

Agriculture Digitization, Power and Food System Sustainability

Valeria Sodano¹ and Carmela Cappelli²

¹ University of Naples Federico II, Via Rodinò 22/a, Naples, 80138, Italy

² University of Naples Federico II, Via Porta di Massa 1, Naples, 80133, Italy

Abstract

Many international institutions working in the field of food policy have appealed to digitization as the cornerstone of future food system sustainability strategies. However, some works have cast doubts on an excessive emphasis on digitization benefits, highlighting some risk of negative side effects that would hamper, instead of facilitating, food system transition. By crossing the literature on the risks of digitization with that on power and sustainability, the paper stresses the importance of the concept of power for assessing the effects of digital technologies on food system sustainability. One conclusion is that to ensure that digitization is consistent with sustainability objectives, public intervention should address some critical issues, such as: data sovereignty, increased surveillance and corporate control over farming practices, increased influence of corporate power on state regulatory choices.

Keywords

Digitization, agriculture, food system, sustainability, power, contracts, data governance

1. Introduction

Digital innovation in agriculture includes applications that range from the productive to the distributive level, such as: genome-edited seeds, smart tractors and sensors, farm robotics, farm management platforms, digital marketplaces, digital freight management, quality sensors and analytics, automate warehouse, financial services, digital tools for commodity chain traceability and transparency. Over the last years agriculture digitization has been hailed as one of the main instruments for attaining food system sustainability. Many international institutions working in the field of food policy have appealed to digitization as the cornerstone of future food system sustainability strategies [1,2,3]. On 9 April 2019, in Brussels, EU Member States signed the “Declaration on a smart and sustainable digital future for European agriculture and rural areas”, recognizing the potential of digital technologies (such as artificial intelligence, robotics, blockchain, high performance computing, Internet of Things and 5G) to tackle urgent economic, social, climate and environmental challenges.

However, some works have cast doubts on an excessive emphasis on digitization benefits, highlighting some risk of negative side effects that would hamper, instead of facilitating, food system transition. Among the risks there is the increase of power imbalance within the food supply chain. This paper relies on some insights from recent studies on digitization risks and on the role of power in sustainability transitions to identify the ways in which digitization may trigger power dynamics hindering food systems transition.

2. Agriculture Digitization and Sustainability: The Role of Power

One largely recognized risk of digitization is a further consolidation of the food system. Most digital innovation applications suit large farmers and intensive agriculture [4]. For example, in South America, over the past years a renewed race to buy land by large multinationals and financial groups has been

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EMAIL: vsodano@unina.it (A. 1); carcappe@unina.it (A. 2)

ORCID: 0000-0003-0908-432X (A. 1); 0000-0002-9068-7146 (A. 2)



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strictly linked to digital innovations [5]; with these latter pushing towards a further concentration in the agricultural sector. Moreover, digitization is producing a wave of mergers and strategic alliances at vertical level, with agrochemical firms integrating information technology firms and vice versa. Bayer and BASF for example offer their apps (like Xarvio) for collecting data captured by tractors' tracking devices in order to sell their products to farmers with more fine-tuned marketing strategies. With growing data at hand, the largest internet companies have also started to integrate agribusiness apps in their platforms. Microsoft for example is expanding its Azure FarmBeats platform for deploying chatbots, like Kuzabot in Kenya, which give small farmers advisory services for the benefits of agrochemical companies like Syngenta which is a partner of the chatbot provider Arifu [6].

A second risk of digital innovations is the possible marginalization of the cultural and ecological knowledge of small-scale farmers, with their knowledge being replaced by data analytics and/or AI. The main risks from digitization for alternative agriculture practices, such as agroecology and organic farming, reside in the possibilities of small farmers losing their knowledge and skills, as well their right to repair their equipment or accessing sensitive data. The environmental narrative through which agribusiness corporations are using to legitimize digitization [7], could also create the false perception of an environment friendly conventional agriculture, making sustainable alternatives losing their support by consumers and policy makers.

