WIFO ■ REPORTS ON AUSTRIA
11/2025

Digitalisation in Austrian Agriculture.

An Overview on Current Evidence and Challenges

Franz Sinabell

Digitalisation in Austrian Agriculture

An Overview on Current Evidence and Challenges

Franz Sinabell

- Digitalisation is a multipurpose technology that is increasingly being used throughout the economy.
- In order to strengthen competitiveness in the agricultural sector, policy measures are being implemented to subsidise innovation and digitalisation.
- Digital tools are used on almost all farms in Austria, especially in administration and to support decision-making.
- High costs or low expected benefits stand in the way of the wider use of digital technologies in agriculture.
- Data protection concerns and the risk of dependency on individual companies also act as barriers.

Obstacles to a greater spread of digital solutions and technologies in Austrian agriculture

Approval rates as a percentage

"Given the importance attributed to digitalisation in increasing productivity and reducing environmental impacts, more attention should be paid to ongoing monitoring."

The two most important reasons for not using digital solutions and technologies are that the expected benefits are too low and the costs are too high (source: Kettner et al., 2023a).

Digitalisation in Austrian Agriculture

An Overview on Current Evidence and Challenges

Franz Sinabell

July 2025

Digitalisation in Austrian Agriculture. An Overview on Current Evidence and Challenges

In EU agricultural policy, digitalisation is seen as an important vehicle for increasing innovation and productivity in agriculture. While the international literature allows conclusions to be drawn about the extent to which digital technologies are used in the economy as a whole and in the agricultural sector in particular, there are comparatively few relevant studies on Austrian agriculture. This article presents the results of two empirical surveys that provide an overview of the spread of digital methods and technologies in Austrian agriculture and analyse the advantages and obstacles to their use. In view of the importance of digitalisation for productivity and environmental protection, more attention should be paid to ongoing monitoring.

JEL-Codes: Q16, Q19, O47 • **Keywords:** Agriculture, digitalisation, Austria

Scientific referee: Michael Peneder • **Research assistance:** Dietmar Weinberger (dietmar.weinberger@wifo.ac.at) • **Cut-off date:** 17 March 2025

Contact: Franz Sinabell (franz.sinabell@wifo.ac.at)

Imprint: Publisher: Gabriel Felbermayr • Editor-in-Chief: Hans Pitlik (hans.pitlik@wifo.ac.at) • Editorial team: Tamara Fellinger, Christoph Lorenz, Tatjana Weber • Media owner (publisher), producer: Austrian Institute of Economic Research • 1030 Vienna, Arsenal, Objekt 20 • Tel. (+43 1) 798 26 01-0, https://reportsonaustria.wifo.ac.at/ • Place of publishing and production: Vienna • 2025/RoA/7496

1. Introduction and problem definition

Increasing productivity in agriculture is an important goal of agricultural policy. Digitalisation should make a significant contribution to this.

In the Common Agricultural Policy (CAP), programmes are generally developed for periods of seven years in order to pursue the objectives set out in the Treaty on the Functioning of the European Union. Increasing the productivity and competitiveness of agriculture is a core objective of the CAP (see Art. 39 of the Treaty)[1] and also has a high priority in national agricultural policy (see Section 1 (4) of the Agriculture Act)[2]. According to the CAP Strategic Plan, this objective is pursued with several measures. Digitalisation is an important element of the cross-cutting objective of "knowledge sharing, innovation and digitalisation" (see Art. 6, Regulation (EU) 2021/2115 of the European Parliament and of the Council)[3].

In its current "Report on the State of the Digital Decade", the European Commission (2024) recommends that the Austrian economic policy should also promote the development and use of digital solutions in the agricultural sector, in addition to other explicitly mentioned sectors. A study by the Joint Research Centre (Barabanova & Krzysztofowicz, 2023) investigated why and how such projects can be successful in the EU. It shows that the choice of means must be based on the initial situation as well as capacities and resources in order to accelerate the digital transformation in the agricultural sector.

This article first presents the results of studies on digitalisation in the Austrian total economy. Chapter 3 outlines research findings from German-speaking countries on digitalisation in agriculture. In Austria, this topic has only been studied to a modest extent to date; the core results of two empirical studies for Austria are presented in chapter 4. The article concludes with a discussion and conclusions.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri= LEGISSUM:agricultural_policy (accessed 28 February 2025).

