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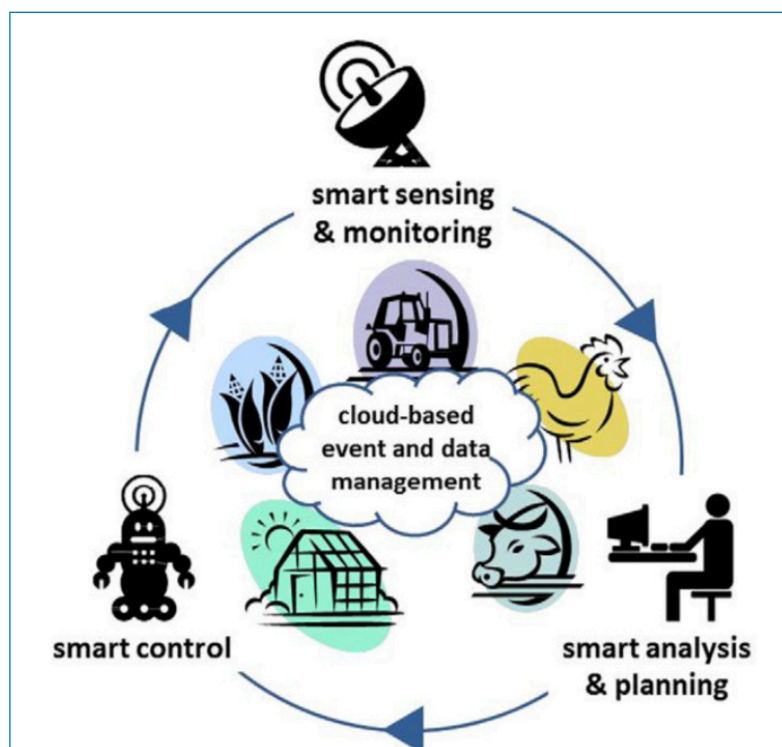
In the global food system, the “farm-tech revolution” could shift the balance of power to the detriment of the weakest

At hungerexplained.org, we have already drawn the attention of our readers on the importance and some of the characteristics of the “Big Data” revolution occurring in our food system [[read](#)], although the agrifood system is generally considered to be lagging behind in this process when compared to most other sectors.

Two recent reports, one from the European Parliament and another from the OECD help to get some additional knowledge of on-going changes and understand what is at stake.

What is meant by “farm-tech revolution”?

The [European Parliament study](#) analyses the impact the digital revolution may have on the food system highlighting the potentially disrupting character of the on-going processes that may “*force companies to change their business approach, with risks of losing market share or becoming irrelevant, if they don’t*”.



Source: Wolfert, 2017

According to its authors, the so-called “farm-tech revolution” is characterised by four dimensions likely to disrupt the existing system: (i) a “*rise in data volumes, computational power, and connectivity*”; (ii) “*the emergence of analytics and business-intelligence capabilities via artificial intelligence*”; (iii) “*new forms of human-machine interaction such as*

augmented-reality systems” and connected machines or devices (Internet of Things) and; (iv) “improvements in transferring digital instructions to the physical world, such as advanced robotics”.

The tools developed in this context offer opportunities for adopting new agricultural technologies at farm level, such as smart farming and precision agriculture which generate and use data that allows more accurate application of inputs, more rapid decision making for a more efficient management of crops.

The OECD publication, Digital Opportunities for Trade in the Agriculture and Food Sectors, stresses the critical importance - already highlighted in our earlier article - of the development of mechanisms that create data outside of the direct involvement of humans such as connected machines or devices with sensors (satellites, robots such as drones or driverless tractors and other machinery such as thermostats, meteorological, seismic or air/water quality measurement stations, etc.) able “*to transpose the real world into machine-readable formats*” - i.e. generate data - from which algorithms will produce “*new forms of knowledge*”, thus creating new opportunities. In this context, it is estimated that the “*Internet of things*” will very soon be constituted by tens of billions of connected devices.

What consequences? The positive side

The EU study identifies key benefits that can be expected from the on-going transformation: improved management and reduced costs for producers, better information and quality of products for consumers, better farm and field evaluation and more effective policies for authorities, reduced water consumption and impact on the environment and new business opportunities for the private sector.

The OECD publication looks into the ways in which the reduction of transaction costs brought by the digital revolution could impact on international trade of food and agricultural commodities, and how changes put in motion could transform in-depth our food system by determining who the new big players will be and how value added will be distributed among actors of global value chains.

Let’s remember here that for most food products the weight of the price paid for primary products (farm gate price) is often very low in the final price paid by consumers (often less than 10%). A sizable share of the difference between these two prices relates to the costs incurred to gather the information required for carrying out transactions (information on market conditions, on policy and incentives, on rules, regulations and standards, information required to identify a proper partner and to reduce risks of failure, etc.).

For agricultural producers, for example, greater and cheaper access to information (prices, norms and standards, meteorological forecasts, extension information) and to new modes of payment (smartphone based) potentially reduces transaction costs and risks, and thus increases their chances of participating in markets while it may also increase their productivity.

For their partners (traders, processors, banks or even consumers and their associations) information is now increasingly available on the frequency and amount of fertiliser, water and pesticides actually used on a particular crop by individual farmers, and medicines given and treatments made on individual animals.