A third risk is associated with data governance. So far, there is a lack of effective regulation on data protection and property rights. The exclusive property rights of sensible data (strategic for the functioning of the entire food system) on the behalf of individual internet or agribusiness companies pose many risks, such as: compromising interoperability and data quality standards; limiting cross-border data flows; reducing the availability of services; limiting the choice of policies for farmers. Since farmers do not own their data, they may not have the ability to transfer historical data between technology providers, or to choose who services their machinery [8]. Furthermore, the lack of a trustworthy governance of agricultural data may pose extreme national security risks, since food is a key geopolitical weapon.

The role of power in sustainability transitions and transition governance, has been recently stressed with regard to: the issue of empowerment and transformative agency [9]; the multiple and conflicting roles that states play in transitions [10]; the actors/loci of powers that play the main roles in thwarting the transformative processes [11]; the recently occurred power shifts in the system, which lead to forms of less democratic governance challenging transformation [12].

By crossing the literature on the risks of digitization with that on power and sustainability, it is possible to identify at least two research fields that require a specific focus on the concept of power.

The first research field is the traditional area of the political economy decision processes. When policy choices involve tradeoffs and equity issues (as for example in the case of sustainability policies that must find a balance between the different environmental, economic and social objectives), decisions cannot rely solely on economic and technological considerations but need to be framed as power struggles among different political parties by means of consensus and vote seeking. The more democratic and transparent the political confrontation, the better, from the point of view of overall social well-being, the decision process will be. Therefore, the first political issue concerning sustainability and digitization may be summed up by the questions: does digitization affect important social issues that need to be addressed at the political level? Are policy choices for digitization made in a transparent and democratic way?

The answer to the first question is affirmative. Unfair distribution of innovation benefits and costs, the disruption of technologies entailing traditional knowledge and cultural values, data privacy issues and national security risks, are all important social issues that need to be addressed at the political level.

The answer to the second question is not affirmative, since digitization may help the processes of power shifts, away from traditional national political arena, described by Baker: a shift upwards, towards a global dimension, and shift outwards, towards non-state actors. This is because the control of new digital technologies and related data by large multinational corporations means that global corporate power plays an increasingly important role in food governance. In terms of theory of power such shifts means that regulatory choices will depend not only on the first dimension of power, which is the political power of the traditional liberal political thought [13] but also on the second, agenda power, and the third, hegemonic power, dimensions of power. Agenda power [14], refers to the power decision makers have not only to choose among 'choices on the table' but also to leave some possible

choices off the table, excluding them from the political agenda. Hegemonic power is the ability to manipulate others' desires; it is the power to prevent people, to whatever degree, from having grievances by shaping their perceptions, cognitions and preferences in such a way that they accept their role in the existing order of things [15]. Corporations, through their lobbying activities, may exercise some form of agenda power in the public policies decisional arena, and, through influential social activities (often framed through the rhetoric of corporate social responsibility), may exercise some form of hegemonic power at level of civil society, making the public more akin to bear costs and risks of digitization. The rise of corporate power produced by digitization, therefore, may reduce transparency and democratic participation in policy decision processes.

The second research field that requires a specific focus on the concept of power is the economic area. Digitization contributes to the third power shift denounced by Baker: the shift inwards, which occurs as markets become increasingly concentrated and corporate strategies are implemented in order to gain market power within and across food supply chain segments. Digitization fosters market concentration, and therefore the exercise of market power. It also affects the distribution of value added along the food supply chain, due to the disproportionate bargaining power of suppliers of digital innovation with respect to their customers. Such a high bargaining power is due to the lack of data governance which creates transactions characterized by high information asymmetry, ill-defined property rights and low levels of contract enforcement. According to the theory of contract and to the Transaction Costs Theory these characteristics give the richest and most informed party in the transaction the opportunities to exploit the quasi-rents and the residual claims associated with contract incompleteness [16].

