



Article

Social Innovation as a Prospect for the Forest Bioeconomy: Selected Examples from Europe

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Abstract: Very recently, social innovation has become a subject of investigation in forest research. Earlier on, social innovation turned into a term used in EU policy strategies for addressing social issues and the self-empowerment of local people, as well as for tackling economic, social, or environmental challenges. The question of how the forest bioeconomy might profit from social innovation remains. The article examined the forest bioeconomy from the perspective of social innovation features: How is social innovation reflected in the forest bioeconomy? The forest sector is identified as one principal supplier sectors in the updated *European Bioeconomy Strategy*. In the strategies' general objectives of job creation and employment through the green economy, we detected some links to social innovation. In contrast, the *EU Social Innovation Initiative* includes social aspects via addressing collective action, integration of vulnerable social groups, and rural and urban economic development, without mentioning explicitly the forest sector. In order to make use of both EU policy documents, it is necessary to enquire on the overlaps. This research focused on the communalities in their policy goals as a reference framework for systematically identifying specific forest bioeconomy activities fitting into both realms. With example of these activities, we showed how the forest bioeconomy plays a unique role in addressing hitherto unmet needs with the development of new types of services. There is rich potential in the forest bioeconomy for private forest owners and producers with activities that range from social biomass plants to collectively organized charcoal (biochar) production in remote rural areas. Most of these are service innovations, while some combine services with product innovations. Our findings challenge positions that regard economic and social issues as strictly separated. As a result, they are identified as two combined complementary sources of income for Europe's forest owners.

Keywords: collective action; entrepreneurship; service innovation; social aspects; societal challenges; qualitative research

1. Introduction

In forestry, social innovation is increasingly attracting scholarly attention [1–6]. Social innovation was one of the European Union's innovation policy initiatives. It is distinct from other innovation strategies because it moves beyond the focus on enterprise-driven technical innovation to include other sectors, such as health, social services, and education [3]. It adds a social dimension to innovation by including social-ecological innovation [4] and economic revival for remote rural areas [1,5]. This paper examined how the forest bioeconomy can profit from social innovation by using the two principal founding policy strategy documents as point of departure: The EU social innovation initiative [7] and the EU Bioeconomy [8]. Both have been developed within the last decade and were launched around the

same time. The former was presented by the then president of the European Commission, José Manuel Barroso, in 2013 [3], while the latter was introduced in 2012 through the Commissions communication “Innovating for sustainable growth: a bioeconomy for Europe” [9]. Since then, both have developed into increasingly prominent concepts for political leaders and policy administration [10,11]. They both promise great changes and answers to pressing issues. The Bioeconomy Strategy and its recent update identify several major objectives that dip into forestry, such as the need for reducing dependence on nonrenewable resources or the sustainable management of natural resources, as well as the provision of cleaner production in all possible economic realms [8] (p. 22), [12]. The EU Social Innovation Initiative addresses complex global social problems with collective engagement. The two programs aim to ensure and drive overall sustainable development.

All this implies an opportunity for the forest-based sector to take a lead in the sustainable development of the bioeconomy [13]. The forest-based businesses can contribute to a sustainable and inclusive biosociety.

Innovations of all kinds, including social innovation, can play a prominent role in the transformation to a sustainable future forest use. This article searched for successful examples in the forest bioeconomy that may have an opportunity to scale up in future alongside a wider transformation process [14]. The Bioeconomy Strategy explicitly refers to society with its objective number five of “creating jobs and maintaining EU competitiveness” [8] (p. 22). Social innovation necessarily appears as more encompassing of social aspects, as it has been presented as a solution to many kinds of old and new social risks at a time of growing uncertainty, budget cuts, and economic pressure on public administrations as deliverers of social welfare and economic development [15,16].

The Bioeconomy Strategy was updated in 2018 [8] and goes now hand in hand with the EU Agenda 2030 and the UN sustainable development goals (SDGs). It is using the very large notion of a bio-based economy that encompasses a broad range of related economic sectors and interlinks with all kind of ecosystem services [8] (p. 27). Clearly, there is a strong focus on “production” in most bioeconomy strategies [17]. The forest bioeconomy has potential for fostering employment and community development with its renewable resources. This article investigated modes of social innovation in the forest bioeconomy. How is social innovation taking place in a forest bioeconomy and what are its transformative potentials? What are the chances and prospects for private forest owners therein? We addressed collective action and communal benefits through both private and public-private collaborative efforts that go hand in hand with forest owners’ interests. Like the bioeconomy, the forest bioeconomy comprises multiple strands [18] that open opportunities for forest owners. So far, these opportunities have not yet been examined from a social innovation perspective. The question remains, where and how forestry can combine social aspects and collective action with economic interest and income security?

The paper first outlines the methods applied in order to subsequently draw the links between social innovation and the forest bioeconomy by focusing on the key features included in both. For this, we started from the text of the Bioeconomy Strategy and searched for overlaps with forest bioeconomy contributions. In what follows, the paper presents our results by linking the empirical examples from the forest bioeconomy to the key social innovation aspects. Our findings, presented in the conclusions, suggest that especially new collaborative forms of multifunctional forest management in combination with social services can be established on the basis of social innovations.

