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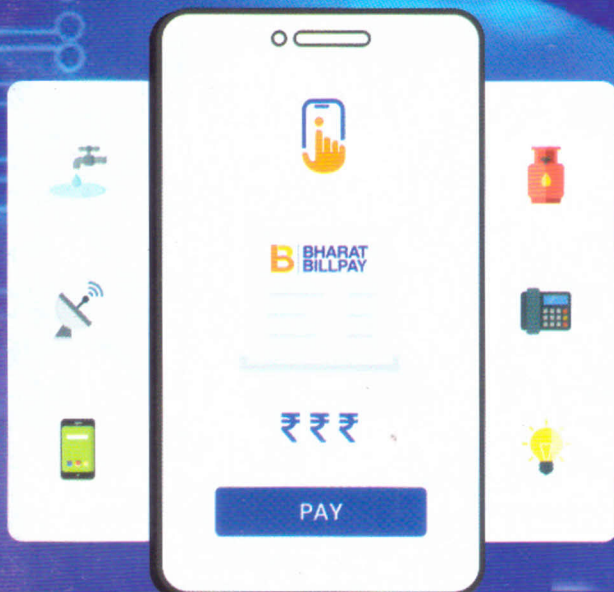
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## Digital India





# Farming 2.0: Digitising Agri Value Chain

Saravanan Raj and Ashwini Darekar

Digital technologies hold tremendous potential to transform the Indian agricultural economy and impact the lives of Indian farmers and other stakeholders. Major challenges confronting Indian agriculture include unsustainable usage of resources, declining farm productivity, rapidly growing demand for high-quality and safe food, stagnating farm incomes and fragmented land holdings. These can be overcome through sustainable and scalable deployment of digital technologies and infrastructure.



**D**igital technologies are most important recent innovations in terms of all actors in the agri-food chain. It not only assist in primary production but also extend support from food supply chain management to new business development. The digitalisation of agriculture is widely accepted as the next agricultural revolution with a potential to change the way of food production as well as consumption. In agriculture, drones, satellites, sensors and robots have the potential to revolutionise farming, even at small-scale. Sensors and satellites provide information on soil moisture, temperature, crop growth and livestock feed levels, enabling farmers to achieve better yields by optimising crop management and reducing the use of fertilisers, pesticides, feed and water. Digital agriculture could help farmers to be more precise with inputs through precise weather forecasts or sensors scanning the soil. Additionally, through the use of robotics or autonomous machines, farmers will be able to curb down labor costs which might lead to unemployment in the sector. This in turn might result into more people leaving rural communities to find jobs in urban area.

## Leveraging Social Media in Agri Value Chain

There is a growing focus on the farm-to-fork movement. Since the inception of social media more than a decade ago, a growing number of producers are using it to share their stories about farming and farm operations. Since social media is an open dialogue, it enables users to express interest, or disinterest, in products, services or businesses in a public forum. Social networking through Facebook and Twitter opens a wide range of doors in terms of connecting farmers and retailers with consumers. The same level of engagement with social media can benefit those further up the supply chain as well, as increasing number of farmers and farm-based businesses are finding out. Amid efforts of the University of Agriculture Sciences (UAS) Alumni Association, Bangalore, farm scientists and agriprenurs associated with this association took bulk orders for grapes and communicated to the grape farmers to supply at the pre-fixed remunerative price for farmers and consumers without involving any middlemen. Hundreds of grape growers in and around the Bangalore city had come together to establish a direct line



to consumers into the city instead of letting their produce wither away. Farmers were connected to the consumers by the University alumni association member who formed the voluntary group to help consolidate the information for the buyer community and volunteers.

On the Facebook group 'love local buy local', social media users have been taking part in 'challenges' to promote the sale of specific crops, such as pineapple. A farmers-network in India called Harvesting Farmer Network (HFN) with mobile application provides a virtual support group advice on crops and agricultural practices. The HFN mobile application is useful to get farm information, advisory, mandi prices of India's important mandis and farm produce. The application is also helpful buying and selling by farmers themselves.

