BIG DATA IMPLICATIONS FOR AGRICULTLURE

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Introduction

Farm data has become a current topic in agriculture as well as other industries and is known as 'big data'. Debate regarding the ownership of the data and who should receive value from the use of that data are hotly debated. The myths of big data in agriculture are dispelled here and insights into best management practices with respect to using data isolated to a given farm as well as within a larger community are offered.

The valuation of agricultural data has been elusive whether from a single field or data aggregated in near real time across many farms. Data from a given farm has finite value to that specific farm, but data aggregated into a community is considered to have much greater value.

Big data includes geospatial data and the associated meta-data on production, machinery, and environmental factors including seeding depth, seed placement, cultivar, machinery diagnostics, time and motion, tillage dates, planting, scouting, spraying, and input application. In addition to data on the products and how those products are applied, information on precipitation events, evapotranspiration, and heat unit accumulation supplement the data.

It is intuitive that value exists in agricultural data. Raw data in its original form often has no value, at least until it has been converted to information suitable for making decisions. The control of data is deemed valuable, however data valuation is elusive and determining that value has not been straightforward. Agricultural value is usually expressed as land values or production stemming from grain and animal products, but agriculturalists must think differently about the storage, analysis and value of this intangible resource.

Data is not like grain or other physical goods. For instance, a farmer can retain ownership of grain even when that grain is stored in an elevator comingled with other producers' grain. Since data are electronic as opposed to physical, copies of raw data are indistinguishable from the original and may be considered identical (Griffin et al., 2016). Essentially, once a copy of the data has been made available to another party, the originator of the data has minimal control of the data such that multiple entities may have access to viable copies of the data (Ellixson and Griffin, 2016).

Furthermore, data is considered a "non-rival" good because the consumption or usage of data by one person does not alter another person's ability to consume or use the same data. A classic example is motion pictures; multiple people can watch the same movie without loss of value to any one viewer by an additional person watching that movie. Agricultural examples of non-rival data include accessing weather reports or USDA crop production. In these examples, the value to a given farmer is not affected by another farmer acquiring the information. The same is true of data; a farmer and multiple other entities can consume the farmers' data without reducing the value initially enjoyed by the farmer.

Data may be considered "excludable" or "non-excludable" depending upon access rights to the data. Ownership of "excludable" goods carries a right to exclude others from having access. Thus, most privately held goods typically are excludable. Using the non-rival example from above, weather data may be privately held and only available to subscribers such that the data are excludable. If the weather data were reported by a government entity such as USDA, then that data would be non-excludable. Privately held agricultural data can be excludable only while it is controlled by the party that generated it; however, once it has been shared with other parties or aggregated, that excludability is likely significantly reduced or eliminated.

Farm data may be more valuable when shared within a community. Analyzing data pooled across many farms may reveal patterns impossible to determine while examining individual farm data. The information that can be derived from community analyses frequently increases with the number of parties sharing data. This "network externality" effect means that the value of participating in a network increases with the number of participants.

Excluding others from benefiting from one's own data usually means avoiding the community and therefore forfeiting any potential benefits. The general population has at least some reluctance in sharing data regarding themselves; and farmers tend to be even more so. To explain farmers' behavior, data can be thought of as a resource. When a farmer gives up control of their intangible resource, it is common for them to believe they are also giving up their 1) competitive advantage, 2) bargaining power, or 3) control over something that may be used against their favor.

Discussion

Although farm data is not as mature as some other industries, services surrounding agricultural data are catching up quickly. Agriculturalists should think of data as an intangible good rather than physical goods such as grain, livestock, machinery, farmland or even subsurface minerals. Agricultural data are digital and non-rivalrous. Data valuation continues to be an area researched by economists.

The agricultural industry is being impacted by the advent of big data although in its infancy. Barriers are likely to continue impeding adoption of both big data and precision agriculture. An overview of big data implications that agricultural attorneys, farm management advisors, and their clientele should be cognizant of has been provided. On-going studies are underway to quantitatively address how the open market and society will value farm data.

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