[2] https://www.ris.bka.gv.at/eli/bgbl/1992/375/P1/NOR12138682 (accessed 28 February 2025).

[3] https://eur-lex.europa.eu/legal-content/DE/TXT/?uri= CELEX:32021R2115 (accessed 28 February 2025).

2. Digitalisation in the Austrian economy

With systematic surveys such as the DESI – Digital Economy and Society Index from 2014 to 2022[4], the DESI Dashboard for the Digital Decade[5], Eurostat data on the use of digital technologies in private households[6] and the Investment Surveys of the European Investment Bank[7], there is a wide range of data bases that can be used to monitor developments in the field of digitalisation. Digitalisation is understood as a versatile, multi-purpose technology (Peneder et al., 2019) that has the potential to contribute significantly to innovation and increased productivity. In Austria, it has triggered significant changes in various areas of the economy and society in recent years. As Peneder et al. (2016, 2017, 2019) show, digitalisation promotes employment growth in the long term, but also leads to shifts in the content and focus of occupations. They emphasise the need to invest in high-speed data transmission networks and to strengthen "digital intelligence" as a determinant of competitiveness.

Bock-Schappelwein et al. (2021, 2023) state that Austria occupies a middle position in terms of digital change within the EU. The prevalence of platform work in Austria is low, especially in the service sector. In order to increase economic competitiveness, it is necessary to improve the digital infrastructure. Bärenthaler-Sieber et al. (2022, 2024) also place Austria in the middle of the EU in terms of the use of digital technologies. Despite lagging behind in terms of the availability of ultra-fast broadband internet, the use of artificial intelligence (AI) has increased significantly in Austria. Large companies in the services sector in particular are increasingly relying on AI applications. Suggestions for promoting digital technologies include subsidies for open network access models and the expansion of gigabit-capable access networks.

In addition to these selected studies on digitalisation in the Austrian total economy, several articles focus on specific topics. Hölzl (2019) and Kügler et al. (2019), for example, analyse the use of digital technologies in small and medium-sized enterprises (SMEs) in Austria. The deficits identified can be attributed to internal company challenges and a lack of information and knowledge. Targeted measures are recommended to promote the diffusion of digital technologies and business models. Kirchner (2018) examined the impact of digitalisation on energy consumption and the environment. His study shows that digitalisation can reduce energy and resource consumption through better technologies and intangible goods, but also contributes to the increased generation of electronic waste. He emphasises the need to create supportive framework conditions in order to leverage the transformative potential of digitalisation and drive forward a socio-ecological transformation of society. Streicher and Reinstaller (2021) examined the influence of digitalisation on the demand for rail freight transport. According to them, digitalisation has both short- and long-term effects on freight demand and the modal split. Angel (2022), in turn, addressed the digitalisation of contacts with public authorities and political participation, as well as their importance for the welfare state. In addition to suggestions for future research, he emphasises the need to develop policy measures to support digitalisation and minimise its undesirable effects on society.

As this brief literature review shows, digitalisation is an important subject of empirical economic research in Austria. In contrast, the agricultural sector has not yet been a core topic of relevant studies in the context of Austrian economic policy. As there are also no statistics at EU level that show the intensity of digitalisation in the agricultural sectors of the member countries, it is not possible to make any statements about Austria's position in a country comparison.

Although there are numerous studies on digitalisation in Austria, there is little specific evidence on the agricultural sector.

3. Literature review on digitalisation in agriculture

As digitalisation is a multi-purpose technology that is used in practically all production steps and in the entire farm management, the number of applications in agriculture is almost impossible to keep track of (Moreno et al., 2024). Increased digitalisation not only has the potential to make production processes more efficient, but can also reduce the negative environmental impact of production due to resource-saving procedures and thus facilitate the attainment of sustainability goals (Huck et al., 2024; Myshko, 2024).

The digital transformation of agriculture is primarily analysed in the literature through surveys and studies on the use of digital technologies. Ammann et al. (2022) conducted

In the international literature, digitalisation in agriculture is seen as an approach to reducing negative environmental impacts.

