

Ethical and Legal Considerations in Smart Farming: A Farmer's Perspective



Foteini Zampati

Abstract Smart farming contributes to exponential income growth, enhanced decision making, better services and products, as well as productivity and profitability. Nowadays, numerous agricultural technology providers are entering the market, focusing on aggregating farmers' data. But many farmers, especially smallholders, do not benefit from the sharing and exchange of this data, which leaves them feeling disempowered. Until today, ethical considerations were often side-lined because gathering more data was seen as necessary, and concerns about how data might be abused or misused were only subsequently considered. However, with the increase of big data in smart farming, it is more essential than ever to focus on the ethical aspects of data governance (access, control, consent) and practices. Therefore, these ethical questions will provide valuable insights into how data is being collected and used, for what purposes, how to bridge the digital divide, and how to create transparency and build trust between stakeholders. This chapter will focus on farmers' perspectives and how they could actively participate in a more equitable data sharing and exchange in the agri-food value chain by contributing to the design of a fairer data governance framework. The adoption of agricultural codes of conduct is the example that will be explored.

1 Introduction: The Challenges Posed by Digital Technologies for Farmers

It is evident that the adoption of digital technologies in agriculture has marked the start of a major transformation: Better services and products, innovations, enhanced decision making and increased profitability and productivity (Zampati, 2019). But do smallholder farmers really benefit equally, or even at all, from the benefits of data sharing? Moreover, do all stakeholders in the agricultural sector have the same

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access and control to these insights? What concerns do farmers have on such issues as data ownership, access and control, security and privacy?

Lack of transparency around the above-mentioned issues and whether farm data should be considered ‘personal’ or not, are some of the data challenges faced by all agricultural stakeholders, particularly farmers. Moreover, data transactions are currently governed by contracts and licensing agreements, in which the terms and agreements are complex. This leaves smallholder farmers with very little negotiating power and it is obvious that a lack of trust dominates these relationships (Wiseman et al., 2019a, b).

The lack of awareness about these rights or the use of data (mostly for farmers) has contributed a lot to an unfair distribution of wealth in the agricultural sector. This perception of inequitable distribution of advantages and disadvantages in the world of production, collection, distribution and use of data is something quite common to agriculture. Global power imbalances have been identified relative to the limited access of some farmers to digital technologies and or to the data they generate (Kshetri, 2014; Rodriguez et al., 2017; De Beer, 2016; Maru et al., 2018; Ferris & Rahman, 2016). This is the so-called digital divide between the developed and the developing countries, which is caused by a lack of means to buy the technologies required for digital farming (Kshetri, 2014: 2; Maru et al., 2018; Ferris & Rahman, 2016) and a lack of scientific data skills among farmers (Ferris & Rahman, 2016: 6). Another reason for this unfair distribution of power is the fact that only large farms are able to pay for the costs of accessing the information based on data, while this is expensive for small-scale farms in developing countries (Ferris & Rahman, 2016: 8; Chaves Posada, 2014), and that recommendations made on the basis of data are not always well suited to the needs of small farms (Rodriguez et al., 2017; Kamilaris et al., 2017; Maru et al., 2018; Ferris & Rahman, 2016). Furthermore, the power imbalance between data contributors and data aggregators is evidenced by the inability of farmers to negotiate the standard terms of the large agri-businesses’ data licences that govern the agricultural technology (Carbonell, 2016; Jakku et al., 2018). These ethical concerns have a definite impact in society. As Van de Burg et al. state, “in discussions about if and with whom data ought to be shared, or the desirability of different power (re)distributions, a lot is pre-supposed about the desirability of different impacts of smart farming on society” (Van der Burg et al., 2019).

Overall, farmers are perceived to have little control on data flows and use, information and knowledge. On the one hand their data sharing is hindered by unclear data governance and risks of data misuse, and on the other hand they face the challenge of gaining access to necessary data provided by others. Both types of challenge are linked to inequitable data flows.

