SOCIAL & ECONOMIC EFFECTS OF DIGITALIZATION IN ORGANIC AGRICULTURE: THE EXAMPLE OF ROBOTS FOR WEED CONTROL IN SWITZERLAND

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The DESIRA project and Swiss Living Lab

- DESIRA (Digitization: Economic and Social Impacts in Rural Areas) is a European research project (duration: 2019-2023) coordinated by the University of Pisa and involving 25 partner organisations.
- Through a European-wide network of 20 'Living Labs' (LL), the project evaluates



Effects of digital technologies

Here we provide an overview of the experts' assessments of the areas in which digital technologies for weed management in organic vegetable growing tend to have a positive or negative effect.



the past, current and future socio-IT-related effects of economic innovations to address the in order opportunities challenges and of digitization.

- vegetable Swiss organic outdoor growing: 23% of the total vegetable area.
- The Research Institute for Organic Agriculture (FiBL) is organizing a LL in Switzerland with the question of how digital technologies and the use of robots can support Swiss organic farming and is focusing on weed management in vegetable growing.



- Specifically, the following issue is guiding discussions in the Swiss LL: "How can weeds in Swiss organic vegetable production be effectively controlled?"
- June 2020-April 2021: A literature research, 4 long semi-structured interviews, 1 online survey with 13 people, 1 workshop with 11 participants and 6 additional short interviews were carried out with farmers and experts.

Use of digital technologies

- At the moment, with the exception of individual pioneers in the field of vegetable growing and excluding experiments, no fully automatic weed management systems are used in Swiss vegetable production.
- All models relevant for organic production are equipped with GPS and cameras, so that autonomous and precise work can function without human intervention.

Source: Dino weeding robot - naio-technologies.com.

Economically:

- Some experts assumed that quality requirements are particularly high in organic vegetable growing and are weighted more heavily than quantity maximization \square The cost factor of digital tools was thus perceived as negligible.
- Often, technology costs were however emphasized as an important factor for the frequency of use, and emerging disparities between financially strong and financially weak companies were pointed out.
- Cost savings in production could be disproportionately absorbed by lower sales prices. The hurdle of high entry and maintenance costs could for instance be overcome through sharing schemes.

Socially:

- The time required to using digital tools was sometimes found to be too high - Relevant aspect as the work in vegetable growing is closely timed due to the high diversity of crops.
- GPS-controlled guidance systems are perceived positively, as their use allows areas to be mapped and thus managed more efficiently. Also, this can lead to a 'calmer' working atmosphere (less fluctuation in working hours and time savings).



- robots (see The graph on the left) can be connected smartphones to and tablets, which means that farmers can control them remotely.
- Standard digital tools can be found in the fields of weather forecasting, administration, communication and

organization.

- The time saved does not show up in the form of more free time, but rather as a shift of the working time freed up to other areas.
- Communication between those involved in organic vegetable growing has become easier and more decentralised thanks to digital tools.

Ecologically:

- Almost all respondents assume that some improvements can be achieved using digital tools in the future.
- The digital tools currently in use do not tend to reduce the consumption of resources (energy, water, etc.), but do simplify certain work processes and minimise the physical strain on the workforce.



Conclusions

- Although more and more digital tools are being used in Swiss organic vegetable growing especially in the areas of administration, organization and communication - there is still little experience with autonomous devices in the area of weed management.
- There are still many technical details that would have to be adapted for a real needs-based application in Switzerland. Example: Need for a better adaptation of robots to slopes.



- The interviews and the workshop have shown that although many actors are open to the new technologies, they also have clear requirements for improvement in the areas of user orientation, data protection, transparency and cooperation between development and practice.
- Together with its partners involved in the DESIRA Living Lab, FiBL wants to develop new future scenarios for weed management in organic vegetable production and to evaluate the role of digital technologies in further details.







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