[4] https://digital-strategy.ec.europa.eu/en/policies/desi (accessed 28 February 2025).
[5] https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts (accessed 28 February 2025).
[6] https://ec.europa.eu/eurostat/statistics-explained/index.php?title= Digital_economy_and_society_statistics_-_households_and_individuals (accessed on 28 February 2025).
[7] https://www.eib.org/en/publications/online/all/digitalisation-europe-2022-2023-evidence-from-eib-investment-survey.htm (accessed on 28 February 2025).

an online survey (n = 150) in Switzerland. The focus was on digital methods and technologies used in agriculture and approaches to evaluating future use. Based on an online survey (n = 161), Block et al. (2021) showed the high importance of smartphones for real-time data collection and analysis, which are crucial for effective risk management on farms.

Gabriel and Gandorfer (2000) provided a general overview of the digital methods and technologies used in agriculture based on a survey of 2,390 farmers in Germany. The study identified the most commonly used technologies and their impact on agricultural productivity and sustainability. In 2021, Gabriel et al. (2021) extended their earlier work and provided a detailed analysis of digital technologies used in livestock production (n = 591). The study also considered farm characteristics such as size, type of production and degree of digitalisation.

Groher et al. (2020) conducted a survey (n = 1,497) in Switzerland focussing on the use of the internet in agriculture. Their study showed that the internet is increasingly being used to access information, communicate with other farmers and manage farms. Michels et al. (2019) surveyed 829 German farmers online and by telephone to determine the degree of digitalisation in the agricultural sector. According to their findings, digital technologies have considerable potential to optimise agricultural practices, but there are also challenges associated with the adoption and integration of these technologies.

These studies from Germany and Switzerland show the growing importance of digital technologies in agriculture and their potential to improve productivity, sustainability and risk management. However, they also emphasise the need for support to overcome the challenges of implementing and using digital technologies in the agricultural sector.

4. Findings on the state of digitalisation in Austrian agriculture

To date, there have been two studies on the status of digitalisation in Austrian agriculture, which approach the topic from different perspectives.

In Austria, digitalisation in agriculture has not yet received the same attention as in Switzerland or Germany. However, there are two economic studies on the status of digitalisation in the Austrian agricultural sector.

In 2021, KeyQuest (2021) conducted a representative telephone survey of farmers, which focussed on a total of 25 "new technologies". Firstly, their awareness was surveyed and subsequently also their current or planned use. On average, each farm was asked about 17 technologies. The KeyQuest study thus provides an overview of the frequency and distribution of digital technologies in Austria's agricultural sector.

Digital tools are primarily used in administration and to support decision-making.

The following year, a similar survey was conducted among more than 500 Austrian farmers who are among those who are providing book-keeping data for the annual farm income report (Kettner et al., 2023a, 2023b). The 97-question online survey aimed to determine their experiences with digital applications in various areas of production and marketing. In addition to general digital technologies for agriculture, a distinction was made between technologies used specifically for arable farming or livestock production. Farmers with little experience in using digital applications were also invited to take part in the survey, as their responses are important for understanding the barriers to digitalisation. The aim was to determine the benefits of using digital technologies in agricultural practice and to identify inhibiting factors.

The following two sections present the key findings of the outlined studies from Austria, although for reasons of space, the specific questions and statistical analyses that can be taken from the original sources (KeyQuest, 2021; Kettner et al., 2023a, 2023b) have not been reproduced.

4.1 Dissemination and use of digital methods and technologies in Austria's agricultural sector

The attitude of Austrian farmers towards digitalisation is predominantly positive. The main motive for using digital technologies is to make work easier, ahead of improving quality and yields and increasing profitability. The respondents are pragmatic about the new technologies, with functionality, ease of work and affordability taking centre stage.

The level of awareness of the technologies surveyed is 94 percent, with technologies for business management (especially for dealing with farm administratian and authorities) having the highest utilisation rates. Digital technologies and tools are primarily used in management and administration. The digital services offered by banks, authorities and Agrarmarkt Austria (AMA), the paying agency of farm policy, play a central role here. Almost all of the farmers surveyed use apps on their mobile phones to exchange information and for weather forecasts. Warning services are used intensively in crop production when they are available.

In the area of purchasing and sales, around 20 percent of respondents see advantages in digital technologies. One-fifth of farms operate their own websites, while web shops and integrated booking systems are less common. Such applications are mainly used in the direct marketing of goods and services, such as farm holidays.

