Social and psychological factors influencing the use of digital technologies in agroforestry: preliminary results from the DigitAF project.

Linda Reissig[1], Sonja Kay[1], Giotto Roberti[1], Bohdan Lojka[1], Rico Hübner[1], Gosme Marie[1], Alberto Mantino[1], Margherita Tranchina[1], Jari Vandendriessche[1], Reubens Bert[1], Paul Pardon[1], Michael den Herder[1]

1 Agroscope, Ettenhausen, Schweiz

Introduction

Agroforestry is a nature-based solution that offers a significant potential for potential for increasing sustainability in the agricultural landscape (Stewart et al. 2022).

Objectives / research questions

Despite its proven potential, the adoption of agroforestry faces context-specific challenges, including a lack of decision-making tools and barriers that hinder the assessment of economic, environmental and social benefits. Digitalization has changed and continues to change agricultural production (e.g. Bronson 2019; Klerkx et al. 2019) in different types of farms and also holds great potential for agroforestry (Stewart et al. 2022). Digital farming technologies are a more recent phenomenon. There are several studies on how they have been introduced on farms (e.g. Barnes et al. 2019; Heitkämper et al. 2022; Nowak 2021; Tamirat et al. 2023). In Agroforestry digital decision aids, tools or applications can help planners and managers with design and management – but they are often not easy to use or understand. Seen the innovative nature of both digital farm technologies and agroforestry with its diversity in structure and products, there is very little known about the choice of digital agroforestry technologies by farmers, in particular in Europe (Kalanzi et al. 2021; Van Cauwenberghe et al. 2023).

The DigitAF Horizon Europe project aims to promote digital tools for agroforestry. One of its tasks, presented in this paper, was to identify the state of use of digital agroforestry tools by farmers and to provide in-depth insights into the decision-making process of agroforestry farmers in different countries from a social and psychological research perspective.

Methodology

As part of a multi-stakeholder survey within the DigitAF project, a section was designed to specifically understand (1) farmers' level of adoption of digital agroforestry tools and (2) farmers' social and psychological factors influencing the use of digital technologies in agroforestry. In addition, variables describing the farm structure (farm type, farm size, mobile and internet infrastructure) and sociodemographic situation (age, gender, education, financial situation) were used as control variables in the analysis. The survey was conducted using Google Forms.

The survey asked the following closed-ended questions using Likert scales to understand the side of the farmer as decision-maker: knowledge about digital farming technologies and also about digital agroforestry, attitude towards the phenomenon of digitalization in agriculture in general and in agroforestry, workload, personality, technology affinity, self-efficacy, motivations behind the usage of digital agroforestry tools and social influencing factors like the recommendation of their usage by consultants. In addition to attitudes towards digital agroforestry technologies, we also surveyed specific attitudes, such as the attitudes to data sharing, knowledge of data protection and farmers' willingness to share data were also part of the survey.

The sample consisted of 37 responding farmers. They were recruited from six Living Labs in seven European countries (IT, DE, NL, UK, FI, CZ, BE). All farmers were part of Agroforestry Communities. Agroforestry was chosen by 30 farmers when asked, "What is your farm type?".

Results

The survey shows that about one third of farmers already using digital technologies in agroforestry. The largest share of farmers in our sample is in the information phase of this technology adoption.

As seen in Figure 1, we find a predominantly positive attitude towards digital technologies in agriculture in general, and this applies to these technologies in agroforestry.

Figure 1 Attitude of farmers towards digitalization in farming and digitalization in agroforestry (N37).

Farmers in the Living Labs also have a high affinity for technology interaction. They also have in common a mostly medium financial situation, a self-declared workload that is too high and an intermediate knowledge of agroforestry.

Discussion and Conclusion

Despite the different contexts in which all members of the Living Labs operate the social and psychological influences on the use of digital agroforestry technologies seem to be similar. Farmers have positive attitudes towards digital technologies in agriculture in general and agroforestry in particular. The following analyses will show the factors on the farmers' side and shed light on their decision-making process to apply digital agroforestry technologies. As our sample has a high proportion of users and farmers interested in these technologies, we can show the facilitating factors for the use of digital agroforestry technologies on farms. At the end of the analyses, we will make recommendations on the features and capabilities that enable the technologies to be used, thereby facilitating the practice of agroforestry and strengthening its diffusion.

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Keywords

Agroforestry, Decision, knowledge, perception, decision-making, farmers' motivation, risk factors, decision analysis, facilitation, case study, adoption constraints, Case studies, farmer perception, personality, Adoption, farmers' decision making

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