2. Materials and Methods

2.1. Conceptual Framework: Theories of Social Innovation and the Forest Bioeconomy

In order to answer the initial question of how the forest bioeconomy can profit from social innovation, we adopted a framework that first identified the main features of social innovation in order to subsequently carve out how it fit to the forest bioeconomy. The forest bioeconomy has no commonly agreed upon definition [9,18] and plays different roles in different EU countries [8,9]. Thus, it was

conceptualized here to encompass the whole supply and production functions of the sector. We used this broad definition for the purpose of our study as a starting point. The goals of social innovation are normative and also encompass a broad range of diverse aspects. One example is the Organisation for Economic Co-operation and Development's (OECD) "Forum on Social Innovations" [19] that has developed a general working definition of social innovation stating that it "can concern conceptual, process or product change, organisational change and changes in financing, and can deal with new relationships with stakeholders and territories." Social innovation seeks new answers to social problems by: (1) Identifying and delivering new services that improve the quality of life of individuals and communities; and (2) identifying and implementing new labor market integration processes, new competencies, new jobs, and new forms of participation, as diverse elements that each contribute to improving the position of individuals in the workforce [19]. In this view, social innovations are regarded as dealing with the welfare of individuals and communities. Linked to the forest bioeconomy and the forestry actors' network, social innovation includes societal values and trust among different stakeholders in order to maximize benefits for all. Hence, it is society and/or individuals (both as consumers and producers) that are included in the process of innovation, especially when their needs and demands are initiating innovations. So far, several definitions of social innovation exist [16,20–27]. In fact, most authors speak of "new arrangements" linked to societal needs, problems, and changes. The SIMRA project [28] has developed a definition of the concept: "SI is 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" [27] (p. 22). Social innovation is understood from different angles by its many proponents. From the forest bioeconomy perspective, we suggest disentangling the processes that lead to the innovation from its outcome, the innovative service(s) and/or product(s). Subsequently, we distinguished (i) the social innovation in the process of its creation (with the involvement of collective civil society actors) from (ii) the social innovation in its outcome (the output and its societal impacts) (see Figure 1).

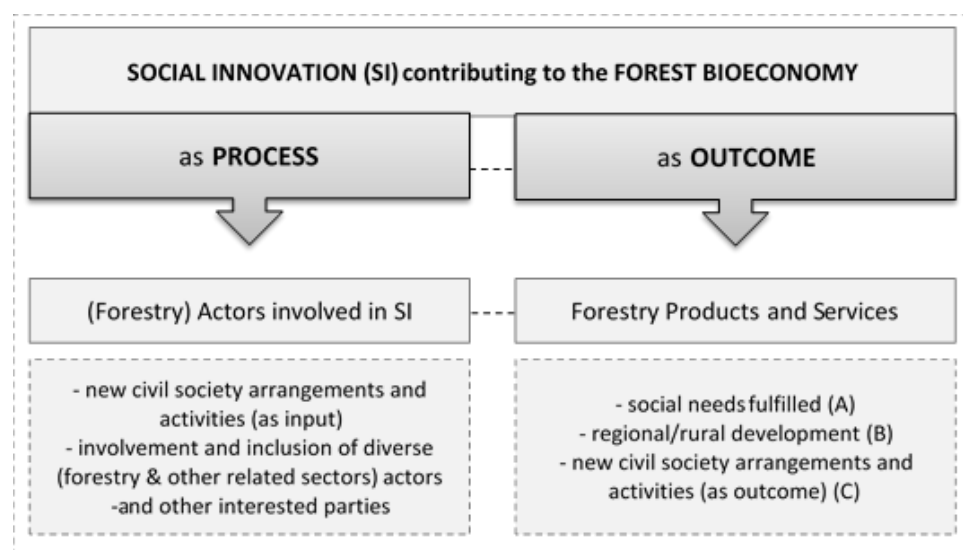


Figure 1. Role of social innovation as process and outcome in the forest bioeconomy.

2.2. Two Stages of Social Innovation and Three Types of Relevance for the Forest Bioeconomy

In the first stage, "social innovation as process," the innovation process is fed by new actors' arrangements, new institutional settings, and new forms of civil society engagement. In this stage, social agreements and negotiations of diverging interests are necessary attributes. The second stage, "social innovation as outcome," ideally creates wider social impacts through the social innovation, such as new organizational or institutional arrangements, new civil society engagement processes, economic development, and forest products and/or services.

This links to our initial research question, how is social innovation relevant to the forest bioeconomy? What role can it play for the provision of goods and services and the creation of new products? In order to become relevant for forestry, social innovation must be expanded to the private and public sectors, to new technologies, and research institutions, as well as reach out toward diverse actors and institutions of civil society than the single forestry actors' networks. The expanded network has higher adaptive capacity, as it contains not only the strong ties between the trusted actors, but also weaker ties to other actors with complementary knowledge sources. The bioeconomy concept needs to intensify its sustainability aspects and include more actors and the civil society as well, as consider intangible services in the forest bioeconomy [29]. This way, it must reach out beyond its main focus of production. Therefore, we see a need to distinguish between three main types of social innovation of relevance for forest bioeconomy (as illustrated in Figure 1) [3]:

- *Social benefits and needs (A)*: Social innovation covering forest owners' objectives in combination with fulfilling social benefits and needs.
- *Sustainable rural development (B)*: Social innovation covering forest policy objectives in consistency with regional/rural development.
- *Participation and collective action (C)*: Social innovation covering collective civil society involvement, community forestry, and interactions in the forestry actors' network.

