DIGIFOREST: TOWARDS FUTURE DIGITAL FOREST APPLICATIONS BY MEANS OF A SEMINAR AND AN INNOVATION WORKSHOP

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ABSTRACT: South Savo, Finland, is a leading region in wood production, but lacking behind in the development and utilization of digital technologies. The aim of this work was to rapidly generate new ideas for future digital applications in the forestry sector to serve regional development goals. A combination of a seminar and an innovation workshop was organized. The main target audience consisted of professionals from forestry and forestry technology industries, as well as students and staff from a university of applied sciences. Four leading Finnish experts gave thematically coherent lectures to orientate the participants towards generating their own ideas and the main activity was an innovation workshop. The results of the half-day innovation session were 201 raw ideas for new digital forestry applications covering the full range of wood procurement and management processes and 15 further developed concepts. In line with the principles of open innovation, all the created ideas and concepts were made available to all the participants as well as others. We suggest that similar events focusing on innovating new digital solutions specifically to support processes in biomass production and utilization would be greatly useful for the industry.
Keywords: forestry, innovative concepts, digitalization, innovation session, seminar, workshop

1   INTRODUCTION

Open innovation events can be in a decisive role in the regional development of an industry. This paper addresses the role of higher education institutions in the regional innovation system and the concept of open innovation. The core idea of regional innovation systems is that interactive processes between different actors, networks and continuous learning processes will enhance economic growth, technological dynamism and competitiveness in regions [1]. Two dominant approaches have been adopted: the triple helix model [2] and the university engagement approach [3, 4]. In both approach continuous interaction between different actors is perceived as crucial. Nevertheless, an engaged university has a distinctly active and initiating role in regional development [1].

In contemporary settings of abundant knowledge, companies can no longer afford to rely entirely on their own ideas to advance their business. This phenomenon has been coined open innovation. Chesbrough and Bogers [5] defined open innovation as 'a distributed innovation process based on purposively managed knowledge flows across organizational boundaries'. The starting point of open innovation is opening up the innovation process in contrast to closed innovation, in which companies generate their own innovation ideas, and then develop their business with that input on their own [6].

A topic considered as one of the foundations of the open innovation principles is the development of open source software [7]. While digital technologies have played an important part in the adoption of the open innovation concept, only later attempts have been made to examine open innovation outside high-tech industries, like in mature and asset-intensive industries [8]. As a result, it has been discovered that even SMEs in low-tech industries have proven to be very successful in using and integrating knowledge from external partners [9].

Prior to the innovation process there is typically a phase called the 'front-end of innovation'. It includes idea generation and the organization of promising ideas [10]. One of the open innovation instruments, the Innovation Session Method, concentrates on the early phase of innovation facilitating cooperation, learning, enhancement of skills, competences and new ideas and solutions [11].

According to research, working with a wider network and the active involvement of external stakeholders has been found to be essential to the effectiveness of open innovation process [12]. The stakeholders might act as contributors to the creation of new knowledge and innovations or receivers of knowledge that is used to generate innovations. Moreover, the open innovation process may profit from possible differences between stakeholders, as they bring about heterogeneous factors favorably contributing to the output. [12]. Similarly, the innovation sessions are typically organized for a heterogeneous set of actors with different hierarchical positions in public, private and non-governmental sectors [13]. During the sessions, various tools are used to facilitate the group work and creativity [11].

Based on the literature, three selections appear to be vital for the success of innovation sessions. 1) Careful selection of expertise for the session ensures that the right people present at the session and a sufficiently limited group of actors and participants are involved. 2) Clearly defined challenges, goals or problems should be included, when selecting themes for an innovation session. 3) Finally, the organization arranging the session need to be prepared to engage in open innovation and committed to contribute to the session process and to furthering its results. [11].

In recent years, the development of digitalization in the forest sector in Finland has been fast. The work has been partly led by the universities and national research organizations and partly by the big forest companies, which have also included SMEs in their innovation processes. The rapid development is mainly due to the open forest resource data and the tailored forest data standards for data transfer. Moreover, the new technologies used in the applications develop fast. These include, for example, efficient mobile networks, sensors and remote measurements, analytics and artificial intelligence, information ecosystems and platform economy, visualizations and simulations, and automation and robotics.

Despite this, South Savo, the leading region in wood production in Finland is lacking behind in the development and utilization of digital technologies in forestry. Given the rapid development of new digital technologies,

opportunities for applications advancing both the sustainability and effectiveness of the forestry sector are still high. Consequently, a combination of a seminar and an innovation workshop was organized by the South-Eastern Finland University of Applied Science in order to rapidly generate new ideas for future digital applications in forestry to serve regional development goals.

2   APPROACH

The DigiForest innovation session for the forest sector was based on the open innovation concept and it was held in November 2018 in the city of Mikkeli, Finland. A combination of a seminar and an innovation workshop lasting for one afternoon (4 hours) was organized. As the intention was to especially enhance the co-innovation between the forest sector in South Savo and the South-Eastern Finland University of Applied Sciences, the main target audience consisted of professionals from forestry and forest technology industries, as well as the staff and students of the university of applied sciences. The latter were chosen based on their good knowledge of the latest technology. There were 50 participants in the event, out of which 26 also attended the innovation workshop.

New ideas were already under development before the workshop, as the participants were provided with information of the purpose of the innovation workshop on the web page of the event as well as in the reminder e-mail for the registered participants. Further, they were informed to consider potential innovative applications while following the seminar based on the development trends and the examples of practical applications presented.