In crop farming, tractor steering and guidance systems are relatively widespread, especially on specialised crop farms. Fertilisers and pesticides are often applied on a site-specific basis. Many farms are planning to utilise these techniques in the near future. Sensor-controlled irrigation and control of hoeing equipment are less widespread, which is also due to the lower demand. Autonomous robots for weed control were not used at the time of the survey.

In livestock production, barn cameras are common and many farmers who do not yet use them intend to purchase them. Digital systems for controlling the barn climate and feeding are also in use, albeit rather rarely. Robots are only used by a few farms. In livestock production, the investment costs for digital solutions that significantly increase productivity are very high, especially for automatic milking and feeding systems. Such systems are only worthwhile from a certain farm size and are therefore often only purchased as part of expansion investments.

The results of the two surveys show that there is a close complementarity between supply and demand and the use of digital technologies. Publicly provided warning services for pests in plant, fruit and wine growing have been established for years. Digital applications on smartphones have made the use of such warning services much easier and feedback systems have significantly improved functionality compared to pure information systems. Machines with automatic tracking and steering systems have only been increasingly used on farms in recent years. An important reason for the delayed adoption of these technologies is that their immediate benefits are too small to justify an early investment in a new tractor. The same applies to the automation of livestock production. Significant conversion measures and therefore fundamental changes to operational processes and organisation are usually necessary for such systems to be used effectively.

4.2 Challenges and obstacles

The use of digital technologies in Austrian agriculture is hampered by various obstacles. Almost half of those surveyed see the high costs in relation to the expected benefits as the biggest obstacle. A good fifth cite a lack of knowledge or a lack of technical requirements as barriers.

High costs, a steep learning curve and a lack of immediate profitability are among the most important barriers to the use of digital technologies in agriculture.

Unsuitable interfaces for data exchange between individual components are not only a frequent annoyance, but also often the reason for not using digital solutions at all. If it is necessary to copy and adapt data between applications at great expense, this increases application costs and sources of error, which reduces the benefits of digital solutions.

The latter are particularly evident when several digital solutions can be combined without friction. This leads to increased production, cost savings and higher revenues. Individual digital solutions help to simplify administrative work, but the greatest benefits are achieved by networking different digital systems.

Financial reasons are the main reason for non-utilisation of digital technologies. A lack of advice or further training measures in the field of digital technologies are less frequently cited as obstacles, although many farmers would be interested in further training or personal advice. Data protection concerns also play a role and are a motive for being reluctant to use digital solutions.

Demographic and business characteristics correlate significantly with attitudes towards digital technologies. Younger and better-educated farm managers are more sympathetic to it on average. Farm size correlates most clearly with the intensity of use, especially of technologies in the production sector. Economies of scale are therefore likely to have a greater impact in the future if digital technologies are used more frequently.

The most important sources of information about new technologies and solutions for respondents are farm journals, the internet and conversations with other farmers. Those who already use digital technologies intensively are increasingly using sources of information that require more initiative, such as webinars, presentations, trade fairs and working groups.

5. Conclusions and outlook

As the available empirical findings show, several prerequisites must be met for the successful implementation of digital solutions in one's own sphere of influence. Above all, the development of digital skills and knowledge is essential. Acquiring these often requires considerable effort. Agricultural businesses are comparable to small and medium-sized enterprises and face the same challenges. Measures aimed at SMEs should therefore be equally open to farmers.

Ongoing monitoring would be necessary for the targeted observation of digitalisation in Austria in order to be able to accurately evaluate the effectiveness of the measures taken.

Subsidising an effective digital ecosystem with corresponding investments in infrastructure and connectivity makes it easier for farmers to decide to invest in digital technologies. One example of this is the public provision of "Real-Time Kinematic" (RTK) signals, which allow agricultural machinery to be controlled with centimetre precision.

In economic and agricultural policy, digitalisation is seen as an important driver of a more productive and sustainable economy. For this reason, numerous measures are being taken to accelerate the adoption of digital technologies in practice. However, it is currently only possible to recognise to a limited extent which measures are effective and in which areas there is a particular need for action. While systematic evaluations have been established for private households and companies outside of agriculture, surveys in the agricultural sector currently only look at individual aspects and are not carried out regularly. Systematic monitoring is still lacking in Austria. In view of the importance attributed to digitalisation in increasing productivity and reducing environmental impacts, more attention should be paid to ongoing monitoring.

