
Digitalization in Agriculture: One Steps Towards Advancement

Tanushree Saha^{1*} and Madhurima Maiti²

^{1&2} Department of Agricultural Extension,

Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia

Corresponding Author – tanushreesaha94@rediffmail.com

Introduction

Digitalization, is the socio-technical process of applying digital innovations. So, now the question is 'what is digital agriculture'? The technology which is applied in agriculture for the betterment of farming system like overcoming productivity stagnation, strengthen market linkages and improving farm management that ensures food security and reduce dependency on imports. Digital agriculture means the use of computer and communication technologies for sustainable agriculture (Ozdogan, *et.al.* 2017). Digital agriculture brings together new opportunities and widespread use of advanced, data-intensive computer technologies in agriculture. Digital agriculture is also known as e-agriculture.

Indian agricultural scenario is like India has 131 agro-climatic zones, one of the biggest food grain and oilseed producers in the world, largest producer of milk production, 2nd largest producer of fruits and vegetables and tea production in the world. Through agricultural sector, India contributes around 15 per cent of GDP. But now-a-days, Indian agriculture is suffering from over population, soil infertility, crop damage due to improper nutrition management which causes low productivity in agriculture sector, that is another main reason of malnutrition. So, using different technology in agriculture sector will be helpful to mitigate the above-mentioned problems.

Components of digital agriculture

Different components of digital agriculture are,

1) Big data: The scope of big data application is large. The ability to track physical items, collect real time data and forecast scenarios can be a real game changer in farming practices. It also helps to feed a growing population by increasing farm productivity and profitability, to use pesticides without harming the ecosystem, to optimize farm equipment in large field and ensure long-term health of farm equipment and to manage supply chain issues by tracking and optimizing delivery truck route etc. In digital Agriculture period the machines have all kind of sensors which are used to gauge data and resulting analysis of data. Big data helps farmers to monitor all parameters of production of real time. Thus, improving the process of decision making (IDEAGRO2015). Data production process consists three stages.

Process oriented: This is the process driven and data from traditional operating system related to activities of an enterprise, its customers and its operations. (IRMA 2016)

Machine Generated: Data obtained from machines, obtained from objects, many sensors used to record and measure agricultural operations. (Hashem 2015)

Human sourced: Data that are collected from personal experiences are here. Social media data, personal blogs, and comments,

pictures and videos are in this category (Devlin 2013).

Cloud computing is used to store large-scale data but with low investment cost and also makes it possible to instant access to this data (Chavali 2014). A wide range of farm implementations can be obtained through cloud computing. Such as-

- Real-time monitoring and guidance in agricultural production: Agricultural activities can be viewed, controlled and intervened immediately if required. (Zhu *et al.* 2013).

- Farm management system: farmers can enter data into the system time and space independently. So, they can take managerial decisions to be up to date all time (Patel & Patel 2013; Ault 2013).

- Data flow from external sources: Information for weather and other climatic conditions can be obtained instantly which are needed in agricultural practices and used directly in decision-making through interrelated devices (Goraya & Kaur 2015).

2) Internet of Things and Drones in Agriculture: IoT revolution will entirely change sectors such as production, energy, agriculture, transportation and other industrial sectors within next 10 years (O'Halloran and Kvochko, 2015). In Agriculture, existing tools can be more functional by using IoT. IoT can bring information from different sensors and RFID tags, so has unlimited potential application areas. The Internet of Things can reduce the gap between Scientists, farmers and Crop by using the sensor network in Agriculture. This helps producers to take timely appropriate decisions thus all resources can be used efficiently.

Well, in case of sensitive agriculture implementations; satellites and air vehicles are very useful to obtain information about agricultural areas for a long time. Use of Drone technology for agricultural purposes has

become widespread. Farmers can access the images they need very easily and quickly by low cost and less time. Some drones are specially developed for agricultural purposes that have special sensors and image systems which can detect pest and diseases by clicking image of the crop (Doyle, van der Wal *et al.* 2015).

Scope for digitalization in India:

Our climate is slowly and continuously changing day by day. So, there is a challenge of climate change to the farmers. To meet the challenges of climate change use of Digital agriculture is necessary by using ICT tools in agriculture.

E-agriculture plays a vital role to open up opportunities for non-traditional players in the agriculture value-chain. It helps to bridge the current information gap.

Both central and state government take different steps to promote digitalization in agriculture in India by developing various policy initiatives. Government wants to promote virtual agricultural market through electronic platform. By using the platform, farmers sell their produce to all over the country.

Modern equipment and improved technology can enhance production and storage capacity.

Kisan call centres and different mobile apps help the farmers by providing various answers of their queries, opportunities for betterment in field and market.

The component of e-agriculture like sensor, communication network, Unmanned Aviation Systems (UAS), Artificial Intelligence (AI), robotics are helps to use the time and resources more efficiently.