### Mobile and Internet Penetration in India

In its report, Telecom Regulatory Authority of India (TRAI) said that the total number of subscribers at the end of December 2019 stood at 71.84 crore, which increased to 74.319 crore by quarter ended March 2020. Internet and mobile usage in India is all set to cross the 900-million mark by 2023, with nearly two-thirds of the population estimated to have internet access and a mobile device which can unlock 80 percent. The total number of smartphone users in India is likely to rise to nearly 83 crore by 2022, fueled chiefly by low data rates, the India Cellular & Electronics Association (ICEA) said in a report. Digital India, launched in 2015 aims towards the promotion of digital literacy and creation of digital infrastructure for empowering rural communities. The role of Digital Agriculture needs to be considered within Digital India by considering that 58 percent of rural households depend on agriculture as one of their most eminent source of livelihood (IBEF, 2020). According to a study by the Boston Consulting Group, this share of rural India will jump to 48 percent by 2020. Steps taken by the Indian government recently may make this happen sooner than predicted. The use of Information and Communication Technology (ICT) to support the transmission of localised information and services working towards making farming socially, economically and environmentally sustainable, while contributing to the delivery of nutritious and economical food for all – this comprises Digital Agriculture. This has also led to the rise and development of mobile apps which are

helping existing government schemes, and other agriculture-based information to reach farmers in rural India. This digital change is acting as a game-changer for Indian agricultural conditions.

### Early initiatives under the e-Governance

In India, the main thrust for e-Governance was provided by the launching of NICNET in 1987 – the national satellite-based computer network. NICNET was extended via the State capitals to all district headquarters by 1990. Computerisation of Land Records in collaboration with NIC to ensure that landowners get computerised copies of ownership, crop and tenancy and updated copies of Records of Rights (RoRs) on demand. Only two states (Karnataka- Bhoomi Project and Odisha) and three Union territories have completed 100 percent computerisation of land records, four states are yet to start the process. Project Gyandootand Lokvani in Uttar Pradesh, FRIENDS in Kerala, e-Mitra in Rajasthan, e-Seva and Smart Gov in Andhra Pradesh, Khajane in Karnataka, Sustainable Access in Rural India (SARI), are few examples of e-governance in India

### Past Experiences of Digitalising Farming

Farmer's portal of the Department of Agriculture and Cooperation is a platform for farmers to seek any information related to agriculture. Block level details related to soil fertility, storage, insurance, training, etc. are available in an interactive map. Users can also download farm friendly handbook, scheme guidelines, etc. Kisan call centre services launched by the Ministry of Agriculture took to harness the potential of ICT in agriculture. Entertaining more than 22,000 calls daily, the call centre ensured uninterrupted service even during lockdown owing to the collective expertise of the team functioning from their home. IFFCO Kisan Sanchar Limited (IKSL), IFFCO iMandi, m-kisan, e-sagu, e-Arik (e-Agriculture), e-Villages, e-AgriKiosk and m4agriNEI of the Central Agricultural University, in Arunachal Pradesh and Meghalaya states of North-east, Community Radio (CR), e-choupal, The Fisher Friend Mobile Application (FFMA) and Parry's Corner by East India Distilleries (EID) Parry, are other initiatives which has helped in the creation of social networks among the farming community.

### Recent Initiatives in Digitalising Agriculture

The Government of India has rolled out several



other initiatives under the Digital India programme to help the farming community. In order to promote ease of agricultural exports from India, the government launched digital initiatives by Export Inspection Council (EIC). For this, three portals have been developed to reduce transaction time and cost in an effective and transparent manner for safe food export traceability, single laboratory for accreditation and approvals and for monitoring export alerts from importing regulators.

**The government has launched a mobile application Meghdoot to help farmers by providing forecast relating to temperature, humidity, rainfall, wind speed and direction, and how to take care of the crops and livestock. Kisan Suvidha Mobile App and Pusa Krishi Mobile App have 10,63,080 and 40,753 downloads respectively since their launch.**

As on 15th November, 2020, under the PM Kisan Yojana, the government has enrolled 11,32,55,666 beneficiaries. Out of these, 9,30,15,330 have been paid the first instalment of Rs. 2,000. Crop insurance mobile app arrangement provided an estimated 400,000 farmers with much needed cash flow during the cropping season. It led to an increase of the public insurer's weather-based crop insurance portfolio to almost 1 million farmers and a total annual premium volume in excess of US\$50 million. Soil Health Card Scheme was launched in 2015, the scheme has been introduced to assist State Governments to issue Soil Health Cards to all farmers in the country. So far 6954 villages have been identified by the States/UTs from which 20.18 lakh samples have been collected, 14.65 lakh samples have been analysed and 13.54 lakh cards have been distributed to farmers.