In this chapter, we will explore first the challenges that farmers, and specifically smallholder farmers, face in the adoption of digital technologies. What specifically are the reasons that farmers are not fully or at all included in the discussions, design and governance of digital agriculture, even though the benefits are well known? In Sect. 2, we will share some insights from the work of the Global Open Data for Agriculture and Nutrition (GODAN) Initiative to enable farmers to harness the

power of data driven agriculture by defining responsibilities among the various stakeholders and by balancing the obvious benefits of data sharing with legitimate concerns in relation to privacy, security, community rights and commercial interests, mostly from the farmers' perspective. In Sect. 3 we will focus on the ethical aspects of data governance (access, control, consent) and practices.

Systems of governance that could support a fairer, equal distribution of benefits such as codes of conduct and the development of the GODAN/CTA/GFAR toolkit on agricultural codes of conduct are presented in Sects. 4 and 5, respectively. Section 6 provides some conclusions.

2 The GODAN Approach

The Global Open Data for Agriculture and Nutrition (GODAN) initiative¹ is an international alliance with voluntary membership that aims to promote the global availability of open data in agriculture in order to stimulate innovation and increase productivity in this important sector. Today, its global network includes over 1100 organizations (spanning governments, international organizations, the private sector and academia) from 118 countries across the world.

More specifically GODAN supports global efforts to make agricultural and nutritionally relevant data available, accessible, and usable for unrestricted use worldwide. The initiative focuses on building high-level policy, and public and private promotion of open data. Its focus is to increase awareness of ongoing activities, innovations and good practices. Another focus is to guide and assist both private and public sector bodies on open data and open access policy, by promoting capacity development and diversity among open data users for more effective accessibility, use, engagement and understanding of open data. In order to do so, GODAN works closely to define actors' responsibilities to respect the rights of all those affected by the release and use of open data, by balancing the obvious benefits of open data with legitimate concerns in relation to privacy, security, community rights and commercial interests.

Through its enormous network of different international stakeholders, GODAN has enhanced the dialogue and actions between key organisations in order to achieve a common understanding and a consensus around the ethical and legal issues concerning agricultural data, data ownership, data rights, privacy, responsibilities and ethics. More specifically, in 2018 GODAN, the Global Forum on Agricultural Research (GFAR), the Technical Centre for Agricultural and Rural Cooperation ACP-EU(CTA) and the K uratorium f ur Technik und Bauwesen in der Landwirtschaft (KTBL) worked together on the ethical, policy and legal aspects of open data affecting smallholder farmers by engaging with various stakeholders (from governments, the private sector and academia). This collective action included

¹<https://www.godan.info/>

organising workshops and webinars, participation in major conferences, supporting and advising on the development and implementation of data policies on a national and international level, and work on capacity building for farmers and farmers' organisations. Overall, the focus of this work was in relation to farmers' concerns about data sharing and how to promote food security and sustainability through the opening of access to farm data, primarily in developing countries.

This chapter reports on some of the insights acquired by GODAN in the course of these activities and engagements, with an emphasis on practical concerns and questions of interest both to farmers' rights and to ways forward for researchers aiming to re-use data acquired from farmers.

3 Relevant Ethical Questions

Until today, ethical considerations were often side-lined because gathering more data was seen as necessary, and concerns about how data might be abused or misused were only subsequently considered. However, with the increase of big data in smart farming, it is more essential than ever to focus on the ethical aspects of data governance (access, control, consent) and practices. Big data can contribute to improved profitability and productivity in the agriculture sector. However, there are some challenges to be considered such as access, distribution of benefits, equity, inclusion, data ownership and data rights as well as data governance. It is essential to address questions such as, what opportunities do the digital technologies provide? Do all the actors in the value chain receive the same information and insights? How is trust established between big agribusinesses and farmers? It is well known that whoever owns data may control data insights. By addressing the correct ethical questions and by engaging all stakeholders in the agricultural sector (specifically farmers) in an open dialogue, this will provide valuable insights into how data is being collected and used and for what purposes, how to bridge the digital divide, and how to create transparency in order to build trust between stakeholders.

