

Agriculture Sector during COVID Pandemic: Role of Modern Technologies and Digital Platforms for Survival and Sustainability in the Uncertain Situations

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ABSTRACT

The role of modern technologies and digital platform played in ensuring the survival and sustainability of the agriculture sector during the COVID-19 pandemic is significant. This paper examines the impact of the pandemic on the agricultural sector, highlighting the initial difficulties encountered due to lockdown measures, social distancing protocols, and the decline in the workforce. It discusses the adaptation strategies employed by farmers, governments, and other stakeholders, emphasizing the rapid integration of modern technologies and digital platforms to mitigate these challenges. Key agricultural activities such as digitizing production, processing, value addition, marketing, supply chain is discussed along with few relevant successful cases. This article underscores the importance of modern technologies and digital platforms in enabling the agriculture sector to adapt and thrive amidst the uncertainties posed by the COVID-19 pandemic, while offering insights into the future of farming in an increasingly digital and interconnected world.

Keywords: Digital Platforms, COVID 19, Sustainable Agriculture

Introduction

Being a global health crisis, The COVID-19 pandemic made distressing impacts on Indian economy both directly and through essential measures taken to prevent the spread of the pandemic. These impacts are also reflected by in the agriculture and agriprenuership sector. These impacts are damaging for food security, nutrition and the livelihoods of farmers, fishers and others working along the agriculture chain

The COVID-19 pandemic and various restrictions imposed by government has had a sizable impact on agricultural entrepreneurship. The agripreneurs faced various difficulties to carry out activities in the production and marketing processes. It includes production facilities, find labourers, and restrict working

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time. Further, the agripreneurs faced problems related to marketing the products, including in selling agricultural products due to restrictions on mobility between regions and decreased the purchasing power. It caused losses among the agripreneurs due to lower production, value addition and due to unsold agricultural products in the market

The agricultural sector in India has faced so much troubles due to the COVID-19 crisis in spite of many immunities from lockdown, since the agriculture sector provides employment to 55% population and it contributes 17% to GDP, the functioning of the agrarian sector is significant to India (Dhulipala). In addition to that, agriculture is a crucial engine that, like health and education, has the power to propel India to achieve its development goals. The question then is, how can India what are the major problems faced by agriculture sector during pandemic and show such situation and how the agriculture sector can overcome in such situations using technology; learnings and lessons (Edited).

While the Covid-19 poses some challenges for the agriculture system in the short term, it is also an opportunity to accelerate transformations in the agriculture sector to build its resilience in the face of a range of challenges (OECD, 2020). The structure of Indian agriculture has regularly changed as the focus of agricultural development shifted towards acknowledging and accepting the technological developments in the sector, following the vision to improve the situation of the farmers financially. Agriculture has to become market-friendly and flexible by adopting productive efficiency and cost reduction, effective monetization strategies with the help of digital innovation and literacy. The agriculture sector has to cope up with modern technologies and digital platforms to overcome the situations like Covid-19.

Digital Literacy & Modern Technology to Transform Agriculture

Digital transformation, commonly referred as the 'Fourth Industrial Revolution,' has the potential to transform the agriculture sector. Intervention of modern and innovative technologies like AI, IoT, Blockchain, remote sensing, augmented reality, and distributed computing facilitating the access to timely and accurate information on inputs, markets, finance, and the right package of practices adopted for informed decision making. The advanced technologies are making it possible to incorporate farmers into a technology-based agriculture system.

Technological developments in agriculture have transformed severely over the years, from traditional machinery to modern advanced equipment. The indication of technology in various decision-making processes at every farming stage to ensure better crop output has been a noteworthy development in the

overall agricultural landscape. Now, farmers accept technological advancements to increase their potential in any agriculture endeavour. Farming practices are becoming more innovative, less manual, with increased yields with the influx of digitization. At present, digital technology is enabling farmers with precise forecasting, improved production, data-driven decision-making, reducing less human involvement and more. The transformation has optimistically influenced many farmers and ultimately changed agriculture production and agri-entrepreneurship system.

