DEEP DIVE

Data Fiduciary Models & Data Marketplaces

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At-a-Glance

- **A data intermediary that manages access to data based on a duty of care.**
- Enables individuals to have more control over how data is used and shared.
- **Regulatory clarity on the responsibilities** of data fiduciaries is lacking.
- Suitable in conditions of **high data literacy and awareness** and presence of digital infrastructure.
- Most intermediation in LMICs is focused on data insights and analysis, with **limited focus on data ownership.**
- Enables **monetization or brokerage** of data through a platform.
- The platform **facilitates the discovery and transactions** between data providers and buyers.
- Transactions usually occur directly, which could provide individuals with **greater control.**

A data fiduciary (DF) is a type of steward acting as an intermediary that manages access to data between individuals and data collectors based on a legal or contractual duty of care. This approach can take many forms: from those that focus on the use of fiduciary law to require a duty of care toward data subjects, to intermediary technologies, to storage solutions that act as a buffer between one's data and service providers. Governments, banks, and farmer organizations all collect data from users or employees and share this for value-added services, such as analytics. As such, individuals lose control over the purpose or use of this data. In order to account for this lack of control, a fiduciary can provide for possible oversight mechanisms.

Data fiduciary models can be used to create a trusted environment between parties and assist in overcoming power imbalances. The main technical and legal mechanisms primarily ensure data sharing between parties along an agreed set of terms, but may also attend to center the collective aim of data collaboration. These models provide a pathway for farmers to exert more control over their data in a pragmatic, informed manner. Fiduciaries aim to protect the data subjects' interests above all and facilitate security and control.

Stewards have different types of responsibility, accountability, and legal provisions; some involve local data storage while others act as a conduit for directing data. **Mediation of data relationships allows for a representative model that enables individuals to have more control over how data is used and shared.** These models also ensure that benefits derived from the data can be distributed more ethically and equitably. DFs can help introduce new users to a data ecosystem, expand the data, and improve its representative nature.

Data fiduciaries and marketplaces in agriculture

Data marketplaces are digital platforms where a data fiduciary enables data generators (sellers) and data consumers (buyers) to identify, match, and trade respective data assets and requirements. There are two main benefits: 1) they allow businesses to gain access to data from individuals or other parties and 2) they address the disconnected and non-interoperable nature of existing spaces and components handling the data. They present an intriguing model with various governance approaches. The platforms act as an intermediary and permit individuals to upload and sell their data. These data assets can be offered and sold. Vendors will try to standardize or reformat data to be interoperable across users and systems. Although there are variations, they are all rooted in the logic of value-chain supply and demand aggregation and formalization. These applications can play a vital role in the data economy, as marketplaces have the potential to provide an alternative to approaches where individuals or businesses may be reluctant to share private data (e.g., data on crop yields can be used by wholesalers to price gouge). Data marketplaces are increasingly common due to big data, cloud computing, and data storage options. They can provide for more positive financial incentives to publish and share data.

Data marketplaces provide farmers with a space where people can share data at will and with informed consent, gain ownership and sovereignty over data, and have the option to make use of data portability.[1] Marketplaces can also offer access to credit and financing. Improved visibility into farmers' input purchases and transactions and access to advisory services can help farmers improve farm and financial practices, understand supply and demand trends, and ensure cost-effectiveness via traceability and reductions in time to market.[2] Farmer-centric data models should include a right to decide how farm data is used, how benefits are distributed, and how data can be monetized. This includes a right for farmers to control who has access to their data in marketplaces, to prevent the misuse of their data and mitigate the risks of sharing their information. Informed consent for cross-border or external data sharing is one way to increase farmers' control over the final destination and use of their data. In agriculture, marketplaces can look like:

1. government or donor data analytics and observation platforms;
2. monitoring and forecasting tools, typically focused on weather data or food security;
3. agronomy research communities and their funders;
4. commercial farm data analytics platforms that use and integrate third-party data and then put productized self-service data, data analytics, and visualization tools into the hands of decision makers;
5. commercial remote sensing and weather data analysts that have proprietary data collection assets and specialize in specific data types, but also develop value-added data intelligence products marketed to decision makers or other agri-intelligence intermediaries;
6. custom data analytics providers that bundle data and analytics with consulting and advisory services (e.g., working with investors or agribusinesses to deliver value-added intelligence insights or support specific decisions).[3]

1. Bhatt, A. (2021). Data sovereignty: the quintessential model for the new world order. ILI Law Review (Summer Issue).
2. Tsan, M., Totapally, S., Hailu, M., Addom, B.K. (2019). The digitalisation of African agriculture report 2018–2019. CTA.
3. Idem, p. 85-86.