**The 1917 iTEAMS, Meghalaya is an e-extension programme for market-oriented, cloud-based facilitation and farm advisory service that connects farmers to markets through real time agro advisories, affordable logistics, and market information ([www.1917iteams.in](http://www.1917iteams.in)). Earlier it was pilot tested as a research project titled m4agriNEI, an integrated information dissemination system by integrating IVRS, Mobile application, web portal, SMS and MMS advisory among the marginal and small land holding farmers of Meghalaya State of North-east India and Andhra Pradesh State of South-India, since 2012 to 2017 by the Central Agricultural University (CAU) and Digital India Corporation (DIC). (For more information <http://www.megagriculture.gov.in/>)**

As per the eNAM portal of Ministry of Agriculture as on 16 November, 2020, 1000 regulated markets, 86477 commission agents, 1798 Farmer Producer organisation (FPOs) and 1,68,22,408 farmers in 28 states and 3 UTs are linked with the e-National Agriculture Market.

Agri Market APP is a mobile application been developed with an aim to keep farmers abreast with the crop prices and discourage them to carry-out distress sale. The International Crop Research Institute for Semi-Arid Tropics (ICRISAT) received a Microsoft Artificial Intelligence (AI) for Earth grant and this pilot project is implemented in 2018 in the state of Andhra Pradesh where farmers have always relied on their guesswork to decide when to plant and a combination of ancient traditions. The internet of things (IoT) as a computing concept which describes the idea of everyday physical objects, which are being connected to the internet and being able to identify themselves to other devices. Companies like Trimble, Tata Kisan Kendra (TKK), and Fasal, among many others, are working to introduce Precision agriculture (PA) to Indian farmers. TKK, which is an initiative launched by Tata Chemicals Limited (TCL), has the vision to propel rustic India from the ancient farm practices into the modern age of satellites and IT.

AgroPad is an AI-powered technology helping farmer's check soil and water health. AgroPad10, developed by IBM, is a paper device about the size of a business card. The microfluidics chip inside the card performs on the spot a chemical analysis of the sample, providing results in less than 10 seconds. The Coffee Board has developed a Coffee Connect – Mobile App for providing advisory services to the coffee growers and also taken up a pilot project in Collaboration with Precision Agriculture for Development (PAD). In order to create a transparent digital platform or marketplace for both domestic and international coffee buyers and sellers, Coffee Blockchain initiative, a pilot project, is developed in coordination with Eka Software Solutions, one of the global leaders in digital commodity management platforms for agriculture. Companies like AgriDigital are making headway in creating more transparent and efficient supply chains through the use of blockchain technology. The association of Indian food companies are gearing up with quite a few tech giants to adopt Blockchain.

The Government of India recently launched the 'Swamitva scheme' under which drones will draw



a digital map of every property falling within the geographical limits of a village and demarcate the boundaries of every revenue area. Ergos has one of the most unique models in the Agri-tech landscape. They have a "Grain Bank model" that is providing doorstep access to end-to-end post-harvest supply chain solutions to small and marginal farmers. Given the issue in rural area, the government has announced plans to provide digital connectivity in all schools so they can receive quality education and training by using online platforms like Massive Open Online Courses (MOOCs) on SWAYAM.

Digital Green, an organisation that trains Indian farmers in sustainable practices is developing a voice-enabled WhatsApp chatbot. The technology will provide seamless market connections, enabling smallholder farmers to improve their incomes amid economic disruptions caused by COVID-19. Plant and crop disease identification over WhatsApp developed by PEAT, a German startup, Plantix11 is a mobile application, which is a massive database of pictures of plant disease that can be used for comparison. In 2018, the Karnataka government launched "Plantix", to smartly detect pests, plant diseases, and nutrient deficiencies. Telangana government launched its new Integrated Land Records Management System or Dharani Portal for the registration of property. As against 470 registrations on the first day which saw technical problems like servers not responding in time, the number of registrations reached 1,472 on

November 6 with the government receiving payments to the tune of Rs 10.77 crore.

The National Institute of Agricultural Extension Management (MANAGE)-Centre for Innovation and Agripreneurship (CIA) incubates and mentors number of digital agriculture startups using Artificial intelligence (AI), IoTs, MI, Machine learning, and remote sensing technologies for digitalising agriculture. (agri-stratup compendium: at <http://cia.manage.gov.in/StartUpDetails.aspx>).