First, the seminar consisting of four presentations (30 minutes each) gave an overview into the good practices of digital development in forestry, the latest applications and the future prospects. The themes of the presentations were carefully selected so that they would act as a thematic introduction for the innovation workshop and provoke extensively new ideas. The topics of the lectures were: "Risk-taking in industrial digitalization", "Virtual Forest and other digital services for the forest owner", "Digitalization of recommendations for forest management", and "Future trends in the digitalization of wood supply processes".

The first lecture emphasized the importance of risk taking in innovation as well as the importance of generating a large number of ideas, as only two percent of new ideas may lead to projects with high utility. The second and third lectures acted as a thematic introduction to future services for the forest owner and forest management. The fourth lecture was given right before the workshop and it presented the most important future trends connected to wood supply to provoke new workshop ideas related to those trends. Inspired by the illuminative presentations the participants went forward to innovate future digital forest solutions to the innovation workshop, which was facilitated by two professionals in innovation events.

In the innovation workshop, the 26 participants were divided into five tables (Fig. 1). After a short introduction by two facilitators of the workshop, an innovation question was framed: What is the revolutionary digital forestry application of the near future like? Every participant was instructed to innovate personally at least a few ideas coming rapidly into mind without any criticism or discussion with others in the table. Simultaneously,

various images were projected on the screen to create associations with new ideas. Ideas were then written down and circulated so that everyone in the table familiarized themselves with ideas innovated by others. The participants were also asked to extend the innovative ideas of others by making them more complete. This was followed by a phase of free discussions based on the ideas developed so far.

Figure 1: Participants innovating in the innovation workshop.

After the discussions, every table chose 3-4 best ideas and planned those concepts a bit further together. An innovation form was filled in for each of them considering the core issues of the solution, its benefits, resources needed, and open questions. In addition, it was possible to add a drawing demonstrating the concept, visual appearance or user interface of the application. Next, the facilitators divided all the participants into two larger groups, where the new ideas on the innovation forms were presented to others. Finally, all the innovation forms were attached on the wall and everyone voted for the best idea.

3   RESULTS AND DISCUSSION

As a result, the innovation workshop produced in total 201 raw ideas and 15 concepts further developed in groups. The raw ideas were simple descriptions of potential applications including, at least in some cases, their main benefit or field of application. Examples of raw ideas included "Rapidly up-dating map browser from satellite images", "Echo device for detecting rotten wood", "A program following the logs along the transport chain", and "Applying car navigator principles for teaching forest machine drivers to better control the harvester".

The concepts planned further during the workshop included the following:

- application for the information management of the general view of a forest
- laser vision in examining the body of a tree
- a robot and program for taking care of recently planted forests
- sensors attached on trees
- drone harvester
- labeling trees based on their amount of carbon
- program noticing bird nests on the ground while logging
- application for reporting forest-related information
- application for ordering transportation in forest sector

- simulation of destructions in the forest
- forestry advisor mobile application
- camera installed into harvester with related applications
- live streaming of logging
- digital games for forest education
- sensors for lumberjacks

The innovation session method of "DigiForest" combining a seminar and an innovation workshop appeared to work fine for the idea generation and the organization of promising ideas. The aim of the seminar was to deliver information about the latest trends of digitization in the forest sector, about managing digitization and the future digital applications in forestry. The feedback of the participants showed that the selection of external experts was successful as they contributed relevant and timely information to the innovation session. In line with the prior research [11, 12], the diversity of the presenters' viewpoints proved to be useful for the participants. Especially, the participants learned that there is already a multitude of different data sources, and the digitalization of forestry has developed to the point, where new applications are innovated and tested with high speed.

The objective of the workshop was to generate new ideas and develop concepts for the future applications related to forest digitalization. Both the method and facilitation of the innovation workshop received positive feedback from the participants. As suggested, a heterogeneous set of participants with different hierarchical positions played an important role [11]. In addition, the challenge in the form of an innovation question was defined clearly enough [11]. Further, results of the workshop showed that the value of fast innovation and a great amount of ideas for advancing digitization efficiently was well accepted and appreciated.

In line with the principles of open innovation [6], the utilization of the results was advanced by sending all the created ideas and concepts to all the participants of the innovation session. Moreover, the results were also made available to other stakeholders upon request. The innovation session is not the last step in the innovation process. After this 'front-end of innovation' [10], the implementation of the new ideas remain to be realized. To avoid conflicts in the utilization of the ideas, the recipients of the workshop results were requested to inform the organizers of the innovation session, if they intended to act on an idea or ideas. Thus, the results were free for utilization and the organizers of the session coordinated the utilization process.

4   CONCLUSION

The innovation session method with a combination of a seminar and an innovation workshop appeared to function well in the context of digitalization of the mature and asset-intensive field of forestry. A great number of new ideas and concepts were generated in a short time period to be further utilized in the regional innovation system. Even though this innovation method was not focused especially on biomass production, many of the new ideas and concepts related to digitization in sustainable forest management, wood procurement and education are applicable to energy wood production, too. However, we suggest that innovation sessions focusing on innovating new digital solutions specifically to support processes in biomass production and utilization would be greatly useful for the industry. In the end, the final goal of open innovation is an ecosystem of forestry, where people, organizations, and sectors can foster co-creation to nurture digital technologies toward a positive social and economic impact within the regional innovation system.

5   REFERENCES

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ACKNOWLEDGEMENTS