Since the world of agriculture is quite diverse, it consists of different types of agricultural methods and farming realities. In order to maximize their potential, it is important that digital solutions are designed with a view to the farming communities' needs.² This is especially true in African countries with very low literacy levels and limited knowledge of digital technologies, yet where the highest untapped agricultural potential remains. Smallholder farmers are not harnessing the power of data and must overcome challenges and risks to ensure that investments benefit them. In this case, there are two main challenges that need to overcome: first, to gain access to

²See also Kochupillai and Köninger (this volume): "Artificial Intelligence (AI) technologies, especially machine learning systems can utilize the data collected and managed by a blockchain/ DLT based system to design apps that bring unique and custom-made information and solutions to farmers."

relevant data and services provided by others and, second, to make sure that any data they share does not actually weaken their positions.

Data asymmetries and imbalances as well as monopolies are quite present/dominant in the agricultural sector. These data asymmetries arise when smallholder farmers with rather limited resources reveal their most personal farm data in order to gain access to benefits of technology, while those who can transform the collected data into useful information reveal little to nothing about the back-end processes or how or where the information will be kept or used. Therefore, there is a need to address the question of the balance between the cost of introducing the technology versus the expected benefits for the farmers (Kritikos, 2017). Farmers need to feel and be engaged in the decision process of how collectors will use their data. They also need assurances of their privacy and control; they seek transparency and trust in their interactions with providers; and they would like to receive the benefits of their data and to have access to relevant data.

Because of the above-mentioned situation, important questions and issues have arisen:

- Who owns data?
- Who is entitled to the value of the data?
- How will that data be used or potentially shared?
- What about data protection? What do we mean by farmers' rights to data?
- What is the state of recognition of these rights at the national and international level?
- What is the role of the General Data Protection Regulation (GDPR) in the agricultural sector?
- How should these rights be implemented in local and international laws, guidelines and policies and how can they be protected?
- What should be done to include farmers in the mechanisms of data collection, evaluation, transmission and use?

These issues of course aren't new to people in the agricultural sector. But there is a big need today to address them right and quickly to ensure farmers' rights. It is already well known that ownership as a legal concept is rather complex, and farming data is not traditionally recognised as a type of property that is subject to ownership. The currently available ownership-like rights of data are limited to intellectual property rights (copyright, patents, database rights, trade secrets, plant breeders' rights and trade secrets). However, none of these provide adequate protection of data ownership. In particular, copyright is one way in which data can be owned but data is not always or even normally copyright protected by default. Facts – for example, statistics, formulas, geo-information and news – are not copyrightable (De Beer, 2016).

The European Parliament's 1996 Database Directive establishes *sui generis*, i.e. unique, rights in databases that fall short of the standard of an intellectual creation required by copyright law (De Beer, 2016). Database creators have the right to prevent extraction and/or reuse of the whole or of a substantial part of the contents of a database. To gain this protection, the database creator must establish

that there has been a substantial investment in the obtaining, verification, or presentation of the contents. The term of protection is 15 years, but it is renewable whenever the database holder makes any substantial change to the contents of the database (Wiseman et al. 2019a, b). Patents and plant breeders' rights do not protect data directly, but can nonetheless limit the ability to use data related to innovations in agriculture (De Beer, 2016).

It is quite difficult to define data ownership in farm data. For example, even where data is protected by copyright law the ownership of copyright can be varied by contract (Wiseman et al. 2019a, b). Therefore, it is better to ask the question who has control and access to farm data, rather than asking who owns data. In many cases, farmers own data generated from their farms but they have little control over who or how their data is going to be used.

4 Practical Solutions: Codes of Conduct

While laws and regulations that govern personal data (such as The European General Data Protection Regulation or GDPR³) are becoming increasingly common, there is a lack of legislation covering the collection, sharing and use of data in agriculture (Zampati, 2019).

It is worth mentioning though the recent EU Regulation on the free flow of non-personal data, and its relevance for digital agriculture. Just one year after launching the General Data Protection Regulation, the EU launched a new regulation about the control of non-personal data, which defines data on precision farming as non-personal data. This highlights the need for more analysis to achieve a clearer distinction on personal versus non-personal farm data, which would help alleviate privacy concerns going forward. Appropriately, the new regulation emphasizes the importance of self-regulation within the data economy: It encourages the development of industry-specific codes of conduct, allowing for transparent, structured and seamless sharing of data between service providers.