Data marketplaces can assist in overcoming economic and environmental challenges, optimize productivity, and cut costs. There is an obvious need for farmers to double their productivity while following standards of food safety and ensuring monitoring of crops, livestock, and weather conditions and access to techniques of best practice and traceability of product. For instance, Dawex Data Exchange technology provides safe and compliant circulation of data across the food chain for more efficient practices and enhanced profitability.

E-commerce platforms (often called marketplaces). These web-based platforms provide a window for farmers to upload data and connect with buyers, wholesalers, transporters, and suppliers; they help farmers with the data and information required to succeed in business. E-commerce platforms also monitor market trends to facilitate procurement, track and trace imports and exports, among other key services. However, these do not tend to have any farmer-centric data governance components. The tools focus on connecting various stakeholders across the value chain and democratizing farmers' access to buyers and suppliers. Nonetheless, marketplaces can empower farmers, especially in low- and middle-income countries (LMICs), by generating and sharing data on prices, transaction history, and demand. Without data on the demand and supply of a product, farmers have limited information from which to base their pricing decisions. Marketplaces also facilitate transactions between farmers and cooperatives directly, eliminating costs for middlemen.

SIMagri is a community platform for all players in the value chains. It is an information system that is accessible via the internet or SMS. SIMAgri enables farmers and farm organizations to conduct simulations and projections on future food needs, production needs, availability of arable land, climate change impact, and more. It is a platform to enable researchers, development practitioners and others to facilitate access to information on the forecasting of food demand and investment needed to bridge the gap of demand. It simulates data through adjusting the rate of each factor with an aim of better decision making for future investments. e-NAM is India's national digital marketplace for farm commodities. It is meant to provide access to information on prices, allow advance registration facility, and allow viewing of bids by farmers for their products.

Most fiduciary models are based and focused on Western societies and specific to certain sectors; only a few have ventured into agriculture in LMICs. Some novel models of data intermediary relationships are being tested. AgriStack is an example of a government-mediated digital platform created by the Indian Agriculture Ministry (with Microsoft) as part of their India Digital Ecosystem of Agriculture (IDEA). It's designed to improve planning in the nation's agricultural sector while providing farmers information to help increase their crop yields via its Unified Farmer Service Interface. The government, via a Memorandum of Understanding, mediates the data relationship, and each farmer is given a unique ID and the means to control their personal data. However, there is no formal duty of care for individual farmers. AgriStack faces criticism for compromising the privacy of farmers, operating in the absence of a strict data protection law. In the event that farmers' data is compromised, the legal vacuum that exists without those protections would make it difficult to establish liability and provide redress for damages.[4]

4. Bhardwaj, V., Pande, T. (2021). The Digitisation of Agriculture in India: How AgriStack Infringes Informational Privacy, Oxford Human Rights Hub, 2021.

Agros aims to revamp rural farmers into digital producers via a digital identity encrypted in blockchain, which links them with various opportunities without the need of the internet. Agros's tools consist of a "digital identity kit," which provides access to diverse digital services. It allows farmers to control their data in an easy, safe way via the app Identi Connect. **FarmStack** is a platform developed on open protocols that provides for a secure and trusted data exchange. It enables data management and control of farmer data by farmer groups and assists in developing secure connections with individuals. Farmers can select their data by providing consent, which is recorded and can be revoked. A data wallet enables a user interface to assist farmers to appreciate the advantages of data sharing and approaches to control it. Further, FarmStack also operates as a steward that can reboot the data-sharing network by incorporating parties and providing them the authority to govern data.

