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Importance of Digitalization Agriculture

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Historically, agriculture has undergone a series of revolutions that have driven efficiency, yield and profitability to previously unattainable levels. Market forecasts for the next decade suggest a 'digital agricultural revolution' will be the newest shift which could help ensure agriculture meets the needs of the global population into the future.

Digitalization said to be one of the most significant trends globally at present. It involves the introduction of digital technological innovations into existing (organizational, industrial, societal) systems. The digitalization of everyday life will continue to result in the disruption of the currently powerful: technologies; individuals; organizations; and networks. Digitalization provides access to an integrated network of unexploited big data with potential benefits for society and the environment. The development of smart systems connected to the internet of things can generate unique opportunities to strategically address challenges associated with the United Nations Sustainable Development Goals (SDGs) to ensure an equitable, environmentally sustainable, and healthy society.Applied to agriculture, many of the proposed benefits of digitalization centre on increased efficiency through precise mechanization, automation, and improved decision-making. The digitalization of agriculture is widely hailed as the next agricultural revolution that will change how food is produced and consumed.

Digitalization will change every part of the agri-food chain. Digital agriculture will create systems that are highly productive, anticipatory and adaptable to changes such as those caused by climate change. This, in turn, could lead to greater food security, profitability and sustainability. During the past decade, the implementation of technology gave farmers the opportunity to drastically increase yield sizes by maximizing output and automating input via the capabilities of Ag-Tech. However, experts are sure that it is necessary to automate and digitize some of the most essential processes in farming even more, such as planting and

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cultivation in order to reap the benefits of optimal sustainability and gradual profitability. It is crucial to realize, that digitization will help us meet the goal of sustaining our growing population, which is, of course, the biggest challenge we are facing due to the ever-increasing number of people on earth.

The potential benefits of digitalizing the agri-food sector are convincing but it will require major transformations of farming systems, rural economies, communities and natural resource management. This will be a challenge and requires a systematic and holistic approach to achieve the full potential benefits.Digitalisation is perhaps the best way to leapfrog many of the challenges we face. However, we need to understand the regulations because, as you begin to collect farmers' data, there are issues of data security, ownership and sharing. If the data already collected, standardized and analyzed remains in the hands and control of the few, it defeats the whole purpose of digitalization. It is only when the data is widely shared that newcomers do not have to spend the same amount of time and effort collecting the same kind of data. To deploy this technology at the national level, there must be some key role of the government as part of the system. In most cases, the government does not often work in partnership with the private sector, so we need to find better mechanisms for them to work together.

However, in order to continue succeeding with precision agriculture and digitization, it is necessary to help farmers go through three preparatory stages first.

- The first one is the concept of automation – the process of reengineering labor-intensive processes.
- Secondly, we must do a good job of utilizing the capabilities of AgTech in terms of crop monitoring.
- Thirdly, the installation of sensors – crucial for equipment maintenance.

If we help farmers achieve these 3-steps and help them adopt these approaches globally, it is realistic to reach the stage of abundance in food resources by the year of 2050.

Digital innovations and technologies may be part of the solution. The so-called 'Fourth Industrial Revolution' is seeing several sectors rapidly transformed by 'disruptive' digital technologies such as Blockchain, Internet of Things, Artificial Intelligence and Immerse Reality. In the agriculture and food sector, the spread of mobile technologies, remote-sensing services and distributed computing are already improving smallholders'

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access to information, inputs, market, finance and training. There are several conditions that will shape the digital transformation of agriculture in different contexts: Basic conditions are the minimum conditions required to use technology and include: availability, connectivity, affordability, ICT in education and supportive policies and programmes (e-government) for digital strategies; Enabling conditions ('enablers') are factors that further facilitate the adoption of technologies: use of internet, mobile phones and social media, digital skills and support for agripreneurial and innovation culture.