Advancement in the technologies is essential for modern agriculture. Digitalization is an unavoidable indication of modern technology. It provides economic growth, crop protection from diseases and pests, increase in yield and income, better access to seeds and inputs, adaptation to climate change, favourable financial services, better crop pricing, etc. Agricultural technology has seen a substantial increase in investment in the last decades. Significant technology advancements have improved the Agriculture Knowledge Graph and enabled critical stakeholders of the Agri value chain with data-driven insights, and sustainably allowed to “improve productivity and efficiency” by combining satellite imagery with IoT and field intelligence. Adding to that, enhancement in the industry are indoor vertical farming, robotics and automation, precision agriculture, livestock technology, AI, and blockchain. Digital technology driven by Big Data in agriculture enables practical solutions for resolving complex issues allied to soil health, harvest quality and quantity, fertilization and chemical input, sowing date, seed variety, crop images, pest and disease incidents, irrigation, geotagging, and various agronomic data observation during different crop stages (Kumar, 2021).

The use of digital technology is crucial for enhancing agriculture productivity by delivering customized solutions to farmers based on the crop type, planting date, and variety of seeds, localized weather information, and estimated market prices. Advanced big data analytics are deployed for path-breaking inventions to improve soil quality and access the water stress level, resulting in better crop output, study yields, harvest dates, pests and diseases outbreaks, and pest control methods. The development of internet technology has opened farmers’ unparalleled access to vast resources and tools to make farming operations easier. Now, farmers are getting a higher portion of the marketable value of their produce due to democratized market pricing and lesser transaction costs owing to digital literacy. To increase farmer efficiency, big data and mobile phones can increase upstream access to inputs and credit. Market integration and agreed-upon standards, prices, and grades provide targeted solutions for

increasing agricultural productivity.

Agriculture Value Chain: Challenges During COVID

Agriculture value chains from farm to fork are complex webs, due to that alot of stakeholders including producers, consumers, agriculture and fishery inputs, processors, transporters, and more are involved. In a country like India, where over 80% of farmers are smallholders, who is owning less than two acres of land, both the input supply chains that cater to farmers' input needs (seed, fertilizer, agro-chemicals) and the output supply chains that link farmers' produce to consumer demands are highly intermediated. The Agriculture value chains in India has traditionally been constrained for capital and labour. Also, most the agriculture sector is labour intensive, dependent on local labour markets. The COVID restrictions created breaking down of informal labour markets, where farmers are unable to harvest their produce due to labour shortages. The labour shortage is due to the both large-scale returns of migrant agricultural workers to their native villages and the restrictions placed on local workers are reasons for labour disruptions. The advances in digital technologies provided innovative end-to-end solutions across value chains.

Agricultural Extension via Mobile Phones During Covid-19 Pandemic

There are cadres of stakeholders working in agricultural sector, have a significant role in agriculture and agripreneurship development, who play key roles in technology transfer. These experts are often referred to as field extension workers or agriculture extension officers, and, in most Indian states, they are employed by the Department of Agriculture (Dhulipala). Extension workers are naturally allotted to a group of villages. They are responsible for undertaking workshops, training programs, or field demonstrations on good agriculture practices and technologies (Dhulipala).

The implementation of stringent COVID restrictions and physical distancing measures adversely affected the functioning agriculture extension systems. Extension workers found it is challenging to move across villages and gather farmers for trainings or other capacity building activities. There is a situation raised to identify the alternative methods to continue extension activities in such situations. It is identified that electronic devises and modern digital platforms are one alternative which can enable the extension activities. Agricultural extension work can be done via smart phones, tablets and computers. Latest data on penetration of mobile phone and network coverage is encouraging. While e-Extension has been happening in India for some time, the efforts have been experimental in nature and never positioned as the sole method for transferring

information and conducting trainings. In the present situation, phones and mobile networks might be the only means through which farmers can access meaningful consultancy services (Dhulipala). In 2020, the penetration rate of smartphone in India reached 54 percent with a volume of around 149.7 million and was estimated to reach 96 percent in 2040 (Sun, 2021). The Internet usage in India is estimated in as of 2020, estimated number of Internet users who have accessed Internet in the last one month is around 622 Million. This is shared by the urban population with a 323 million and rural population with 299 million. The number of active internet users are expected to grow and reach 900+ million by 2025. (KANTAR, 2021)