Integrated agricultural digital marketplaces are sometimes referred to as "super platforms" aimed at providing macro-farm intelligence. In a typical model, super platforms "combine digitally enabled market linkages, digital finance, and digital advisory services into an integrated service bundle for farmers."[5]

Why data fiduciary models and marketplaces matter

Data fiduciaries provide for a number of benefits, including:

- Permit data sharing effectively, efficiently, and sustainably between multiple actors.
- Allow and simplify individual data control and leverage it for consent and convenience.
- Ensure data management is secure and safe.
- Ensure responsible use of data and in accordance with the rules of the organization.
- Avoid bilateral data-sharing agreements between participating entities.
- Aggregate consent to authorize data sharing among parties.
- Provide for discoverability and comparison of data, with indicators of quality and scope.

Fiduciary models, like data exchange platforms or personal data stores (PDS), leverage data based on a few essential elements:

- The data steward authorizes which actors can participate in the data exchange or provide services to farmers. The steward is the licensing authority and runs a protocol from a specific location or jurisdiction. Authentication is given to trusted parties via subscription. A steward could be a government body or a consortium of partners.
- Open-source protocols are created to leverage data. These are rules set out to standardize communication. In agriculture, they can be used to improve data governance by facilitating communication between different platforms. This allows sharing data from a farmer to a consumer through peer-to-peer (P2P) connectors with appropriate use policies and rules.
- The protocol aims to **build trust and collaboration** by allowing farmers to decide how, why, and when their data should be shared and used. This is supposed to give **more control** to farmers over their data, to safely share their data with different actors in the ecosystem.
- Open data wallets provide for **granular consent provisions**, such as purpose or use, to safeguard interest and data security. Wallets function as consent managers; the farmer can consent to share data collected by one party with another within the ecosystem.

5. Tsan, M., Totapally, S., Hailu, M., Addom, B.K. (2019). The digitalisation of African agriculture report 2018–2019. CTA, p. 88.

- Connectors are apps or software that data providers and consumers have to download for P2P data sharing, helping the protocol work more efficiently. The P2P sharing protocol connects otherwise siloed parties, allowing easy access to services for farmers. Farmers gain **bargaining power** and better access to benefits and services. **Interoperability** between parties allows farmers to avail better information and services

While most platforms are at an early stage, there are a variety of interesting use cases in relation to personal data. DataFund promotes decentralized governance of data where data subjects are in control of managing sharing requests. This data management system could afford greater control to individuals on when and with whom they want to share their data. Solid is an infrastructure for individuals to have their personal online data stores ("Pods") at home. Many other projects and organizations are involved in similar enterprises, such as Streamr, Databox, Blockstack, and Sandstorm. There are some valid concerns around hyper-individualism, and use of these systems warrants further exploration. Valid concerns exist around people hoarding their personal data and storing it in their own PDS, focusing almost exclusively on the technical aspects.[6] Datacoup offers users a tool to monetize their personal data via a data marketplace.

Account aggregators (AA) are data exchange platforms that use a certifying authority, such as a central bank, for service providers and limit themselves to prescribing technical standards for sharing and requesting data. Application program interfaces (APIs) collect consent via the **digital consent artifact**, rather than an agreement with each of the parties, to fulfill data-sharing requests. AAs need a governance framework to define rights, roles, and responsibilities of all, and have a policy and institutional set-up for handling complaints and grievances. The AA is designed to operate as an **aggregator of consent** to authorize data sharing among parties, using a common protocol provided. The AA requires an agreement with the data provider and the consent of the user. The information user also needs to have an agreement with the AA to make a request to access the data. The consent artifact contains data on the customer identity and details of data requested. This is transferred in order to authorize third party access of user information. AAs involve a consent collection user interface through multimedia. It comprises a backend consent handler via a data application that matches consent and relevant data, and which can be configured; a farmer would be provided a notification. It also integrates ecosystems through a matchmaker.

As international data governance professor Linnet Taylor put it, "the freedom to control the terms of one's engagement with data markets is an essential component of any data justice framework because it underpins the power to understand and determine one's own visibility."[7] Increasingly, there is a **hybridization of data marketplaces and personal data store models** where organizations offer individuals both the ability to securely store, access, and sell their data to buyers on more transparent and consent-driven terms. Transactions tend to occur directly, which arguably renders greater control to individuals.