Consequently, to steer a new paradigm of agricultural data governance, there is a need to develop transparent data sharing codes of conduct, and self-regulation that responds to the situation and needs of communities and balances the distribution of benefits between actors in the agricultural value chain. Therefore, codes of conduct have started to emerge to fill the legislative void and to set common standards for data sharing contracts: codes provide principles that the signatories/subscribers/members agree to apply in their contracts. Farm data is an example of such sensitive data flows. Farm data flows go from the farm to many other actors (extension agents/advisory service providers/agri-tech companies, farmers' associations, financial service providers, government, etc.) and then – aggregated and combined and in the form of services – back to the farm. Such flows potentially open up data that

³<https://eugdpr.org/>

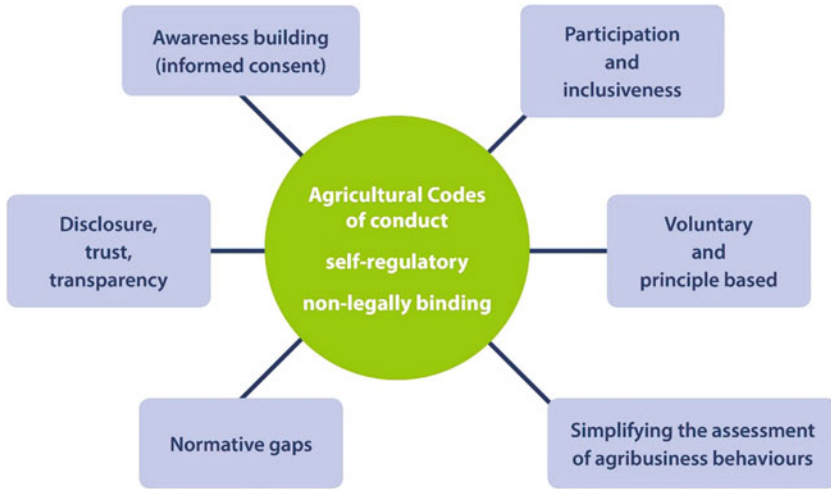


Fig. 1 Key characteristics of agricultural codes of conduct (Zampati, 2019)

should only be shared with specific actors under specific conditions, or should be anonymised in order not to harm the farmer's interests and privacy. This is especially true in the case of smallholder farmers whose farm data often coincides with household and personal data and who are in the weakest position to negotiate their data rights (Wiseman et al. 2019a, b).

Currently, there are five main agriculture data codes: the US American Farm Bureau Federations' Privacy and Security Principles for Farm Data,⁴ the New Zealand Farm Data Code,⁵ the EU Code of Conduct on Agricultural Data Sharing by Contractual Agreement,⁶ the French *Charte sur l'utilisation des données agricoles* (French Charter on the use of agricultural data) and very recently in 2020 the Australian Farm Data Code. The existing codes of conduct cover central issues such as terminology, data ownership, data rights (including right to access, data portability, and the right to erasure/right to be forgotten), privacy issues, security, consent, disclosure and transparency. In general, these codes of conduct attempt to harness the benefits of ag-data while protecting producers' privacy and security. Even though they are not legally binding (they are a form of self-regulation that relies on the goodwill and social responsibility of industry and agribusinesses), these codes help build awareness around data use and sharing and the importance of transparency in agricultural data flows, they change the way agribusinesses view data, and they make data producers – primarily farmers – more aware of their rights (Wiseman et al. 2019a, b; Sanderson et al., 2018) (Fig. 1).

⁴<https://www.agdatatransparent.com/principles>

⁵<http://www.farmdatacode.org.nz/>

⁶https://cema-agri.org/images/publications/brochures/EU_Code_of_conduct_on_agricultural_data_sharing_by_contractual_agreement_2020_ENGLISH.pdf

5 The GODAN/CTA/CFAR Guidelines

In July 2018 the Global Open Data for Agriculture and Nutrition (GODAN), the Technical Centre for Agricultural and Rural Cooperation (CTA) and the Global Forum on Agricultural Research (GFAR) convened an expert consultation process **on ethical, legal and policy aspects of data sharing affecting farmers**. The idea was for a collective action on *Empowering Farmers through Equitable Data Sharing*.