Using Digital Platforms in Agriculture Sector: Learning from Pandemic

Issues related to Pandemic and restrictions are not only affecting the production side of agriculture but logistics and marketing activities also. Because Indian agricultural spot markets usually shows large crowds, particularly during harvest times, governments are designing ad hoc measures to curb large gathering of farmers, traders, and shoppers. For instance, *mandis* in Punjab and Haryana are issuing tokens that indicate a specific time for the farmers to bring produce to market. There is also a cap on the quantity of produce they can sell. Farmers, however, are struggling to find workers to help load, transport, and unload produce at the *mandi*, therefore disrupting the efficiency of the spot markets. These issues have been addressed using modern technology and digital platforms in a crisis like pandemic.

a) Digitizing Input Supply Chains During COVID-19

The agri-input supply chains which provide farmers access to pesticides, fertilizers, chemicals, and seeds etc. could also see a mini digital revolution due to the consequences of COVID-19. Similar to the farm-to-fork supply chains, input supply chains are highly intermediated. There is an urgent need for converting strong informal seed sector to a formal seed gateways using digital & e-commerce platform models, through which farmers access seeds. This potential digital platform will reduce the human interactions and the challenges during COVID like situations. In addition to that, creating whole digital system which provides e-Extension services, other services, utilising e-commerce platforms and integrating with financial institutions to facilitate institutional credit to smallholder farmers will bring a single window opportunity to improve the access of farmers in the different nodes of agriculture value chain. The investments in key logistics must be enhanced to sustain the demand for agricultural commodities. Besides, e-commerce and delivery companies and

start-ups need to be stimulated with appropriate policies and incentives (Peter Carberry, 2021).

b)Digitizing Agriculture Production During COVID-19

New models of digital platforms are coming in the agriculture sector from private ventures. Uber-style models of providing machinery as a service have emerged in a few pockets of the country for the past few years. These platforms are working on digital platforms to aggregate demand and mobilize machinery in order to cost-effectively provide to the needs of farmers. Along with this model, there are also some promising machine based service models using drones to perform tasks like pesticide spraying. This model is not operational in a larger level due to smaller holding nature of Indian agriculture. But farmers might be more tending to discover the Uber-style model to address upcoming challenges of the agrarian sector due to its informal nature. The government has an active role in enabling the functioning of labour market. For example, a digital platform could connect farmers and labour, minimizing the physical contact and crowding and, therefore, reducing the spread of the virus in informal labour markets. Digitalisation can also help to formalise of informal agriculture sector and create a means to implement targeted interventions to protect agriculture sector.

c)Digitizing Value Addition During COVID-19

The shift to digital quality assessment, grading, assaying, and trust in procurement present bigger challenges. Quality examining and grading of agri-produce is largely subjective, and although governments have been investing in assaying labs at *mandis* to gradually reduce human subjectivity and physically inspection of produce. If markets were decentralized to the farm gate, there would also need to be a mechanism in place to remotely grade commodities and reduce the need for physical inspection. There is some promising image recognition technology that is viable for a few commodities, and work is ongoing to address challenges in several other commodities where grades are dependent on the chemical composition of the product. Until a solution is found, blended digital platform models facilitate these activities at the farm gate.

d)Digitizing Procurement of Agri-Produce During Covid-19

The COVID crisis also opens an opportunity to start warehouse-based sales through eNAM (electronic-National Agriculture Market), which is an all-India electronic trading portal. The concept of rural godowns, large warehouses within APMC premises, have been part of many government policies and plans of the National Bank for Agriculture and Rural Development. However, rural

godowns have yet to get momentum. Farmers have to undertake lesser supply to minimize their losses during the pandemic due to the limited number of buyers and traders in the spot markets. The government enabled to store the excess produce in the warehouses with a document of the storage of their assets with electronic negotiable warehouse receipts. This receipt could be pledged by the farmer for immediate liquidity without the need to undertake a distress sale, and the produce sold once market demand returns. Digitally-enabled warehouses would also have boosted governments' ability to procure goods at Minimum Support Price (MSP) and allowed for the transfer of funds directly into farmers' bank accounts.

e)Digitizing Agri-Marketing During Covid-19

There were arguments to amend the APMC Act in the wake of the corona pandemic in favour of digital platforms which could be an effective way to enable decentralized marketing and supply of agriculture produce from the farm gate. For example, digital platforms could be designed to facilitate contract-farming arrangements and remotely monitor and control for quality. Activities like aggregation, packaging, transportation, and delivery could be scheduled in a way that minimizes contact in order to protect workers. These digital platforms could open digital sale opportunities for farmers who typically depend on spot markets to sell.