The first type of social innovation combines forest owners' objectives with social needs and includes vulnerable groups. Very often, these are organized as social enterprises and comprise volunteer work.

The second type covers forest policy objectives of multifunctional ecosystem services and regional economic development [30]. Forest owners act collectively as parts of the rural society at large with initiatives like the formation of regional or marketing labels, bioenergy initiatives, or activities around non-timber forest products.

The third type covers the attributes of social innovation in terms of civil society participation and new forms of stakeholder involvement in forest activities. Here, private forest owners engage in joint voluntarily cooperation and collective stakeholder engagement.

Of course, all three types of social innovation in forestry have overlaps and no strict boundaries.

The conceptual framework above is summarized further in Figure 2 (below) and connects to the empirical sources of this article, which are described in more detail in Sections 2.2 and 2.3 below.

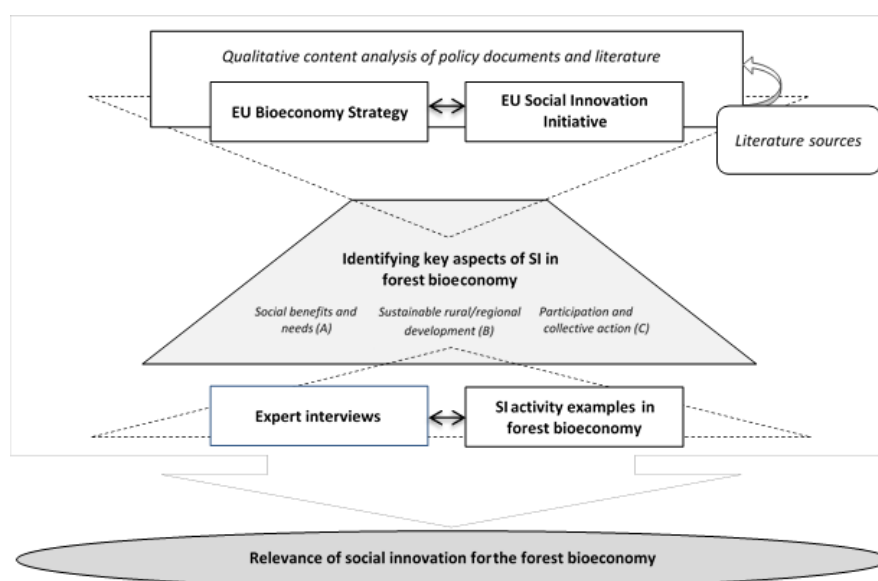


Figure 2. Conceptual and methodological approach.

2.3. Document and Literature Analysis

To answer the initial question of how the forest bioeconomy can profit from social innovation, we investigated the role that social innovation plays within the forest bioeconomy. Hence, a *systematic document and literature analysis* on the addressed topic was undertaken. We focused on the two main topical policy documents: The EU Bioeconomy Strategy including its update, and the EU Social Innovation Initiative. The topics for analysis in the documents were informed by our parallel literature analysis (see below) and were linked strongly to our research interest, namely the reflection of social innovation in the bioeconomy strategy and the notion of forestry in the single objectives of same strategy. The single steps of the analysis were informed by the qualitative analysis exemplified in the work of Mayring [31], as follows:

- From what level do the documents originate?
- How is social innovation described in the policy documents? (categories for perception of social innovation)
- How is the forest bioeconomy described in the policy documents? (categories for perception of forest bioeconomy)
- What policy instruments are suggested for social innovation and the forest bioeconomy? (categories for monetary, legal, informational)
- Who are the main audiences or beneficiaries of the social innovation and the forest bioeconomy strategy? (categories for community support, socially excluded groups, participation, beneficiaries, private, semi-private, the role of public institutions, notions of civil society, notions of stakeholders)
- How is the budget allocated to specific measures? (power distribution)
- How is the role of public institutions designed in the strategies?

In parallel, an accompanying secondary data collection was accomplished by conducting *literature search*. The focus was on (i) peer refereed papers in high ranking scientific journals, (ii) policy documents, and (iii) grey literature (conference papers, research reports). We searched systematically for literature in our universities digital library catalogues, internet sites, and databases such as Scopus, ISI Web of Science, and Google Scholar, as well as institutional databases regarding policy programs (EFI–The European Forest Institute, EU–the European Commission, FAO–The Food and Agricultural Organization of the United Nations, UNECE–The United Nations Economic Commission for Europe, the European Commission’s webpage). We identified the literature that deals with social innovation following the principle of salience of topics: Social innovation, innovation support, institutional change, political framework, and innovation systems, as well as specific aspects of social innovation like social inclusion, participation, social change, social policy, employment, rural problems, and marginalization. From the peer reviewed papers and grey literature, we used the abstracts, as well as the whole articles focusing on drawing insights for our research interest, the links between social innovation, and the forest bioeconomy. The guiding analytical sub-questions were:

- What is the concept of social innovation?
- What is the concept of the forest bioeconomy?
- How do the authors deal with institutional change, transformative change in relation to rural problems, and marginalization?
- What role does the forest industry have in the articles?
- How are social problems overcome and how are solutions designed towards a forest bioeconomy?