The core of our vision for the collective action is that farmers can be empowered to harness data driven agriculture through **inclusive data ecosystems that nurture equitable sharing, exchange and use of data** and information by all and for all participants in agri-food value chains, with special consideration of smallholder farmers, the most vulnerable to inequitable data flows.⁷

One key requirement for such an empowerment is enabling equitable governance of data flows that support a fairer and more responsible distribution of benefits, where transactions are based on mutual interest and trust. As part of this collective action GODAN/CTA/GFAR decided to focus on developing better data management practices through the adoption and implementation of agricultural data codes of conduct, voluntary guidelines and principles. The suggestion of the development of codes of conduct, voluntary guidelines and principles specifically comes at a time where there is no clear legal framework for farm data sharing, as mentioned above.

GODAN, CTA and GFAR launched in May 2020 an online tool on agricultural codes of conduct. This tool was created by initially reviewing existing codes of conduct, voluntary guidelines and principles relevant for farm data sharing. It was drafted as part of the consultative process taking place in the GODAN/CTA Sub-Group on Data Codes of Conduct. The aim and purpose of this tool is to provide a guide to best data management practice to farmers and agri-businesses and associations who collect, manage and share their data. It has an additional practical purpose: to provide the conceptual basis for general scalable guidelines for everyone dealing with the production, ownership, sharing and use of data in agriculture. An interesting point from GODAN and its partners' farmer-oriented perspective is that, as the review showed, the existing farm data codes do not have farmers or farmers organisations as their primary target audience – not to mention smallholder farmers – but rather agribusinesses and ag tech companies that work with farmers and use their data. Codes of conduct are an instrument for these companies to ensure data sharing by gaining the trust of farmers through transparent documentation of good practices. So, while being prepared by bodies that represent also farmers and indirectly raising farmers awareness of their data rights, they are not written primarily for farmers and so far surely not for smallholder farmers (Wiseman et al. 2019a, b). Therefore, with these general scalable guidelines, this tool provides guidance for associations of smallholder farmers in developing countries on how to use/adjust/negotiate/set up a

⁷ <https://www.gfar.net/documents/vision-and-strategic-plan-collective-action-empowering-farmers-through-equitable-data>

farmer-centred farm data sharing code. A key point of these guidelines is the essential role of trusted organisations like farmers' cooperatives in interpreting/ contributing to/negotiating the code for their farmers (Wiseman et al. 2019a, b; Sanderson et al., 2018).

These Guidelines help to produce a guidance list to consider when sharing or collecting agricultural data with partners. They aim to:

- Raise awareness around the collection, use and sharing of farm data.
- Improve transparency, clarity and honesty in the way farm data is collected, used and shared.
- Encourage the fair and equitable collection, use and sharing of farm data in a way that benefits farmers.
- Build trust and confidence in the way farm data is collected, used and shared so that, where appropriate, farm data can be utilised in ways that bring benefits to agriculture.
- Allow flexible implementation, so that providers can establish appropriate practices around farm data collection, use and sharing.

The tool features 17 clauses from which the users should be able to select a clause relevant to their situation and proceed to a checkout where the selected clauses can be used as a document. The clauses are as follows:

