

## Governance of Agricultural and Genomic Data

### Context

Big data, structured and unstructured, is generated from diverse sources, in volumes too large for traditional technologies to capture, manage, and process in a timely manner.<sup>1</sup> This data can be a competitive advantage for firms that have identified means to extract value. These large datasets raise questions of ownership, privacy, accessibility, and sharing, among others.

### Scope of the Issue

Farm equipment is typically fitted with a host of sensors capable of capturing a wide array of data that, once analyzed, can aid farmers to make production and commercialization decisions. A key challenge for agriculture is, who owns this data?<sup>2</sup> Is it farmers who own the equipment, crops and farmland? Or, is it the equipment producing firms that have invested in the development of sensors and monitors? Farm data is digital and therefore is *intangible, irreplaceable* and *non-rival*. Farm data cannot be touched, it can be lost if there is an equipment or transfer malfunction, one person accessing it does not inhibit others from doing the same, and use does not alter the data. These properties complicate ownership assignment. A potential solution is to treat this information as a trade secret as defined by the Canadian Intellectual Property Office.

Farm data value is generated at two levels: within a single farm enterprise; and as part of a community of aggregated data.<sup>3</sup> The value of farm data is cumulative – it is posited that farmers with larger amounts of high quality data make better decisions, but this data is worth less than the same ‘pooled’ data from a community of farmers in a given region. Pooled farm data provides a clearer picture of farm production and processing dynamics that users can leverage to improve land and input management decisions. Initially, farmers may be motivated to sell their individual data to analytic firms. However, after sufficient information has been pooled and analyzed, farmers might shift from selling data to extracting the benefits of pooled data in exchange for continued individual data supply.

Big data is additionally generated from plant genome sequencing.<sup>4</sup> Knowing the genetic structure and gene function enables plant breeding teams to precisely enhance the traits needed for crop improvement. Ownership, access and value of genomic digital sequence information (DSI) data is the focus of intense debate.<sup>5</sup> Biological resources can be viewed as a form of capital, governed by individual countries, but of global importance for our food system. Countries rich in plant genetic diversity want developed countries, who often have the capacity to sequence and utilize genomic data, to share any generated benefits. No international treaty explicitly refers to the intangible nature of genetic resources, be they plant, animal or microbial. Developed countries currently have no legal obligation to share benefits generated from genomic data. This is reflected in that many plant genomes in whole, or in part, are already freely accessible in public databases.

Further complicating DSI governance is how to extend existing governance frameworks that have been developed to seed banks and botanical gardens and how to accommodate the rights of indigenous populations that do not recognize property rights on living matter. Benefit sharing regimes could differ depending on whether the DSI is used to improve a plant to offset stresses from climactic changes versus DSI sourced to extract pharmaceutical, industrial or cosmetic compounds that have market value. Some firms have privately confided that the level of international uncertainty pertaining to DSI access and requisite benefits sharing regimes are now high enough to discourage investments.

### Conclusion

Big data is already beginning to influence research. Early adopters of big data analytics are expected to gain significant market power. Improved plant DSI has the potential to reduce global food insecurity. However, ignoring developing country ownership and benefit sharing issues will exacerbate impediments to their economic development and future willingness to share resources. The challenges resulting from DSI governance are relevant at all levels, international, national, regional and local, requiring governments to ensure that potential solutions are scalable.

### References

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