Particular attention should be paid to the question of whether and to what extent digital technologies contribute to economic benefits. The feedback from the surveys suggests that, in some cases, only minor benefits are bought at high costs because the companies offering services and machines use digital technologies to create dependencies that are difficult to overcome.

6. References

Alarcón-Ferrari, C., Corrado, A., & Fama, M. (2023). Digitalisation, politics of sustainability and new agrarian questions: The case of dairy farming in rural spaces of Italy and Sweden. *Sociologia Ruralis*, *63*(3), 703-728. https://doi.org/10.1111/soru.12420.

Ammann, J., Walter, A., & El Benni, N. (2022). Adoption and perception of farm management information systems by future Swiss farm managers – An online study. *Journal of Rural Studies*, *89*, 298-305. https://doi.org/10.1016/j.jrurstud.2021.12.008.

Angel, S. (2022). Dimensionen von Digitalisierung der Sozialpolitik in Österreich. Ein konzeptioneller Diskussionsbeitrag. *WIFO Working Papers*, (642). https://www.wifo.ac.at/publication/pid/17691201.

Barabanova, Y., & Krzysztofowicz, M. (2023). *Digital Transition: Long-term Implications for EU Farmers and Rural Communities*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC134571.

Bärenthaler-Sieber, S., Bilek-Steindl, S., Bock-Schappelwein, J., & Böheim, M. (2024). Digitalisierung in Österreich: Fortschritt und Nutzung künstlicher Intelligenz in Unternehmen. *WIFO-Monatsberichte*, *97*(12), 661-672. https://www.wifo.ac.at/publication/pid/55990806.

Bärenthaler-Sieber, S., Bock-Schappelwein, J., Böheim, M., Kügler, A., & Schmidt-Padickakudy, N. (2022). Digitalisierung in Österreich: Fortschritt, Breitbandinfrastruktur und die Rolle der Open-Access-Netze. *WIFO-Monatsberichte*, *95*(6), 379-390. https://www.wifo.ac.at/publication/pid/19112229.

Block, J., Michels, M., & Mußhoff, O. (2021). Digitale Risikomanagementtools in der Landwirtschaft. Status Quo und Anforderungen. *Berichte über Landwirtschaft – Zeitschrift für Agrarpolitik und Landwirtschaft*, *99*(1). https://doi.org/10.12767/buel.v99i1.327.

Bock-Schappelwein, J., Firgo, M., Kügler, A., & Schmidt-Padickakudy, N. (2021). Digitalisierung in Österreich: Fortschritt, digitale Skills und Infrastrukturausstattung in Zeiten von COVID-19. *WIFO-Monatsberichte*, *94*(6), 451-459. https://www.wifo.ac.at/publication/pid/12873636.

Bock-Schappelwein, J., Kügler, A., & Schmidt-Padickakudy, N. (2023). Digitalisierung in Österreich: Fortschritt und Bedeutung der Plattformarbeit. *WIFO-Monatsberichte*, *96*(7), 467-479. https://www.wifo.ac.at/publication/pid/37651298.

Europäische Kommission (2024). *Report on the State of the Digital Decade 2024. Annex – Short Country Report 2024. Austria*.

Friesenbichler, K. S., Hölzl, W., Köppl, A., & Meyer, B. (2021). *Investitionen in die Digitalisierung und Dekarbonisierung in Österreich. Treiber, Hemmnisse und wirtschaftspolitische Hebel*. WIFO. https://www.wifo.ac.at/publication/pid/4808308.

Gabriel, A., & Gandorfer, M. (2000). *Landwirte-Befragung 2020. Digitale Landwirtschaft Bayern*. Bayerische Landesanstalt für Landwirtschaft. https://www.lfl.bayern.de/mam/cms07/ilt/dateien/ilt6_praesentation_by_2390_27082020.pdf.

Gabriel, A., & Gandorfer, M. (2021, 8.-9. März). *Wer nutzt was? Entwicklung eines dynamischen Tools zur Erstellung von Nutzerprofilen bei digitalen Technologien in der Landwirtschaft*. 41. GIL-Jahrestagung, Informations- und Kommunikationstechnologie in kritischen Zeiten. Gesellschaft für Informatik e.V. https://dl.gi.de/handle/20.500.12116/35655.

Gabriel, A., Gandorfer, M., & Spykman, O. (2021). Nutzung und Hemmnisse digitaler Technologien in der Landwirtschaft. Sichtweisen aus der Praxis und in den Fachmedien. *Berichte über Landwirtschaft – Zeitschrift für Agrarpolitik und Landwirtschaft*, *99*(1). https://doi.org/10.12767/buel.v99i1.328.