1. **Definitions:** A list of definitions that are relevant to the agricultural sector (e.g. exactly what types of data are going to be collected, what is considered personal data, agricultural data, individual farm data, raw data, aggregated data, data originator, data provider, etc.).
2. **Ability to control and access:** Farmers, in particular whoever has produced/ collected data on their farming operations, either by technical means or manually, or who has commissioned data providers for this purpose, have a leading role in controlling the access to and use of data from their business and the right to benefit from sharing the data with any partner that wishes to use their data. Providers should preserve the ability of the farmer to determine who can access and use individual farm data. However, it would be good for the farmer to agree upon data use and sharing with the other stakeholders who share an economic interest, such as the tenant, landowner, cooperative, owner of the precision agriculture system hardware, and/or an Ag Tech Provider (ATP), etc.
3. **Consent for collection, access, control:** Collection, access and use of farm data should be granted only with the affirmative and explicit consent of the farmer. Via a contractual arrangement the collection, access, storage and use of agricultural data can occur only with the explicit informed permission of the data originator. Consent must be freely given, specific, informed and unambiguous. In order to obtain freely given consent, it must be given on a voluntary basis. The element "free" implies a real choice by the farmer. Any element of inappropriate pressure or influence which could affect the outcome of that choice renders the consent invalid. For consent to be informed and specific, the farmer must at least be notified about the provider's identity, what kind of data will be

processed, how it will be used, to whom it will be disclosed and the purpose of the processing. The farmer must also be informed about his or her right to withdraw consent anytime.

4. **Purpose limitation:** Providers must only collect, use and share farm data for the purposes that have been made clear to the farmer. No reuse of data is allowed for different purposes to those that had been originally agreed.
5. **Notice:** Data originators (farmers) must be notified that their data is being collected and about how and to whom the farm data will be disclosed.
6. **Transparency and consistency:** Data originators (farmers) should be notified about what types of farm data is being collected, as well the purposes for which agribusinesses and ATPs collect, use and share data in a more transparent way (e.g. algorithms). In addition, information should be provided about how farmers can contact e.g. the ATPs with any inquiries or complaints, and also become aware of the third parties to whom their data is disclosed and any risks that may affect farmers who share data with the providers.

All agribusinesses' and Ag Tech Providers' policies, principles and practices should be transparent and consistent with the terms and conditions in the legal contacts. No contract change can be effective without the other party's agreement.

7. **Rights of the data originator:** Within the context of the agreement and retention policy, the data originator (farmer) should be able to have the following rights:
 - Right to portability: Data providers should be responsible for making individual farm data easily available to farmers.
 - Farmers should be able to retrieve their individual farm data in both processed (cleaned) and unprocessed form for storage or use in other systems, with the exception of data that has been anonymised or aggregated and is no longer specifically identifiable.
 - Right to remove, destroy, erase (the right to be forgotten) or return data to the data originator.
8. **Right to benefit:** providers should recognise the originator's right to benefit or be compensated for the use of data they originated.
9. **Disclosure, use and sale limitation:** An agribusiness or an Ag Tech Provider will not sell and/or disclose individual farm data to a third party without first securing a legally binding commitment to be bound by the same terms and conditions as the ATP has with the farmer. Farmers must be notified if such a sale is going to take place and have the option to opt out or have their data removed prior to that sale. An Ag Tech Provider will not share or disclose original farm data with a third party in any manner that is inconsistent with the contract with the farmer. If the agreement with the third party is not the same as the agreement with the ATP, farmers must be presented with the third party's terms for agreement or rejection.
10. **Data retention and availability:** Each agribusiness or Ag Tech Provider should provide for the removal, secure destruction and return of individual farm data

from the farmer's account upon the request of the farmer or after a pre-agreed period of time. The ATP should include a requirement that farmers have access to the data that an ATP holds during that data retention period.