The results were documented in literature protocols and have supported our conceptual approach, as well as the evaluation of relevance of coverage of key aspects of social innovation in the forest bioeconomy (Table 1, below). For our interpretation, all publications and documents in the public domain state an organizations’ aims and objectives. Hence, they can be used as suitable benchmarks against which the evidence from forestry can be measured. Only those documents which were

deemed to be explicitly relevant and as leading to potential impacts on social innovation and the forest bioeconomy were selected for identifying the relations and overlaps. The time frame for our research covered the 10 years before the launch of our main two main policy strategies, the EU Social Innovation Initiative and the EU Bioeconomy Strategy, both from 2012. Thus, the time frame for our research began in 2002.

Table 1. The key bioeconomy objectives and related supply functions from forestry. EU Bioeconomy Strategy objectives [8] (p. 26) and rating of key aspects and role of social innovation (according a scale of strong, medium, and weak).

5 Key Objectives in the Updated Bio-Economy Strategy [8] (p. 26)	Role of SI Amongst Principal Objectives in the Forest Bioeconomy Strategy (Strong, Medium, Weak)	Forestry as a Supplier of Key Objectives of the Bioeconomy	Key Aspects of SI in Forest Bioeconomy Covered (Strong, Medium, Weak)		
			Social Benefits and Needs (A)	Sustainable Rural/Regional Development (B)	Participation and Collective Action (C)
Objective #1: Ensuring food security	Weak	Food and farming: -edible NWFPs -watershed management -feed for livestock	medium	medium	weak
Objective #2: Managing natural resources sustainably	weak (to medium)	Sustainable forest management: -efficient use of biological resources	weak	medium	weak
Objective #3: Reducing dependence on nonrenewable resources	medium (to weak)	Sustainable timber production: -substitution through harvested wood products -substitution through energy use	weak	medium	weak
Objective #4: Mitigation and adapting to climate change	weak	Tackling climate change: -forests as carbon sinks -harvested wood products as carbon sinks -resilience and risk prevention through forests	weak	medium	weak
Objective #5: Creating jobs and maintaining European competitiveness	strong	The forest economy and the wood-based industries: -forest sector workforce -employment in rural and urban areas -green jobs -service provision -services to the forest sector -innovative services, goods and products [32,33] -newly emerging societal trends and emerging markets -new startups	strong	strong	medium

2.4. Interview Data

The interview data collected in this study were part of larger data collection process in the SIMRA project [28]. The role of the interviews was to verify the data obtained from the document search, to increase reliability and validity of the research [34,35], and to prepare the deductive criteria for subsequent qualitative content analysis [31].

With this in mind, in the first step, key experts were identified for interviews. Their selection was based upon expertise in innovation, forestry, forest bioeconomy, forest industries, social innovation, policy implementation, and policy administration. For the interviews, we used a written list of guiding questions [36] which, in our case, focused on the assessment of the particular expert of the policy strategies, their evaluation of future prospects, and their reflection on the links between social innovation and the forest bioeconomy, as well as their assessment of specific social innovation activity examples which illustrate these links across Europe. Each interview was adapted to the respondent, according to the specific expertise requested for the enquiry. We conducted 10 high level expert interviews during 2017–2019, with each one lasting between 30 to 90 min. They took place in a range of locations throughout Europe during the project. Six interviews out of ten were recorded and transcribed. All interview partners were ensured anonymity according to the project's ethical clearance procedures. For the rest of the four interviews that were not recorded (in three, we did not obtain consent, and in one, the recorder did not work), we took notes during the interview itself. The interviews had two main aims in the research process: (i) They served as a complementary tool

for our own interpretation, especially the division we derived on the key aspects of SI in the forest bioeconomy (Figure 2), and (ii) they were used as additional validation instrument for our selection of case examples for social innovation activities (presented in Table 2). In concrete terms, the insights from the interviews were used as one basis for the ranking undertaken by the authors and outlined in Section 3.1 and illustrated in Table 1. They supported the analysis of all material obtained with a focus on our research question.

Table 2. Key targets of social innovation in forest bioeconomy social and business activities.

Key Targets of SI	Activities in the Forest Bioeconomy	Main Focus of the Activities	Assets for the Forest Bioeconomy	Principal Organizational Format of the Activity
(A) Social benefits and needs: Addressing and fostering social inclusion	Forest bioeconomy enterprises targeting vulnerable groups (Social biomass plants (AT and SI), Waldprojekt (AT), Green Care (EU wide), Green Care Forest (AT), Social Farming (EU wide), Forest production projects with former drug addicts (EU wide and AT))	Social inclusion	Economic and cultural benefit for forest owners and enhancement of social values.	Charity, Social Enterprise, NGO
(B) Sustainable rural development: Addressing rural/regional economy	Institutional innovations such as the formation of labels and brands amongst collectives of forest owners: Regional or nature marketing labels; regional development initiatives and bioenergy initiatives ((Nature parks (AT), Charcoal initiatives (SI) [37], chestnut associations (IT), bioenergy (AT))	Economic revenue and soft values such as strengthening of social stability and identity with the income to the region, but also “intangible services” in the forest bioeconomy [23]	Networking and business benefits for forest owners, local empowerment, and economic development.	Business
(C) Participation and collective action: Engagement of civil society, forest owners, and forestry actors	Volunteering (e.g., volunteer reforestation projects in Austrian Mountain regions (AT)) and voluntary cooperation for joint goals (fire brigades (ESP [11]); Mountain bike trails (CH) [38]), communal engagement for woodland management with social, cultural and economic benefits (Woodland Skills Centre, Coppice Wood College (Wales) [39])	Collective activities of multiple stakeholders with a communal goal	Cooperation and trust building around a common goal for all actors involved.	All forms: New organizations and new institutional arrangements, NGO, strong volunteer engagement

