Preventing asymmetric technological and economic use of big data

It may be desirable for African agricultural advisors to have decision-support platforms based on big data in order to better assist their producers, but the implementation of such solutions pose a number of technical, organisational, institutional and ethical challenges.

In Africa, digital development in the agricultural sector is bringing with it a new sociotechnical ecosystem and new players who have most of the expertise (digital companies and start-ups). In order to address the issue of ethics regarding digital agriculture, we therefore need to understand the components of this ecosystem: who are the players and what regulatory system needs to be proposed?

A first component of addressing the ethical issues concerns data – its opening, use and circulation – be it from state information systems that are open (public agricultural statistics) or closed (paid weather forecasts), research organisations, or from sensors mounted on private farming equipment connected with autonomous communication sensor networks (Internet-of-Things), or even from social sensors (personal smartphones).

Stakeholders are not prepared for the challenges

Indeed, the sources and types of digital data are increasing and diversifying, as are the regulatory players and systems that govern them. In agriculture, private digital data is captured from the operation of sensors on various types of farming machinery. This system is implemented by equipment providers through sale contracts for specific equipment authorising the collection and commercial use of sensor data by its manufacturer; customers may be unaware of such practices in other cases. For instance, private drone imaging is being increasingly used to assess production, gathering large volumes of data, which call into question the ethics of service companies concerning the conservation and status of such data. Lastly, the complex nature of the often heterogeneous methods for integrating this data (big data warehouse, data lake, etc.) and linking it means that only a few operators are able use it.

At present, African companies, associations and other players in the agricultural sector are not prepared for these challenges and are not sufficiently guided by contract documents or appropriate public policies.

A second component concerns the development and implementation of analysis models and methods that make it possible to use huge amounts of heterogeneous data. For example, do the results generated by algorithms comply with ethical 'boundaries'? Does data linking guarantee anonymity and personal privacy?

While all African agricultural players are involved in the production of data, algorithm stakeholders on the continent are fewer, and are more generally located in OECD countries. One exception is in the field of public computer science research, which creates codes that are very often open source (and therefore accessible), and the search for thematic applications (as in agriculture), which is relatively well developed in Africa.

The ethical issues here, again, concern the retention of codes by a few, and civil or penal responsibility in the event of serious consequences due to incorrect forecasts. Who will be responsible for a decision error made on the basis of harvest forecasts produced by artificial intelligence, particularly when the service provider is located well outside its region of use?

Accelerating the regulation

It is therefore necessary to accelerate the regulation of the legal, deontological and ethical vacuums. One prerequisite, when national regulations are slow to appear, is to inform populations and users about the value of their personal data and what third-parties can do with it. Digital inclusion should be encouraged by fostering greater user involvement in developing future services from the start of a project, which will guarantee a more participatory and technical approach.

Ethical considerations must also be incorporated in strategic national digital plans (e.g. Senegal's national digital plan and the ECOWAS agricultural policy). Lastly, the state must improve the governance of public digital resources and infrastructure (cloud), the analytical capacities of scientific communities and agricultural technical institutes (training), and technical capacities (computer clusters) concerning data, on the ground in Africa.

An asymmetrical economic use of big data

Without that, the primary risk is asymmetrical economic use of big data, a reflection of cognitive capitalism (the capture of private data by a small number of companies), leading to segregation of the benefits. The beneficiaries will mostly be large, digital-based agricultural companies equipped with machinery, who will receive tailored advice from a private digital service. The losers could be, if we are not careful, family farming businesses that are less organised and for whom the risks of unethical capture of knowledge and data appear to be the greatest.

As regards to research, we are striving to set the example by working with digital companies, creating North-South research networks in this field, and developing disciplinary work (data protection and privacy) and interdisciplinary work on digital farming (the Digital Agriculture Convergence Lab #DigitAg, and the AgriNumA'2019 symposium in Dakar).

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