6. Renieres, E. (2020). The future of data governance, It's time to move beyond individualistic approaches to data governance, Berkman Klein Center Collection.
7. Taylor, L. (2017). What is data justice? The case for connecting digital rights and freedoms globally. Big Data & Society, 4(2), 2053951717736335.

In some cases, data marketplaces work to ensure that individuals receive a fair price for the data exchanged or sold. These models can center recognition and compensate for the value of personal data for research. For example, the Luna DNA model ensures that subjects are provided agency over their data, while creating value for its members and revenue for itself.

Challenges or pitfalls of data fiduciary models and marketplaces

- **These models require individuals to have a high understanding of data management or require the DF to invest in building the capacity of participating farmers and communities.** Garnering effective participation can require awareness building from an external party. Even in models that center data subjects, building data capacity of communities often takes a backseat.
- **Mechanisms like PDS can be useful, but also require infrastructure facilities.** This can vary depending on the national regulations. For example, in India and Indonesia, laws mandate storage of data on local servers. Such norms will require additional infrastructure. It is unclear if financial models of DFs justify the infrastructure costs that would need to be borne.
- **Lack of regulatory clarity on the roles and responsibilities can be a challenge,** even though Europe has seen many encouraging developments with regard to new regulation. Not just in agriculture, but across sectors, regulatory frameworks are yet to meet the realities of data sharing. Even companies might be wary of the lack of clear regulations for a fiduciary. This raises the question of how farmers can better understand and engage with this model.
- Data marketplaces are seen as an opportunity to improve the value chain, because of their potential to leverage Big Data for better insights. However, these models are not without risk to farmers, especially in terms of **transparency and accountability** for how their data is shared and used. For example, big tech companies that aggregate data have a lot more capacity than individual farmers to gain valuable insights from disparate data sources, possibly resulting in information asymmetries that favor large corporations.
- **Trust is significantly important and hard to tackle.** The marketplace must ensure that users can trust that the data is not misused, data quality is high and reliable, data supply is stable, and data delivers value once used. Understandably, data owners have a built-in fear of loss of control over data once reutilized by other stakeholders, and at the same time, data buyers or consumers might not be prepared to pay the required fee for the data due to a lack of recognition of the data value in relation to the costs.
- **Operational complexity influences the market dimension.** In situations where the best experience must be provided for consumers, the products must be available in platforms where consumers are or shop. In this case, accumulating the right amount of data for each channel for an experience of the product in the marketplace is demanding.
- **Pricing models for data are not standardized.** It can be hard to valuate datasets, as value changes with purpose and use. This could result in monopolistic pricing or squeezing out smaller players or newcomers who cannot afford key datasets. There are several ongoing debates on how ascribing or reducing the value of an individual or community's data to economic value may harmfully incentivize individuals and communities to sell data.

Financial viability and sustainability

In terms of revenue streams, fiduciary models are likely the most promising. Models enable the creation of new, high-quality data streams, providing a cut from the inflow of a potentially massive amount of data and the value-added products generated from it. Data fiduciaries need a design framework that adequately accounts for the economic incentives and financial sustainability. The AA system requires a deeper study of how to provide and reorganize incentives so that users are

encouraged to share data freely and more frequently, which may not be if the cost of every data transfer is imposed on the consumer or end user. The models can function as a paid or a free service. Generally, fiduciaries function as a paid service. A subscription fee structure could consist of tiered pricing for various types of consumers, restaurants, and retailers. Data marketplace owners can utilize two kinds of pricing mechanisms, one of which would be fixed pricing and dynamic pricing depending on the sharing of data. Governments can finance and take a lead in building the data infrastructure of a (super) marketplace. Private sector players, especially banks and input dealers, who are required to enable services to farmers, can co-finance, co-develop, and sustain the process. They can provide services like digital finance, advisory services, market linkages, and supply chain.

Important applications and considerations in LMICs

- **Different intermediaries are assisting in responding to data demands from farmers, generating new data, and repackaging data to develop novel applications.** Trusted fiduciaries are taking up a diverse range of roles, along with connecting data providers, such as governments, with those who benefit from using data and data-driven products.
- **Emerging data intermediaries are trying to use new technologies to connect farmers directly to the digital market.** Agros in Latin America is using blockchain technology and an encrypted digital identity that can enable farmers to access digital services from the field.
- **However, there are limited examples of the engagement with farmers on the question of data control and monetizing their data.**

How can stakeholders create an enabling ecosystem for data fiduciaries and marketplaces?