3. Conclusion

Environmental narratives are legitimizing a digital transition in the food system. By emphasizing the positive effects of digital technologies on food system sustainability, corporate actors gain institutional support for their technological developments and are able to consolidate and advance their control over technologies, livelihoods and food production, while, at the same time, marginalizing agro-ecological alternatives in international fora and institutions [7]. This paper brought attention to the issue of power as an important element to take into account when evaluating the impact of digitization on the sustainability of the agri-food system. References to the theories of power helped to understand that even if some digital innovations provide some advantages in terms of environmental sustainability, these latter might be largely outweighed by negative effects in terms of economic and social sustainability. The power discourse allowed to highlight how the growing power of some subjects (corporate power) and the growing asymmetries of power (power imbalance, which damages alternative systems) may hinder transformation (with negative effects on all the three sustainability dimensions). It also allowed to understand how political power within the system might be shifted, due to the new technologies, from the public to the private sector and from national to global level. To ensure that digitization is consistent with sustainability objectives, public intervention should address some critical issues, such as: data sovereignty, increased surveillance and corporate control over farming practices, increased influence of corporate power on state regulatory choices. A general conclusion of the paper is that with lack of attention to agency, conflict, and power, agriculture digitization becomes a 'taken for granted' innovation pattern, deemed to be unconditionally beneficial to sustainable development. The theories of power help to evaluate the impact of digital technologies starting from a broader perspective that contemplates the technological and social sphere in a way which is consistent with the multidimensionality of the concept of sustainability, avoiding the drift of misleading depoliticizing or naturalizing of socio-economic phenomena.

4. References

- [1] EC, A Europe fit for the digital age, 2019. URL: A Europe fit for the digital age | European Commission (europa.eu).

- [2] OECD, Digital Opportunities for Better Agricultural Policies, 2019. URL: <https://doi.org/10.1787/571a0812-en>.
- [3] FAO, Digital technologies in agriculture and rural areas, 2019. URL: Digital technologies in agriculture and rural areas - Briefing paper (fao.org).
- [4] L. Prause, S. Hackfort, M. Lindgren, Digitalization and the third food regime, *Agric Hum Values* 38 (2021) 641–655. doi: <https://doi.org/10.1007/s10460-020-10161-2>.
- [5] GRAIN, Digital fences: the financial enclosure of farmlands in South America, 2020. URL: <https://www.welthungerhilfe.org/news/latest-articles/2019/digitalisation-in-agriculture/>.
- [6] GRAIN, Digital control How Big Tech moves into food and farming, 2021. URL: GRAIN | Digital control: how Big Tech moves into food and farming (and what it means).
- [7] P. Newell, O. Taylor, Contested landscapes: The Global Political Economy of Climate Smart Agriculture, *Journal of Peasant Studies* July (2017). doi: <http://dx.doi.org/10.1080/03066150.2017.1324426>
- [8] M. A. Jouanjean, F. Casalini, L. Wisemani, E. Gray, Issues around data governance in the digital transformation of agriculture: the farmers’ perspective, 2020. OECD Papers, No. 146, 1-38.
- [9] F. Avelino, Power in Sustainability Transitions: Analysing power and (dis)empowerment in transformative change towards sustainability, *Env. Pol. Gov.* 27 (2017) 505-520. doi: 10.1002/eet.1777.
- [10] P. Johnstone, P. Newell, Sustainability transitions and the state *Environmental Innovation and Societal Transitions*, 27 (2018) 72-82. doi: <https://doi.org/10.1016/j.eist.2017.10.006>.
- [11] C. Béné, Why the Great Food Transformation may not happen – A deep-dive into our food systems’ political economy, controversies and politics of evidence, *World Development*, 154 (2022) doi: 10.1016/j.worlddev.2022.105881.
- [12] P. Baker, J. Lacy-Nichols, O. Williams, R. Labonté, The political economy of healthy and sustainable food systems: an introduction to a special issue, *International Journal of Health Policy and Management*, 10 (2021) 734-744. doi: 10.34172/ijhpm.2021.156.
- [13] R. A. Dahl, The concept of power, *Behavioral Science*, 2 (3) (1957) 201–215.
- [14] P. Bachrach, M. S. Baratz, Two Faces of Power, *The American Political Science Review*, 56, 4 (1962) 947-952.
- [15] S. Lukes, *Power: A Radical View* 2nd. Ed., MacMillan Press, London, 2005.
- [16] V. Sodano, A power-based approach to the analysis of the food system, in: J. Bijman, S.W.F. Omta, J. Trienekens (Eds.), *International agri-food chains and networks*, Wageningen Academic Publishers, 2006, pp. 199–215.