The *social innovation activity examples* that the experts were reflecting on during the course of the interview have been selected by the team of researchers (authors of this article) from the SIMRA case study database [28] and the University of Natural Resources and Life Sciences, Vienna-BOKU innovation case database [40]. The activity examples are initiatives that match the search criteria “forestry”, “forest sector”, and “forest-based bioeconomy” in combination with social innovation in their abstracts. In concrete terms, starting from the pre-defined theoretical definition of social innovation (see Section 2.1, above) [27], our deductive approach enabled the identification of three key themes (outlined in Table 2 below and explained in the conceptual part above): (A) Social benefits and needs, (B) sustainable rural and regional development, and (C) participation and collective action, which were used for identification of social innovation activities in the forest bioeconomy.

Subsequently, our analysis was based on a set of parameters, presented in a matrix in Table 1. The results of the analysis are presented in the evaluation rows of the same matrix (Table 1: “activities in the forest bioeconomy” and “assets for the forest bioeconomy”). They are based on the experts’ interpretation and their perception of the potential role of social innovation key aspects in the forest bioeconomy (always in regard to specific objectives in the bioeconomy strategy). The links between social innovation and forest bioeconomy are presented in Table 2, which combines our conceptual basis with the experts’ perceptions of provided social innovation activities. Table 2 also elaborates focus and approach of the detected social innovation activities in detail. The conceptual and methodological approach is presented in Figure 2.

3. Results

3.1. Forestry and Social Innovation in the Bioeconomy Strategy

In course of the document analysis, we started from the five main objectives of the updated EU Bioeconomy Strategy [8] (p. 26f.) in order to put them in contrast to the role of social innovation among principal objectives in the forest bioeconomy, starting from conceptualization of social innovation as

new solutions to societal challenges with enhanced participation of civil society actors while seeking to enhance outcomes on societal well-being in the related EU document from 2014 [22]. Within the author team, we ranked the results along a continuum of strong to weak. The ranking was done by each author individually. Then, the ranking was discussed and final rankings were fixed. The social innovation aspects are most strongly addressed in objective #5, creating jobs, and weak in all other aspects, which focus on the natural resource aspects of the bioeconomy. Third, we linked the forest bioeconomy as a main supplier to each objective. Here, we found manifold ways of supply functions for the forest sector for all the five objectives of the updated EU Bioeconomy Strategy (row 3, Table 1).

In the next step, our research assessed the three key aspects of social innovation in forestry and put them in relation to the five main objectives of EU Bioeconomy Strategy using the same continuum from strong to weak (column 4, Table 1). This provided a more distinctive picture. The aspect of “Social benefits and needs (A)” in social innovation includes addressing needs of various societal, also vulnerable groups, which is covered to medium extent on the Strategy’s objective of ensuring food security (#1 and covered strongly in objective #5 of creating jobs. This aspect is weakly covered in other objectives which focus on the natural resources side of bioeconomy. “Sustainable and rural development (B)” are strongest addressed in objective #5 (creating jobs) and medium in the others. “Participation and collective action (C)” aspects are covered weakly in first four objectives, because the EU Bioeconomy Strategy concentrates mainly on the production side of natural resources while including people with objective #5, and is therefore ranked medium. Objective #5 reads in full “Creating jobs and maintaining European competitiveness”, and thus seems to be the main link between social innovation and forest bioeconomy. Objective #5 in the strategy emphasizes the fact that the EU bioeconomy employs 18 million people with a 2.3 EUR trillion turnover [8] (p. 27). The quality and nature of social innovation are not fully mirrored in these objectives and, in most of the key objectives, we had to rank the relevance and role of social innovation in them as weak or medium (Table 1).

From a much broader perspective, the connection between the bioeconomy objectives and social innovation would turn out slightly stronger, e.g., if we would link general features of social innovation, like serving to combat rural depopulation, and provide (educational, cultural, and economic) opportunities to the sustainable use of resources as main condition (objective #2 of the updated EU Bioeconomy Strategy [8]), but it would still only be one condition and not a main feature of the activity. Hitting into this vein, Mustalahti [41] has indicated with the example of the Finnish National Bioeconomy Strategy that it is not responsive, as it does not include citizens. The transition to a bioeconomy needs the citizens as one of the main pillars of socially sustainable development [42,43]. Such social features are covered as lip services (mentioning of sustainable resource management) but not thoroughly addressed, e.g., with revealing its social goals. This is because the EU Bioeconomy Strategy and the circular Bioeconomy Strategy are resource-focused [8,44]. For instance, the updated EU strategy presents the key contributions of forestry in terms of turnover, added value, and numbers of jobs [8] (p. 29). It also outlines the value of ecosystems and their services [8] (p. 33), but none of the parts relate the features to social sustainability. Mustalahti [41] has detected similar weaknesses in the Finnish Bioeconomy Strategy. The question of how the European Bioeconomy Strategy(ies) impact on social sustainability and the multipurpose use of forests appears underdeveloped. Social sustainability deals with the question of achieving well-being for future generations and social innovation addresses the inclusion of vulnerable parts of society. Other authors have criticized the text of the EU Bioeconomy Strategy because it does not explicitly mention a need for reduction in the use of biological resources due to natural ecological limits [30].