Government

- **Provide regulatory guidance** on the roles and obligations of DFs. Some jurisdictions are in the midst of regulating this relationship. The Personal Data Protection Bill in India imposes obligations on the data fiduciary. In Europe, four new regulations have been passed, with potentially massive impact. Yet, a lot more clarity is needed on their implications. Regulations on roles and responsibilities in agricultural data sharing could pave the way to enhance trust and reliability.
- **Obtain more investments, which needed to research how farmers take control and make decisions based on their data.** In community-based consent models, it is important to ensure that data stewards best represent the interests of the community. It is vital to explore how potential data stewards would reflect this.
- **Establish clear standards for reusing data** in the data marketplace by third parties to pave the way for trust among stakeholders and assist in defining the rules and regulations of the marketplace clearly.
- Adopt a super platform model (which can be done in certain instances) where the government takes the lead. **Governments can build or promote the development of the data infrastructure.**

Private sector

- **Identify lessons from the DF models in other sectors and identify opportunities for the agricultural market in LMICs,** where it is assumed that DF models have potentially less use and impact.
- **Provide open communication on ownership** and use of data shared.
- Assist and collaborate in **creating data standards.**

Development sector

- **Provide technical guidance and training** on how farmers can engage with a DF.
- **Promote research on the viability of DF models** to mediate data relationships between farmers and the private sector, the government or other stakeholders.
- **Develop common infrastructures** that can help mediate data fiduciary models.

Verstegen Spices and Fairfood uses a decentralized technology to increase transparency of the nutmeg supply chain and create greater involvement of farmers and consumers. Both the company and the nonprofit created two innovative approaches with the introduction of Quality Premium and Data Premium. Verstegen is paying a Data Premium, as an additional income stream, to incentivize participation of farmers and incentivize better data quality. This creates a new type of relationship between farmers, suppliers, producers, and consumers and aims to build a sustainable and future proof food system based on active engagement, transparency and trust.

Pool has as its core mission to "redistribute power, value and control in the data economy," by providing individuals with the option to monetize their data. Pool provides a marketplace and backend infrastructure so that data unions can scale quickly and data products from multiple parties can be easily queried, analyzed, and licensed. Data unions are like farmer cooperatives: As collectives, they provide people with a lot more control and a lot more valuable data. Members are asked if they want to share their data. Through an app, browser plugin, or website, Pool then draw their members' data into a pool of information.[8] These data sets can be sold to data buyers. The members and the operator receive a share.

Digital Green launched **FarmStack** in 2021, with support from The Bill & Melinda Gates Foundation, as a data platform dedicated to fostering coordination and data sharing across the agricultural ecosystem—between farmers and agribusiness—through a fiduciary model that ensures the data and benefits flow back to the farmer. FarmStack uses an Account Aggregator model, which creates data ecosystems collaboratively designed to build agency for farmers.

Mastercard Farm Pass digitizes marketplaces, payments, workflows, and finances for farmers in Kenya, Uganda, Tanzania, and India. Farm Pass links farmers in the most underserved communities to service providers, including banks, schools, healthcare providers, governments, and international development organizations. Farm Pass unites farmers with buyers, aiming to help farmers negotiate the best price for their products. Farmers can also access input markets and evaluate farming information like weather forecasting and advisory services. A digital record of their transactions is stored and can be used to validate financial history needed to apply for credit. It also means that buyers can source their products more efficiently. This solution systemically integrates farmers from loose value chains with quality buyers via a digital transaction marketplace for individual sellers and buyers. The platform connects farmers, cooperatives, buyers, financial institutions, and value-added service providers to increase farmer linkages to markets and financial services. In Africa, already over 659,000 farmers have used Farm Pass to access better prices and credit, with several million more users anticipated to join by the end of 2022 through partnerships with farmers' organizations.

8. Some good examples are Cake, Unbanx, and Ozone.