All this information can imaginably help reduce fraud and foster trust among partners within a given value chain. Of recent, specialised platforms have emerged where economic agents can obtain information on potential partners and even make transactions on virtual marketplaces. The OECD report mentions the example of the ConnectAmericas.com platform developed by the Inter-American Development Bank in partnership with Google, DHL, SeaLand (Maersk), MasterCard and Facebook.

Similarly, the digital revolution can facilitate transport (e.g. by operators collecting information required for grouping small orders and thus reduce costs), border procedures - in particular, the verification that products respect norms and standards could become paperless - traceability and certification (using in some cases the blockchain technology) which allow differentiation of products in crowded commodity markets and create new opportunities for obtaining premiums. It can also make it easier and cheaper for actors in value chains to gain a better understanding of consumer expectations and develop products that have the proper attributes, thus creating more value at a reduced cost.

Both the [EU study](#) and the [OECD report](#) provide several examples of application of digital technologies to the food system. In principle, these developments should reduce costs and information asymmetries among players and bring a better alignment of production with demand. It should also reduce waste, particularly for perishables, through a more efficient and speedy management and even by 3D printing snacks with food waste [\[read here\]](#).

This all sounds great! But is it not too beautiful to be true?

The dark side of the coin

Two important issues remain pending: who will be able to have access to these tools and benefit from them? And, evidently, what will the economic and social consequences of a differential access be?

The dark side of the coin is that the digital revolution may amplify existing disequilibria. It creates new opportunities for powerful actors (e.g. marketing firms or investors) to access precious information and knowledge on their partners and competitors, including, for example, on production and producer conditions and behaviour, or on consumer preferences. While all actors in chains will have access to more and cheaper information and knowledge, a change of balance of power within chains could result from differences in individual capacity of each of them to collect and use this data to create a more sophisticated and specific knowledge useful to strengthen their position relatively to partners or competitors with less capacity. This change would then lead to the most capable earning a greater share of value created. Moreover, another source of the change of power balance will be due to the fact that, as says the OECD report, “*being able to pass on information together with the traded goods throughout the chain can create a competitive advantage*” for some agents compared to others.

It is not so easy to determine *a priori* who the winners and losers will be at the end of the day. Some indications, such as on-going movements of concentration already emphasised in our earlier articles, would however suggest that it is the bigger players who will be the main beneficiaries, because of their greater ability to access and process information and use the knowledge thus generated.

On the contrary, family producers - particularly the smallest - will most likely be the losers because of their inability to have full access and use of information available (because of

poor education, analytical capacity and/or limited financial resources). They will know less about others than others know about them.

This asymmetry among partners will put the weaker actors in a yet weaker position: on the one side, the small isolated farmer with a smartphone will only have access to processed information, while, on the other side, the large company capable of conducting its own tailor-made data analysis will be much stronger. Let's also not forget the existing digital divide between rich and poor countries: according to the International Telecommunication Union, while in 2018 81% of inhabitants in the so-called « *developed countries* » were using the Internet, this proportion was only 41% in the so-called « *developing countries* ».

Lastly, it is useful to recall here that these changes are also likely to create new opportunities for unlawful behaviours.

Further risks stressed by the EU study include a likely loss of agricultural diversity and a homogenisation of agricultural and food production through a greater concentration of agents within the food system (larger firms, markets and production units, creation of monopolies and dominant players, some of which originating from outside the sector) and further marginalisation of those agents (particularly small family farmers or small companies) who will be unable to take up fully these new technologies.

What could be done?

All these dangers point at areas where governments need to act either by developing a proper regulatory environment or by strengthening the capacity of weaker actors to have access to and tap fully the opportunities arising from the on-going digital revolution. The OECD report thus identifies the possibility for governments to save some resources used for trade compliance certification processes that are likely to be less needed in a digitalised environment and reallocate them to facilitating access to information for weaker actors and building trust in the information available. But it is doubtful that such measures would create a perfectly level playing field.

As can be seen from these two reports, the “farm-tech revolution” is happening and is likely to gain more momentum. It has potentially positive and negative impacts. Unless proper measures are taken by authorities, weaker players within value chains risk marginalisation and, ultimately, may “*become irrelevant*”. And this exclusion would likely have a social cost that may exceed the benefit from this revolution, particularly in poor countries where there is a large mass of illiterate and destitute farmers.

To know more:

- Jouanjean, M-A., Digital Opportunities for Trade in the Agriculture and Food Sectors, OECD Food, Agriculture and Fisheries Papers No. 122, OECD, 2019.
- Soma, K. *et al.*, Research for AGRI Committee – Impacts of the digital economy on the food-chain and the CAP, European Parliament, Policy Department for Structural and Cohesion Policies, 2019.
- Dormehl, L., 3D printing snacks from food waste? Sounds gross, but it's actually brilliant, Digital Trends, 2019.

- Wolfert, S., *et al.* Big Data in Smart Farming – A review, Agricultural Systems 153 : 69-80, 2017.

Earlier articles on hungerexplained.org related to the topic:

- Is « Big Data » remodeling our food system? 2018.
- A review of two recent publications and of forthcoming studies illustrates EU's thinking on food and agriculture, 2017.