

# THE DIGITAL AGRICULTURE

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## INTRODUCTION

Agriculture has undergone a series of revolutions that have driven yield and profitability and use efficiency to levels previously unattainable. The first agricultural revolution enabled humanity to settle and transition from hunting and gathering to planting and sustaining (Pre1900s). Further revolutions introduced mechanization (1920), then followed by the development of new, more resistant crop varieties and the use of agrochemicals (“The Green Revolution” of the 1960s), complemented by the rise of genetic modification technologies. The latest is called “digital agricultural revolution” could help humanity to survive and thrive long into the future. Digital agriculture offers new opportunities through the ubiquitous availability of highly interconnected and data intensive computational technologies.

Digital agriculture refers to tools that digitally collect, analyze, store, and share electronic information with the use of new and advanced technologies, integrated into one system to enable farmers and other stakeholders within the agriculture value chain to improve food production. Sometimes known as smart farming or e-agriculture. Digital agriculture includes precision agriculture. Unlike precision agriculture, digital agriculture impacts on entire agri-food chain-before, during and after on farm production.

“Agriculture 4.0” indicating its role as the fourth major agricultural revolution. Frankelius considers 2015 as the starting point of the fourth agricultural revolution. Here we classified digital technologies according to the following structure, based on the complexity and stage of penetration of these technologies in the agri-food sector.

1. Mobile devices and social media;
2. Precision agriculture and remote sensing technologies (IoT, GNSS, RTK, VRT, PLF, UAV and satellite imagery);
3. and satellite imagery);
4. Big Data, cloud, analytics and Cyber security;
5. Integration and coordination (block chain, ERP, financing and insurance systems);



# EFFECTS OF DIGITAL AGRICULTURE ADOPTION

The FAO estimates the world will need to produce 56% more food to feed over 9 billion in 2050. Furthermore, the world faces intersecting challenges like malnutrition, climate change, food waste and changing diets. To produce a ‘sustainable food future’ the world must increase food production while cutting GHG emissions and maintaining the land used in agriculture. Digital agriculture could address these challenges by making the agricultural value chain more efficient, equitable and environmentally sustainable. On-farm precision agriculture technologies can minimize inputs required for a given yield through variable rate application, real time recommendation. Digital agriculture improves labour productivity through decreased labour requirements by automation. Off-farm digital agriculture has the potential to improve environmental monitoring and food system traceability.

Food calories produced in a year, 25% are wasted between on-farm production and consumers. Traceability systems facilitate better identification of supply side weakness and therefore, reduced food waste.

Ensuring food safety, quality and authenticity has become an important regulatory requirement in high income countries. Use of RFID tags and blockchain technologies to certify agri food products characteristics could provide near real time quality signal to consumers and able to get consumer trust. Producers who can leverage environmental certification could sell their products at a premium, because blockchain technologies could enable greater trust in labels like ‘sustainable’, ‘organic’ or ‘fair trade’ means it helps to improved producer welfare.

Digital agriculture can help to achieve sustainable development goals by providing farmers with more real-time information about their farms, allowing them to make better decisions. Technology allows for improved crop production by understanding soil health. It allows farmers to use fewer pesticides on their crops. Soil and weather monitoring reduces water waste. Digital agriculture ideally leads to economic growth by allowing farmers to get the most production out of their land. The loss of agricultural jobs can be offset by new job opportunities in manufacturing and maintaining the necessary technology for the work. Digital agriculture also enables individual farmers to work in concert, collecting and sharing data using technology.