Groher, T., Heitkämper, K., & Umstätter, C. (2020). Nutzung digitaler Technologien in der Schweizer Landwirtschaft. *Agrarforschung Schweiz*, *11*, 59-67. https://doi.org/10.34776/AFS11-59.

Hölzl, W. (2019). Herausforderungen für kleinere Unternehmen durch die Digitalisierung. Bestandsaufnahme und Prioritäten. *WIFO-Monatsberichte*, *92*(9), 685-695. https://www.wifo.ac.at/publication/pid/4144820.

Huck, C., Gobrecht, A., Salou, T., Bellon-Maurel, V., & Loiseau, E. (2024). Environmental assessment of digitalisation in agriculture: A systematic review. *Journal of Cleaner Production*, *472*, 143369. https://doi.org/10.1016/j.jclepro.2024.143369.

Kettner, C., Kügler, A., & Sinabell, F. (2023a). The use of digital technologies in Austrian farms. *DISUCO Working Paper*, (4). https://www.landnutzung.at/disuco.html (abgerufen am 28. 2. 2025).

Kettner, C., Kügler, A., & Sinabell, F. (2023b). Digitalisierung in Österreichs Landwirtschaft. *DISUCO Research Brief*. https://www.landnutzung.at/disuco.html (abgerufen am 28. 2. 2025).

KeyQuest Marktforschung GmbH (2021). *Technologisierung & Digitalisierung in der Landwirtschaft*.

Kirchner, M. (2018). Mögliche Auswirkungen der Digitalisierung auf Umwelt und Energieverbrauch. *WIFO-Monatsberichte, 91*(12), 899-908. https://www.wifo.ac.at/publication/pid/4140410.

Kügler, A., Reinstaller, A., & Dachs, B. (2019). Digitalisierung der österreichischen Wirtschaft im internationalen Vergleich. *WIFO-Monatsberichte, 92*(9), 663-673. https://www.wifo.ac.at/publication/pid/4144727.

Michels, M., Fecke, W., Feil, J.-H., Mußhoff, O., Pigisch, J., & Krone, S. (2019). An empirical analysis of internet usage intensity in German agriculture. *German Journal of Agricultural Economics*. https://doi.org/10.22004/ag.econ.319804.

Moreno, J. C., Berenguel, M., Donaire, J. G., Rodríguez, F., Sánchez-Molina, J. A., Guzmán, J. L., & Giagnocavo, C. L. (2024). A pending task for the digitalisation of agriculture: A general framework for technologies classification in agriculture. *Agricultural Systems*, *213*, 103794. https://doi.org/10.1016/j.agsy.2023.103794.

Myshko, A., Checchinato, F., Colapinto, C., Finotto, V., & Mauracher, C. (2024). Towards the twin transition in the agri-food sector? Framing the current debate on sustainability and digitalisation. *Journal of Cleaner Production*, *452*, 142063. https://doi.org/10.1016/j.jclepro.2024.142063.

Peneder, M., Bock-Schappelwein, J., Firgo, M., Fritz, O., & Streicher, G. (2016). *Österreich im Wandel der Digitalisierung*. WIFO. https://www.wifo.ac.at/publication/pid/4118002.

Peneder, M., Bock-Schappelwein, J., Firgo, M., Fritz, O., & Streicher, G. (2017). Ökonomische Effekte der Digitalisierung in Österreich. *WIFO-Monatsberichte, 90*(3), 177-192. https://www.wifo.ac.at/publication/pid/4121495.

Peneder, M., Firgo, M., & Streicher, G. (2019). Digitalisierung in Österreich: eine Standortbestimmung. *WIFO-Monatsberichte, 92*(6), 447-457. https://www.wifo.ac.at/publication/pid/4143342.

Streicher, G., & Reinstaller, A. (2021). *Die Auswirkungen der Digitalisierung in der Industrie auf den Gütertransport in Österreich*. WIFO. https://www.wifo.ac.at/publication/pid/12996983.

Westermann, J. (2022). *Analyse und Klassifizierung von Digitalisierungsinitiativen in der Landwirtschaft*. Hochschule Hannover. https://doi.org/10.25968/opus-2328.