A combination of social, ecological, and economic goals is mentioned in the part of the updated EU strategy, where it emphasizes to “*mainstream the Sustainable Development Goals into EU policies and initiatives, with sustainable development as an essential guiding principle to all its policies*” [8] (p. 27).

Yet, individuals and society are mentioned solely in the supporting text on objective #5 in terms of work force and the potential for job creation at local levels. This part of the text asks for a “[...] more proportionate sharing of the benefits of a competitive and sustainable bioeconomy amongst its producers [

...].” [8] (p. 27). Thus, the social agenda is covered via objective #5 (Creating jobs), mirrored in the degree of key aspects from social innovation covered in forestry and ranked by us from weak to strong toward objective #5 rather than the others (Table 1, column 2). Thus, without creating opportunities for (small) forest owners to also achieve and use outcomes of multi-purpose forest utilisation (services and multi-forest products), the full range of the forest bioeconomy does not appear to be addressed in the strategy(ies), as they simply concentrate on a more strategic use of the biological resources (focusing mainly on bigger producers). With this overlooking of the full range of forestry services, the social aspects and the society are equally left out. The following section will bring in social aspects and present our results on examples from the forest bioeconomy, which include the full range of services under the perspective of social innovation. We will outline them according the three aspects of social innovation made above.

3.2. Social Innovation in Forest Bioeconomy Social and Business Activities

New institutional arrangements and social configurations can lead to successful social innovations in forestry. From this perspective, we focused on examples for innovations that examine forest owners’ objectives (A) in combination with social needs, objectives that (B) foster regional and rural economic development, or that (C) involve engagement from stakeholders and deal with tensions in the forestry actors’ network.

The selected examples in different countries in Europe show how collective action and social engagement of forest owners and other stakeholders have found creative solutions in developing new and improved services and goods. Some of them have a nonprofit background and some, but not all, involve volunteer work. Some have their regular income as businesses.

When addressing social needs (A), the innovation in some cases can also encompass “social enterprises”, “social business” [22,37] or become part of the “social economy” [22] (p. 37), all having particular goals and forms of organisation. For instance, a social enterprise in the forest bioeconomy is an organisation that applies commercial strategies to maximize social impacts together with its profits. This way, it forms part of the so-called “social economy,” which includes a broad range of all kinds of organizations and businesses, such as co-operatives, nonprofit organizations, social enterprises, and charities. We found, in the specific cases, that goals and activities sometimes have a fuller range and can also overlap. In the cases that address regional and rural economic development (B), the innovation process has also involved civil society engagement and engaged stakeholders (C), which is one of the principal prerequisites in the LEADER regional development programs (B) where Local Action Groups are steering the projects. Despite the overlaps, we distinguished the social innovation examples in the forest bioeconomy according to the main principle focus and objectives of the projects. The distinction is insofar useful as it manages to provide a comprehensive picture of the features of social innovation in forestry. The following table (Table 2) outlines the results according to these principal markers.

3.2.1. Social Benefits and Needs: Social Inclusion of Vulnerable Groups in Forest Bioeconomy Activities

This type of social innovation focuses on vulnerable groups in society, like youth, migrants, elderly, unemployed, single mothers, and otherwise socially excluded. One very recent example is the “social biomass farm” (*sozialer Biomassehof SOBIO* [45]), with two biomass plants located in Austria and Slovenia. They were initially funded by the EUs Territorial Employment Pacts Programme (TEP) between 2007 and 2013 and have a common management system. The employees are mainly long-term unemployed from both regions. Another example from Austria is the “CARITAS Waldprojekt” (Caritas forest project) [46] in the Western federal state of Vorarlberg. It was founded in 1998 and has been provided during the last 20 years’ continuous integrational work and therapeutic daily structural work as therapy for drug addicts in a forest, garden, and kitchen. In forestry, such initiatives also range under labels like “Green Care” or “Green Care Forest”, with both having similar backgrounds and overlapping with “Social Farming.” In addition to saleable products, green care and social farming

produce health, employment, education, and therapy. Both integrate people with physical, mental, or emotional disabilities. Farms offer openings for the socially disadvantaged, for young offenders, or those with learning difficulties and people with drug dependencies [47,48]. Within Europe, at least, many countries have different programs and examples with specific national characteristics both in focus and realm [48–50]. They take place on family forest land, either with the landowner as a social entrepreneur or contracted with their non-owner partners, therefore diversifying the use of private forest land toward wider benefits. The idea of Green Care includes health services, education, and employment on farms, and sometimes includes certification schemes for participating farm holders and forest owners. “Green Care Forest” provides new ideas for forest-based products and services. Both Green Care and Social Farming initiatives can also include practical training and employment opportunities for marginalized parts of society, e.g., under the social forest scheme. Its main goals are social, and in their organizational form, they can include social enterprises and other social economy businesses. It will depend on the legal situation for such enterprises in the area. In some EU countries, forest owners have a status as “social entrepreneur,” which is also part of the EU Commissions’ Economic Strategy 2020. Table 2 indicates social farming on private forest land as an example for charitable activities to create opportunities for vulnerable groups of society, such as early-school-leavers, young immigrants, prisoners, and long-term unemployed. These groups of people are enabled to stay and work together with family farmers and social practitioners in the course of farm activities [47].