In developing countries, most of the e-Agriculture services are embedded within e-government or ICT strategies where the main objective is to provide basic e-Agriculture services such as early alert notifications and general information. The use of digital technologies will create the need for policy and regulation in relation to the data that will be generated. A lack of standardization in the format and ownership of data could create disparities, particularly in a scenario where large international companies are pursuing digital agriculture for agribusiness whilst smallholders and local agripreneurs are simultaneously using technologies to tackle societal challenges in rural and farming areas.

Digital transformation has the potential to deliver significant economic, social and environmental benefits. The following examples demonstrate how digital technologies can be applied to improve the efficiency and functioning of agrifood systems:

- EMA-i is an early warning app developed by FAO to facilitate quality and real time livestock disease reporting captured by animal health workers in the field. EMA-i is integrated in the FAO's Global Animal Disease Information System (EMPRES-i) where data are safely stored and used by countries. By supporting surveillance and real time reporting capacities at country level and improving communication between stakeholders, EMA-i contributes to enhance early warning and response to animal disease occurrence with high impact to food security and livelihood.
- The Naïo Technologies team developed agricultural robot to improve working conditions and profitability for farmers. To help farmers tackle the increasing regulations on phytosanitary products, the growing concerns with pesticides, and the lack of workers in the agricultural sector, Dino provides a new and effective solution. The Dino weeding robot allows vegetable farmers to manage crop weeding with a high level of precision, while helping them save time all through the season.

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- Precision Agriculture (PA) is an example of an application of the Internet of Things (IoT) in agriculture. The use of Guidance Systems during planting and fertilizer application can lead to cost savings in terms of seed, fertilizer and tractor fuel, and can reduce working hours in the field. Variable Rate Technologies (VRT) and drones (UAV) can also reduce water and pesticide use and reduce labour and resource costs.
- Over the last few years, the growth in Artificial Intelligence technology (AI) has strengthened agrobased businesses to run more efficiently. Companies that use AI help farmers to scan their fields and monitor every stage of the production cycle. AI technology is transforming the agricultural sector, as farmers can depend on the data that satellite or UAV record to determine the state of the farm rather than walking all the distance. AI can improve resource use, support early decision making through predictive models and maintain 24/7 monitoring systems.
- MyCrop a technology-enabled initiative for farmers, which empowers them through delivering information, expertise and resources, to increase productivity and profitability, hence improving standard of living. It is a collaborative platform that strives to combine cutting edge technology (Big Data, machine learning, Smartphone's/tablets, etc.), innovative business model (agriculture platform as a service), and focused human efforts (agriculture insights, products, and services) to serve smallholder farmers.
- Technologies such as Blockchain have also been shown to deliver benefits. For example, Blockchain has been successfully used to detect poor quality food in food chains allowing early and effective responses. It can also provide consumers with information on the origin of their food, generating a competitive advantage for those who use it.

Much work is needed in the area of digitalization in agriculture and rural areas. There are some key factors to be considered in this work:

- Firstly, a significant challenge in understanding digital agricultural transformation is a lack of systematic, official data on the topic. Much of the data – for example on levels of e-literacy – are only available at the country level with no distinction for urban and rural areas. There is also a lack of information about government support and regulatory frameworks for digital transformation.

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- A second consideration is that there are significant disparities in the adoption of digital agriculture technologies between developed and developing countries and between global companies and those at a local, community or family scale. Factors including financial resources and education levels influence the adoption of modern agricultural technologies. Small farmers in rural areas are disproportionately disadvantaged as well as facing problems of limited access to infrastructure, networks and technology.
- A final factor to consider is that digital agricultural technologies are affected by economies of scale. Adoption is easier for users who can implement them at large scale. Small-scale farmers face a disadvantage compared to large agribusiness actors. This creates disparity between large and small-scale farmers, with a corresponding inequality between developed and developing countries. Transformative digital innovations and technologies are often not designed for the scale at which smallholder farmers operate.