalupe)	Environmental quality and sustainability, entrepreneurship	Forest-dependent farmers to develop a collective project to achieved a diversified agricultural production and forest conservation (create enhanced empowerment, contribute to local economy)	Consortium of farmers, universities; social enterprise, self-organization	Internal ↔ external	Informal ↔ formal
3	Community woodland network (United Kingdom)	Demographic challenges, environmental quality and sustainability	Community woodland network promoting and supporting community woodland groups (create enhanced empowerment)	New forest commons, regional association; self-organization, networking	Internal ↔ external	Informal ↔ formal
4	Community leasing agreement to support tourism in a forest (United Kingdom)	Demographic challenges, sustainability, infrastructure improvement, entrepreneurship, poverty and social exclusion	Community leasing agreement to set up a mountain bike venture in a national land forest (create enhanced empowerment, contribute to local economy)	Local and regional partnership; self-organization, leadership	Internal	Formal ↔ informal

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
5	Policy scheme to support FDC (United Kingdom)	Access to land	Policy scheme giving the option to buy or lease national forest land to community organisations, NGOs and housing bodies where they could provide increased public benefits (create enhanced empowerment, contribute to local economy)	National policy for local communities; self-organization	Internal ↔ external	Formal
6	Network promoting forest fire control (Portugal)	Environmental quality and sustainability, entrepreneurship, land abandonment	Network promoting grazing to make forestry fuel withdrawals, to gain control over fire (improve environmental quality)	Public-private partnership; networking, self-organization	Internal ↔ external	Formal
7	FDC project promoting mycological resources (Portugal)	Entrepreneurship, employment	Project for promoting mycological resources (contribute to local economy)	Local consortium of public and private actors; self-organization, knowledge transfer, social enterprise	External	Informal ↔ formal
8	Network promoting forest fire control (Spain)	Environmental quality and sustainability	Network promoting cropping, livestock husbandry and forestry practices and products to prevent mega fires (create enhanced empowerment, improve environmental quality)	Public - private network, local farmers, university, regional government and municipalities; networking, knowledge transfer	External	Informal
9	Polycentric network for forest	Environmental quality and	Coordination of not-for-profit associations involved in forest protection, prevention	Local cooperative, public participation;	Internal	Informal ↔ formal

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
	fire prevention and control (Spain)	sustainability, safety	and fighting forest fires (improve environmental quality)	self-organization, networking		
10	Association of FDC to promote sustainable forest management (Spain)	Fragmented ownership of forest land and non-existence of networks among forest owners	Association of forest owners and practitioners to promote sustainable forest management (create enhanced empowerment, contribute to local economy)	Local association formed by forest owners members and technicians; networking, self-organization	External	Formal ↔ informal
11	Knowledge-sharing and synergies in the forestry sector (Spain)	Sustainability, non-profitable forestry	Participative space for knowledge-sharing and the creation of synergies in the forestry sector (create enhanced empowerment)	Association formed by state regional office, municipalities, university, forest engineers, forest owners; knowledge sharing	Internal ↔ external	Formal
12	Common pool resource regime for community well-being (Slovenia)	Environmental quality and sustainability, transition	Re-establishment of the forest common rules in the process of transition (create enhanced empowerment, improve environmental quality)	Traditional forest commons – motivated forest owners in community; self-organisation	Internal	Informal ↔ formal
13	Common pool resource regime for carbon smart forestry (Slovakia)	Climate change, competitiveness, sustainability, entrepreneurship	Application of innovative carbon forestry practices by a self-organised local community (environmental quality, forest multifunctionality and local economy)	Traditional forest commons – motivated forest owners in community; self-organisation	Internal	Informal ↔ formal

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
14	Forest biomass heating systems in FDC (Austria)	Environmental quality and sustainability	Development of heating districts run by farmers' cooperatives using forest biomass (improve environmental quality, contribute to local economy)	Local cooperative of local farmers; social enterprise, self-organisation	Internal	Informal
15	Cultural ecosystem services of woodlands (Austria)	Improvement of services/infrastructures, employment, education	Policy programme to use the woodlands for educational, generic, social, and therapeutic intervention (reduce social exclusion)	Policy initiative with public, semi-public institutions and private companies; networking	External	Formal
16	Adaptive governance in common pool resource regime (Italy)	Environmental quality and sustainability, improvement infrastructure, entrepreneurship, poverty and social exclusion	Management of commons and redistribution of earnings through a customary socio-political-administrative institution (create enhanced empowerment, contribute to local economy)	Traditional forest commons, collaboration between municipalities; self-organisation, networking	Internal	Informal
17	FDC network for sustainable forest management (Italy)	Demographic challenges, environmental quality nad sustainability, entrepreneurship, employment	Association in Tuscany based on a large partnership of local actors willing to engage in the sustainable management of forests (contribute to local economy)	Project based non-profit association of public-private actors; networking and social enterprise	External	Formal
18	Forest micro-enterprises for sustainable forest	Sustainability, services/infrastructure improvement, ,	Project to strengthen the capacity of forest micro-enterprises and their involvement in the management of forest resources through	National policy for local actors, participation of	External	Formal

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
	management (Tunisia)	poverty and social exclusion, employment	the sustainable and rational exploitation of forest products in their area of influence (contribute to local economy)	stakeholders; knowledge transfer; networking		
19	Participatory approaches to forest management (Lebanon)	Environmental quality and sustainability, entrepreneurship, poverty and social exclusion, cultural acceptance	Implementation of a new governance structure based on participatory approaches to engage stakeholders in the management of the forest and its resources and decision-making process (create enhanced empowerment)	National forest program initiated by state actors, engaged local people; knowledge transfer	External	Formal
20	FDC social enterprises for vulnerable groups (Spain and Germany)	Environmental quality and sustainability, social exclusion, employment, education	Social business of forest management and silvicultural interventions, training of young and unemployed people under risk of exclusion in order to enhance local social cohesion (reduce social exclusion, improve environmental quality)	Private social enterprise, engaged young and unemployed people; knowledge transfer, leadership	Internal ↔ external	Informal ↔ formal I
21	Network of territories promoting forest landscape models in the Mediterranean area (Spain, France, Italy, Croatia, Greece, Turkey,	Environmental quality and sustainability, competitiveness	Network of territories promoting and supporting the development of model forests (forest landscape managed in partnerships combining the needs of local communities with sustainability) in the Mediterranean area (create enhanced empowerment, improve environmental quality)	National and regional public-private partnership; networking, knowledge transfer	External ↔ internal	Formal

No	Name of example	Social challenge	SI activity (contribution to well-being of FDC)	Type of actors and interactions	Source of knowledge	Institutional mechanism
	Tunisia and Morocco)					

Source: Own elaboration based on Bryce et al., 2017