#### Challenges Faced by Farmers in Adopting Digitalisation in Agriculture

- There is no policy and operational guidelines to use digital media and ICTs for the agriculture digitalisation.
- The capacity and skill in effectively using digital media and technologies among knowledge intermediaries (extension personnel) is limited.
- The lack of timely information on farm inputs, unorganised credit, and absence of market linkages are the major hurdles faced by farmers in adopting new technologies.
- In rural areas, the reach of e-technology is really poor, even the distribution of technology is uneven throughout the country.
- Insufficient connectivity, along with lack of basic computer and smartphone usage skill and knowledge, high costs for services and less literacy hinder rapid development of digitisation in agriculture.

#### Agri Startups Paving Way in Agri Value Chain

Sl. No.	Start up	Year	Location	Overview
1	Ninjacart	2015	Bangalore (India)	It is an app-based B2B platform offering vegetables and fruits.
2	Licious	2015	Bangalore (India)	Online platform for delivery of meat and seafood
3	WayCool	2015	Chennai (India)	E-distributor of agriculture commodities
4	Agrostar	2010	Pune (India)	m-commerce for agri-inputs
5	Jumbotail	2015	Bangalore (India)	Online B2B platform for packaged food, fruits & vegetables
6	Agrevolution	2012	Patna (India)	Online mobile platform & offline centers for connecting farmers with farm inputs manufacturer and produce buyers
7	CropIn	2010	Bangalore (India)	Farm management solutions
8	Vahdam Teas	2014	Delhi (India)	Internet first brand of tea
9	Bijak	2019	Gurgaon (India)	Online B2B marketplace to trade agriculture commodities
10	FarmBee	2009	Pune (India)	Online platform providing data-driven agricultural solutions

(Anupamanand and Saravanan, 2019)



- Despite the visible benefits of the new agricultural technologies, farmers either do not adopt them or it takes a long time for them to begin the adoption process and scaling up. But the truth is that there is a need to demonstrate technology to the farmers so as to give them the confidence and belief in the new technologies.

## Way Forward

Key challenges in digital farming are poor connectivity in rural areas, less awareness of the varying farm production functions, small size of individual management zones, barriers to entry for new terms, lack of scalability and configuration problems, and limited skill and knowledge on digital media and technologies of the agricultural extension professionals. However the overall picture for digital farming is promising in India. The current scenario of pandemic has proved that the future of agriculture depends on its digital transformation. The key factors that will determine the success of digital farming in India are affordability of technology, ease of access and operations, easy maintenance of systems, timely grievance redressal and appropriate policy support.

- For digital farming to succeed in India, the innovations must focus on lowering the cost of technology so that it is available and affordable for the smaller farmers, ensuring mobility and renting and sharing platforms for agriculture equipment and machinery.
- Digitalisation of farming related reliable and quality data is of paramount importance to harness the potential of the digital agriculture initiatives.
- More specifically, the full potential of ICT, big data, Artificial intelligence, Internet of Things (IoT), Block chain and Machine learning and precision agriculture will need to be harnessed to the task of generating sustainable productivity growth, including resolving the water crisis, coping with climate change and for ensuring better market price.
- The private sector can play a crucial role in expanding e-commerce and other platforms into food supply chains to standardise production, organise the farmers, and build logistics capacity in remote areas.
- More and continuous long term investment is needed in public sector to scale-up digitally connected and decentralised agricultural knowledge-technology-food processing supply chain with linkage to alternative logistics providers would increase resilience.
- Additionally, agriculture related research-academic institutions, agricultural extension service providing departments, agri-startups and agripreneurs, NGOs, Farmer Producer Organisations should also reorient themselves towards digital agriculture for the better impact.
- There is also a need for robust research and development that also factors in last mile delivery, preferences, capacity and digital skill of the stakeholders, challenges, and socio-economic impact so that digital farming can empower Indian farmers in a meaningful way.

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(The authors are Saravanan Raj, Director, (Agricultural Extension) and Ashwini Darekar, MANAGE Research Fellow, National Institute of Agricultural Extension Management (MANAGE) Hyderabad. Email: [saravanan.raj@manage.gov.in](mailto:saravanan.raj@manage.gov.in). Views expressed are personal)