3.2.2. Sustainable Rural and Regional Development through Forest Bioeconomy Activities

Disadvantages in rural areas lead to economic problems of regions to secure welfare and income. Ideally, social innovation shall address rural and regional development as a response to societal challenges, e.g., land-flight, unemployment, or lack of infrastructure. Forest policy objectives are consistent with regional development objectives when they strengthen the position and economic stability for forest landowners. One key term is multi-purpose forestry and the combination of forestry goods and services. Associations of farmers and forest owners can contribute to regional and rural development and bring income to the region. Forestry enhances rural and regional development with forest-related, cultural, touristic, and commercial activities, collectively and in collaboration with forest owners, the local population, and stakeholders. In Austria, traditional farm forest owners formed cooperatives to set up and run biomass-based district heating systems in rural villages. By this, they created new business opportunities and created a market for forest residues but tackled also air pollution problems (caused by single house oil and coal heating). The social innovation aspects are the bottom-up initiative and collaboration with various local actors including the municipalities and public and private customers. Another Austrian example is the association of nature parks that developed the brand of “Nature Park Specialities”. There, the biological, recreational, and cultural functions of the regional nature parks are complemented and supported by the traditional products produced and provided by local farmers living in the decided nature park regions and utilizing the label. Another example for regional development through such local initiatives is the “*Associazione Tutela del Marrone di Castione*”, where some hundred associated chestnut growers and supporters from the Brentonico Plateau in a small valley near Trentino in Northern Italy organized activities, services, and gourmet events around their chestnuts. The initiative started with the goal to keep the abandoned cultural tradition of chestnut production alive, but eventually led to the creation of jobs around the production, processing, and marketing of this fruit and associated tourism services [32]. In a similar way, in 2003, one forest owner and other inhabitants of Dole pri Litiji (Slovenia) formed an initiative to support local development through the revived charcoal production [37]. The initiative evolved and local inhabitants started to offer tourist activities around the charcoal production (walking paths, accommodation, and local food). All those examples have in common that through the projects, the initiators managed to successfully cooperate with various regional actors such as forest or agricultural services, research institutes, or local administrations. In most cases, the initial ideas were derived through bottom-up activities. It is also common that the exchange of accumulated knowledge, tradition, and skills play a

great role. Sometimes these resources are combined with knowledge coming from the outside (through advisory services and other interest organizations). Such innovations add benefits in networking and business activities to forest owners and bring income to their regions. Cross-sectoral collaborations along the lines of forestry food, beverage, and tourism are creating new roles for private forest owners in the rural actor networks throughout Europe. The initiatives also contribute to social and cultural capacity building in marginalized and economically weak rural areas.

3.2.3. Participation and Collective Action in the Forest Bioeconomy: Engagement in Decision Making Through New Actors' Constellations in Forestry

Unlike in the examples in rural and regional development above (B), where the engagement was mainly induced by private forest owners, farmers, and single entrepreneurs, in this third key aspect within the main attributes of social innovation, the primary engagement comes from other civil society actors [11,51,52]. Although the term civil society has several meanings [53], it includes nonprofit work in nongovernmental organizations. Examples for community engagement can be found in grassroots movements that evolve through investment of a considerable amount of continuous volunteer work. Such types include community forestry activities like Coppice Wood College (CWC) or Woodlands Skills Centre (WSC) in Wales on communal woodland [39]. Their collective activities have evolved over many years and combine social forestry and communal land management with skills-based training and educational services on woodland management as well as craft-making. The examples also embrace strong involvement of many local individuals and groups that support the work, either through cooperation with and investments of external organizations or through direct collaboration in woodland management, crafts making and training.

Such third sector involvement has become also increasingly important in the coordination and delivery of green infrastructure in urban forestry [54]. Another example of civil society engagement with bottom-up activities can be found in negotiation processes around two formerly illegal mountain bike instalments in Swiss forests, namely the Runca Trail and the Schwanden-Brienzen Trail, where intense conflict resolution processes and stakeholder negotiations led to finally acceptable solutions for all stakeholders [38]. This kind of deliberative social processes with the engagement of numerous civil society actors proved to counterbalance the high costs, which forest owners would have otherwise had for any provisioning and maintaining of the forest recreation infrastructures that were asked for. Continuous exchange and collaborations foster trust and benefits around a common goal and ultimately collective services as output of the efforts.