11. **Contract termination:** Farmers must be given the possibility to opt out of the contract and terminate the collection and usage of their data provided that it's stated in the contract and the data originator is informed about the consequences. Procedures for termination of services should be clearly defined in the contract.
12. **Unlawful or anti-competitive activities:** Data should not be used for unlawful or anti-competitive activities, such as the use of farm data by agribusinesses or Ag Tech Providers to speculate in commodity markets (e.g. price discrimination).
13. **Data protection safeguards:** The contract should mention responsibilities and measures for farmers' privacy, security and confidentiality that data users/providers should take. Farm data should be protected with security safeguards against risks such as loss or unauthorised access, destruction, use, modification or disclosure. Notification policies and measures in the event of a breach should be established.
14. **Liability and Protection of IP rights:** Terms of liability should be defined. The contract should also acknowledge the rights of all parties to protect sensitive information via restrictions on further use or processing. Protection of sensitive data such as personal/financial data, confidential information, trade secrets or intellectual property rights against tampering should be ensured.
15. **Simple and Understandable Contracts:** Providers should be responsible for making a clear contract that is easily understandable to farmers. Contracts for ag data should use simple and plain language. In addition, contracts will clearly specify: (1) important terms and definitions, (2) the purpose of collecting, sharing, and processing data, (3) rights and obligations of parties related to data, (4) information related to storage and use of ag data, (5) verification mechanisms for the data originator, and (6) transparent mechanisms for adding new uses.
16. **Certification Schemes:** Data certification schemes develop transparency and trust around data uses. Codes or accreditation requirements can be monitored through the establishment of an independent Supervisory Authority to evaluate whether contracts comply with these principles. Compliance with the codes of conduct should be rewarded. All stakeholders who respect these principles should submit their contracts and policies for evaluation by an audit team of an independent accredited organization. Upon evaluation a certificate of compliance will be issued.
17. **Compliance with the National and International Laws.** All stakeholders who work and develop Codes of Conduct shall comply with local and international laws.⁸

⁸The content of the clauses is available at: <https://www.godan.info/codes>

These principles and guidelines intend to set common standards for data sharing contracts by touching on significant topics such as definitions, access and control, consent, data rights, and certification schemes. For example, clause 2 refers to access and control. It is actually stated that data collected from farmers should remain farmers property. This clause aims to ensure that only the data for which farmers have given permission is used and shared and that the farmer continues to own all data created by his or her operations. In clause 3, collection, access and use of farm data should be permitted only with farmers' consent. Farmers should be granted appropriate and easy access to their own data unless the aggregated data is not linked to farmer ownership. There is a need to ensure that farmers get a return from sharing their data and that they are informed in a clear and unambiguous way when their data is being collected, used and shared. In this way, making farmers owners of their data and providing opportunities to control the flow of their data to various stakeholders should help build trust with farmers for exchanging data and harvesting the benefits of big data. In addition, when third parties are involved in data collection on farming the third party should have an agreement with the farmer to ensure farmers data availability, access and control of his data. As such, the farmer would be more involved in the discussions and would be able to better control who gets the data produced by his or her technology devices or machines and what exactly can be done with it. More importantly, it should also be recognized that farmers have the right to benefit from the use of data produced on the farm during farming operations where different stakeholders are involved, and the benefits of data sharing should be returned to the farmers (Kritikos, 2017). Furthermore, another topic that is dealt with is the need for simple and plain language within the contracts: *"All contracts should use simple and understandable language and clearly define the purposes for which the data can be used, ensuring that any transfer or change to the data is traceable."*

In clause 16 another important aspect that is promoted with the codes of conduct is the enhancement of the development of certification schemes. Certifications allow farmers to identify technology providers whose data management practices adhere to certain criteria set out by a standard setting or accreditation body. These standards are geared towards ensuring open and transparent data practices, particularly around data collection, processing and sharing, and data storage and security (Jouanjean et al., 2020).

An example is the Ag-Data Transparency Evaluator. A process was developed in 2016 to certify the Ag Tech Providers whose contracts complied with the 13 principles of the American Farm Bureau Federation's Privacy and Security Principles ("Principles for Farm Data", 2014). This tool, in which ATPs voluntarily submit their data contracts to a ten-question evaluation, was created by the American Farm Bureau Federation and is backed by a consortium of farm industry groups, commodity organisations and technology providers. The Evaluator allows ATPs to assess themselves against the Principles for Farm Data in regard to compliance.

Answers to these questions, plus the ATP's contracts and policies, are submitted to, and reviewed by, an independent third-party administrator (the law firm Janzen Agricultural Law LLC). Once reviewed, the results are posted on a website for farmers and other agricultural stakeholders to consult and review. If ATPs receive approval from Janzen Agricultural Law LLC, they can use the "Ag-Data Transparent" seal. The use of the seal informs farmers that the ATP's approach to data management is in line with the Principles for Farm Data.

