

Working title: Stakeholder perspectives on the contribution of digital technologies to improve sustainability of conventional and organic fruit production

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Summary

Agriculture is currently experiencing a digital revolution. The present demands from citizens, farmers, and politicians alike for sustainable and modernized agriculture have pushed agricultural technologies to become digitalized, which is the application of data and information technologies to improve a farming system (Giesler 2018). As advancements are made in the crop cultivation sector of agriculture, a divide is growing between supporters of digitalization and skeptics who are concerned with developing technologies, their costs and benefits, their applications and short- and long- term impacts. The challenge of large financial investment is a leading cause of apprehension in the adaptation of agricultural digitalization by German farmers, followed by concerns of data security and sovereignty, as well as potential technical incompatibility between systems (Schleicher and Gandorfer 2018). One current risk is the focus on large-scale farms and the lack of consideration for digitalization in small- and medium- sized farming enterprises. Meanwhile, digitalization in fruit and vegetable cultivation, small- and medium- sized farms, and organic producers are not prominent in the current dialog. While there is evidence that digital technologies offer the potential to deliver a step-change in productivity and profitability across the value chain, hardly anything is known about the perceptions of potential users and the conducive social and institutional conditions required to realize this potential benefit. For the producers and agencies providing financial aid for research and development of these technologies, it is crucial to understand the current perspectives of the stakeholders in the field, as well as the socio-economic and ecological impacts digitalization can have on fruit production.

The objective of this cumulative PhD is to explore the knowledge and views of stakeholders in particular to their needs and expectations regarding the contribution of digital technologies in fruit production towards increased sustainability. While improved sustainability (socio-economic and environmental) is the priority of this research, other critical takeaways will be gained from this research: by understanding stakeholder perspectives, the conditions (socio-economic, technical) which would enable adoption of digital technologies can be analyzed in order to successfully conceptualize and implement future agricultural policy changes, research initiatives, and business strategies. The methods employed to achieve these objectives include a state-of-the-art review, a media analysis, qualitative content analysis

of a series of semi-structured stakeholder interviews, and socio-economic sustainability indicator selection and assessment.

The area of investigation will be fruit production in the Lake of Constance Region, which is one of the largest and most important fruit growing area in Germany with 19,992 ha of area (28% of Germany's total fruit production area) and has a clear dominance of apple and pears (7,500 ha) cultivated by about 4,000 farms (Statistisches Landesamt 2013). A larger proportion of agricultural area in Lake of Constance region is certified organic than in Germany on average: 12.3% (8,500 ha) of the total Lake of Constance land area is certified organic, in contrast to 7.5% (1.25 mio ha) of the total German agricultural area (Deutscher Bauernverband e.V. 2019). The area of organic fruit tree farming is 2,430 hectares, corresponding to a share of 28.5% of the region's organic agricultural area and 12% of the region's total fruit production area. Overall, farms in the Lake Constance region are smaller than in the rest of the state of Baden Württemberg: in the region of Friedrichshafen, the average farm size was 22.2 ha compared to 34.9 ha in Baden Württemberg in 2019 (LEL Schäbisch Gmünd 2020). In particular, organic farms in the Lake of Constance region are smaller than the national average, at 27.9 and 41.0 ha, respectively (LRA Bodenseekreis and ULB Friedrichshafen 2019).

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