4. Conclusions and Future Outlook

In order to thoroughly understand the future relevance of social innovation for the forest bioeconomy, the has applied a threefold distinction: The social innovations that cover forest owners' objectives in combination with social benefits and social needs; the ones that target forestry objectives in consistency with regional/rural development; and the social innovations that include strong civil society engagement and combat tensions within the forestry actors' network. The division is not entirely sharp and there will always be overlaps, which only mirrors the diversity and societal dynamics inherent in the concept of social innovation. From this perspective, social innovation also has structuration/organizational sides in terms of the new organizational social arrangements, as well as newly emerging local social patterns that can be outcome or initial push (Figure 1). Most of the examples for social innovation above are service-based and include strong societal and social aspects. They either involve a broader range of actors and stakeholders than mere producers and initiators, or they have strong socially inclusive features and targets. Furthermore, they cover a broad range of services and goods in the forest bioeconomy which extend from intangible features going hand in hand with the production [29]. They also include "softer" outcomes, such as ensuring of social stability or strengthening identity via collective action and the creation of some income in remoter rural areas. This distinguishes them from the perspective of a technical and production-oriented

bioeconomy strategy [42]. As social innovation includes societal benefits and services within its core meaning, it links to the bioeconomy concept foremost on the notion of sustainable development. Hence, they can connect when social innovation serves as a way to keep people in rural areas, avoid land flight, and provide (economic, educational, and cultural) opportunities. However, the coverage of key aspects of social innovation in forestry by the EU Bioeconomy Strategy resulted rather weak. Neither are social benefits and needs, (A) participation, and collective action (C) are not strongly addressed. Only sustainable rural development (B) is covered medium to strong within the Strategy's objectives due to the feature of "sustainability" (Table 1). Hence, social innovation connects to the forest bioeconomy when new institutional arrangements are created and there is inclusion of the local population. When the innovation is not merely business- and profit-driven, and when multiple actors are involved in the creation of the innovation and are also affected by its outcome, the innovations turn into social innovations. This appears to be the case with many innovations in the forest bioeconomy that involve multiple and larger constellations of actor groups and organizations and create social impacts. The decisive point is quality and degree of the social aspects of the innovations' impacts as well as the quality and degree of the inclusion of civil society actors (other than business) that are involved in order to render an innovation a social innovation. Thus, its benefit to the forest bioeconomy has to be seen in light of creating social values in its outcome, as well as in the stages of the innovation process (Figure 1). In both stages, it includes social inputs and societal engagement, as well as communication between stakeholders and the innovators, who are very often forest owners. Finally, the innovations in forestry that we detected in our analysis are most often service-driven. The EU Bioeconomy Strategy outlines a bio-based economy, which mainly focuses on products and greener production throughout all economic sectors. The forest sector serves as providing the raw material. Societal aspects are included with the strategies' objective #5 of creating jobs and otherwise implicitly addresses (e.g., with the objective #2, sustainable management of resources). Services are becoming more and more important for forest owners besides the production of timber and biomass. In some of the examples described above, it is farmers and forest landowners who found single social enterprises (as startups) and created income and employment in the region. Some also invented and found a service that serves "social" demands to the benefit of many, such as local food cooperation new to a region or other new activities around ecosystem services, like biochar initiatives or mountain bike trails. In other cases, multiple actors find consensus and mutually support an innovative project that would be difficult to realize by a single entrepreneur, farmer, or forest landowner and form associations and collective action for their land. The outcome can be recreational activities around ecosystem services, such as collective bioenergy heating systems, but also can also be protective measures, such as the formation of volunteer fire brigades. Such expanded networks are most necessary in many of the social innovations that we described as examples in private forestry and the mutual cooperation of forest owners.

In sum, the activities are creating new opportunities and are fulfilling niches in forestry. They provide opportunities out of necessities or out of mere passion of the innovators. Some use the potential of new urban needs as well, especially when it comes to recreational requirements. They provide answers to urban needs with the provision of various services or the revival of traditional activities as touristic or cultural offer. Some of the examples found are responding to environmental and ecological challenges, recognized at the local level as a problem, with the outcome of providing a better life to locals.

We conclude that these achievements are not explicitly dealt with in the bioeconomy strategies, as they are not in the main focus of the bio-based economy. Yet, clearly, the impacts and effects of social innovation mentioned above are also not in opposition to the strategy which covers all possible sectors and systems that rely on biological resources and also aims at linking the strategy to the UN Sustainable Development Goals (SDGs) [8], (p. 28).

The evolving nature of the social innovation concept made us choose a research strategy relying more on subjectively targeted sources and a wider set of search terms. Although this procedure did not follow a pre-defined protocol, it was analytical and the "best available" procedure when

taking the broad concept characteristics into consideration. Our evidence base is partly indicative and observational, suggesting social innovation benefits that will need to be confirmed in further, more rigorous studies. With these limitations in mind, we believe the following questions will be central to forest bioeconomy research for the coming years:

- What type of support do innovations in forestry need, especially for upscaling stages?
- Do we need tactical and operational management in terms of service innovations?
- Are there alternatives to the concept of social innovation in services within the forest bioeconomy?

Building on the social innovation activities and their assessment in this article, requirements for various services may thus be anticipated in years to come. Therefore, the potentially growing relevance of social innovations incorporating wider range of actors is also reasonable to expect. From a social innovation perspective, the limitations of the concept presented in the EU Bioeconomy Strategy lie in its prevalent focus on production. The strategy does not directly include the services related to forests and the forest sector. The services are likely to be very important, as they provide material (wood and non-wood), bioenergy, and a full range of other regulating and cultural ecosystem services [13], as well as intangible services [29]. The forest bioeconomy has potential, but it must consider the chances that could be derived from social innovation in the same sector. It is precisely the diversification of the forestry sector that offers broad and new opportunities for innovations, products, services, markets, and jobs than the sole deliverer of raw material. One step in this direction is a widening of its actors' networks and a consideration of social needs and societal benefits.

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