From January 2020 the "Ag Data Transparent" accreditation and evaluation process has been updated to reflect the growing awareness of the need for data rights that protect the individual.⁹ The scope of Ag Data Transparency evaluation was expanded to include the farm financial sector. It was decided that extending the Seal to the farm financial sector provided some additional protection of farmers' privacy (Jouanjean et al., 2020). Tech providers seeking accreditation now need to answer eleven new and updated questions about how they collect, use, share, and safeguard farmers' data. The updates contain precisions such as the types of data, or the nature of the data user. The issue of user data ownership and consent, including whether a user can opt out, is also explored and the practice of companies selling data to third parties is also taken into consideration.

These clauses developed with the GODAN/CTA/GFAR tool are not intended to be exhaustive and are no substitute for a robust institutional framework to guide and operationalize decision making concerning privacy, ethics, and so on. Overall, these guidelines for farm data sharing provide a voluntary framework. They are designed for use and consultation within national legislation. This online tool aims to describe the shared responsibility of many sectors, addresses the need for a cooperative effort, recognizes the need for capacity-strengthening for its implementation and describes the standards of conduct for fairer and more responsible data management, complementing the existing legally binding instruments.

It is also an evolving tool, with recommendations for a general, scalable and further customisable code of conduct template that best addresses farmers' needs around fair and responsible data sharing. GODAN in collaboration with Youths in Technology and Development Uganda (YITEDEV) is going to work together on the toolkit on codes of conduct in order to empower smallholder farmers and specifically youth and women, and to raise awareness about their rights when negotiating with various stakeholders. This project follows the proposal during the Expert Consultation on ethical, legal and policy aspects of data sharing affecting farmers in Bonn in 2018 to take Uganda as a pilot case. A virtual workshop will be organised to introduce to farmers the concepts of open data, privacy and data rights and to increase understanding. A second workshop will then be organised focused on the codes of conduct toolkit and to get feedback from the farmers.

⁹<https://www.aglaw.us/janzenaglaw/2021/1/26/ag-data-transparent-updates-for-2021>

6 Conclusion

No one can really doubt the power and potential of modern technologies in agriculture. Digital developments such as AI, internet of things (IoT), blockchain and autonomous systems are contributing to efficiency, productivity and profitability. The rate of technological advance is accelerating and doesn't look set to slow down. Yet data issues are altogether more complex in agriculture as there are many and varied actors throughout the agri-food data value chain, with their own specific needs. Many farmers, especially smallholders, do not personally benefit from the sharing and exchange of data that epitomizes the digital age, leaving them feeling disempowered. Monopolies, data asymmetries, discrimination and the lack of transparency and trust as well as lack of legislation and regulation on data ownership, data rights and privacy issues are some of the basic challenges that farmers face in relation to digital agriculture. Therefore in many cases they are often reluctant to share their data because they either feel it might be unsafe, or are unaware of its value. The fact that they don't get any benefit from it only serves to increase their reluctance.

The lack of inclusion of farmers in the design and governance of digital agriculture processes contributes to widening the gap between bigger and smaller stakeholders, and in reality smallholder farmers don't fully embrace the benefits of digital agriculture. As stated in this volume by Devare et al., "an effective data governance strategy must recognize that governance is primarily about people and not directly about tools or technologies. These latter are important but are far from the sole determinants of process and organizational efforts".

In this chapter we addressed farmers' concerns in relation to the adoption of digital technologies in agriculture. We looked at systems of governance that could support a fairer, equal distribution of benefits, where transactions could be based on mutual interest and trust. One such system is the development of agricultural codes of conduct. These principles and guidelines are a means of improving transparency and fairness in agricultural data contracts, and, as such, they can be a viable option to support farmers in their relationship with technology providers and foster trust around digital technologies (Wiseman et al. 2019a, b). It is worthwhile mentioning that despite agricultural codes of conduct being voluntary and not legally binding, they can nevertheless contribute to major cultural shifts, as they provide a solid framework for best practice in data management through the engagement of stakeholders at every level (including and especially farmers) in open dialogue to find solutions that address their differing needs and concerns. This approach can also serve to strengthen trust throughout the data value chain.

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