Big data provides modular data to the farmers on rainfall pattern, water cycle, fertilizer requirement to make the farmers taking decision about better productivity and profitability.

By reading the proper weather forecasts, farmers can minimise the impact of drought and climate change.

Farmers can also avail the post-harvest management technologies.

Drawbacks

The sole intension of the digitalization is to bring in huge scale of advantages and development of the agriculture sector. But still there exists certain gap in the process of implementation.

Firstly, the level of education is the main enemy of the whole process. In India, there is a huge gap between educated farmers and uneducated farmers. And this gap effects the implementation of any kind of modern technology which requires a certain amount of education to adopt.

Secondly, the level of awareness of technology is the other important factor that hinders the process. Though the factor is also related to the level of education somehow, because if the farmers become more educated, then automatically they would be drawn to new exciting technologies because they would understand the advantages. Due to lack of awareness, the farming community stands very far from the new technologies.

It has been evident that majority of the farmers also neglect the new digital technologies due to their age group. Unlike young farmers, the middle aged and old farmers show less interest in using the technologies.

It is burning problem that the young generation of our community is less interested in farming. Even from the farming families, the children of the farmers are choosing other career option but farming. So, the number of the young farmers are decreasing which increase the gap between young farmers and those middle-aged farmers who ignore new digital technologies.

There are many more disadvantages in the digitalization process in our community. The inconvenience in the internet service is also one of them. The whole digitalization stands on the internet service and unlike any other developed society, our India is still suffering from the shortage of internet services, and even if it is there, the poor farming community finds it difficult to adopt due to high price of the interest services.

Use of smart phone, computers and other technologies are much more important in the digitalization process. Knowing how to use and operate these gadgets would induce the digitalization in farming. But lack of education, interest hinders the process of learning these. Also, the farmers find it unnecessary to spend on these rather than other necessary product that they need every day.

Conclusion

Digitalization on agriculture is one of such new concepts that is introducing to India which is improving the farm operations at the level of field. Digitalization will boost the confidence in the farming sector by using big data, drones, IoT like components which are very helpful in agriculture for digitalization. It can help to enhance production and storage. Though digitalization is not directly linked to farming activities, however it will allow the farming community to focus only on take care of digital system in agriculture. In Indian environment, when all the research institutes have engaged to develop new technologies, farming communities need motivation and encouragement to adopt the process of digitalization. Then only digitalization will change the Indian agricultural scenario in future.

Reference

- Chavali, L. N. (2014), Cloud Computing in Agriculture. In Agricultural Bioinformatics, Springer India, 189-213.

-
- Devlin, B. (2013), Business Unintelligence: Insight and Innovation Beyond Analytics and Big Data, Technics Publications, New Jersey, p.151.
 - Doyle, M., How the Internet of Things Helps Grow our Food, Product Lifecycle Report, <http://www.ptc.com/product-lifecycle-report/howthe-internet-of-things-helps-grow-our-food>, Accessed: 11.02.2017.
 - Goraya, M. S., Kaur, H., (2015), Cloud Computing in Agriculture, HCTL Open International Journal of Technology Innovations and Research (IJTIR), 16, 1-5.
 - Hashem, I. A. T., Yaqoob, I., Anuar, N. B., Mokhtar, S., Gani, A., & Khan, S. U. (2015), The Rise of “Big Data” on Cloud Computing: Review and Open Research Issues, Information Systems, 47, 98-115.
 - IDEAGRO (2015), The Era of Digital Agriculture, <http://www.ideagro.es/index.php/noticias/89-the-era-of-digital-agriculture>, Accessed:11.02.2017.
 - IRMA, Information Resources Management Association (2016), Big Data: Concepts, Methodologies, Tools, and Applications, IGI Global Publishing, Hershey, p.279.
 - O’Halloran, D., &Kvockko, E. (2015), Industrial Internet of Things: Unleashing the Potential of Connected Products and Services, In World Economic Forum (p. 40).
 - Ozdogan. B., A. Gacar and H. Aktas, (2017). Digital agriculture practices in the context of agriculture 4.0. Journal of Economics, Finance and Accounting (JEFA), V.4, Iss.2, p.184-191
 - Patel, R., Patel, M. (2013), Application of Cloud Computing in Agricultural Development of Rural India, International Journal of Computer Science and Information Technologies, 4(6), 922-926.
 - van der Wal, T., Kooistra, L., &Poppe, K. J. (2015), The Role of New Data Sources in Greening Growth: The Case of Drones, In 2015 OECD Green Growth and Sustainable Development Forum, Paris, 14.12.2015.
 - Zhu, Y., Wu, D., & Li, S. (2013), Cloud Computing and Agricultural Development of China: Theory and Practice, International Journal of Computer Science Issues, 10(1), 7-12.
- ❖❖