Successful Digital Apps for Farmers

A huge number of Mobile Apps, other than web portals, particularly useful for farmers were launched and found great success and adoption amongst the farmers. The '*AgriMarket App*' which gives most recent local crop prices is being currently used by more than 33000 farmers across India (Agrimarket App, 2020). in the same way, '*KisanSuvidha App*' which provides weather related information is being used by 371045 farmers (KisanSuvidha, 2020), while '*Pusa Krishi*' which provides farm technology and machinery related information is being used by 34265 agriculturists in India (Pusa Krishi, 2020). '*Crop Info App*' is being used by currently more than 10,000 farmers (Crop Info, 2020), while '*Intelligent Advisory System*' for Farmers of North East India has found usage amongst 6124 farmers of NE States of India mainly Manipur, Meghalaya (Intelligent Advisory System for Farmers, 2020).

Further, '*Bhuvan Hailstorm App*' for capturing crop loss due to hailstorms have been used by 1795 farmers to file loss and recovery payments (Bhuvan Hailstorm App, 2020), while the '*Crop Insurance App*, have been used by 24777 farmers by 2020 (Crop Insurance, 2020) (Dhaliwal, 2021)

In area of poultry and animal husbandry, Apps like '*Application for Poultry*' have been used for filing 7808 applications as per official records (Application for Poultry, 2020), while '*PashuPoshan*' App particularly for information and advice for dairy farmers have been downloaded and used by more than 50,000 dairy owners (PashuPoshan, 2020) (Dhaliwal, 2021).

These adoption number across all three domains of access, adoption and application clearly reflects the increasing digital inclusion of the rural communities because of Digital India but if we focus on the total rural population these number are still quite small (Dhaliwal, 2021). The Digital India Program, launched by Indian government in 2015, the initiatives for Digital inclusion in relation to the schemes and sub-programs and technology apps that have been launched under the Digital India initiative especially catering to agriculture and farmers to bring them into digital mainstream. It further investigates the goal achievement of these initiatives and the hurdles which are there. Lastly, it suggests some solutions which can make this program a success (Dhaliwal, 2021).

COVID-19 offers an opportunity to enhance sustainability of the agriculture sector

In the post COVID-19 period, ensuring that the agricultural system is more sustainable and resilient is now an even more urgent priority. The COVID-19 opens an opportunity to learn more about chokepoints and vulnerabilities in the Agriculture and Agriprenuership system, in order to identify necessary investments and reforms that would further strengthen the resilience of the sector to a range of future shocks and challenges. It will be crucial to engage stakeholders in the process of understanding the full impacts of the pandemic on various population groups and the lessons to be learned. In specific, it will be significant to inspect the current resilience toolkit in the agriculture system, with a view to identifying which policy measures have proven most effective and what new measures may be needed to respond to system-wide shocks. It will be particularly important to understand the factors that enable some food and farming businesses to adapt their business models quickly enough to avoid the most negative consequences. (OECD, 2020)

Teachings from the COVID-19 pandemic will need to be integrated into wider responses to challenges confronting the global agriculture system and integrating with modern technologies and Digital platform. Those challenges include: impact food security by reducing animal and crop production. (OECD, 2020)

Conclusion

The digital infrastructure is very essential facility to accomplish digital equality. Due attention should be given to enhance digital literacy, sustained use over time with substantial benefit. This can be achieved through providing access to services at community level where individual access is costly and difficult, capacity building of farmers and stakeholders, economically benefitting up-to-date content with user customization and so on (Laxmipriya Upadhyaya¹, 2019).

Digital tools and technologies pose viable methods for addressing some of the disruptions experienced by the agricultural sector during Covid-19 pandemic. Although agriculture cannot get away with grassroots institutions and human interventions, digital technologies can play an important role in helping the sector overcome specific issues posed by the pandemic. And, faced with the possibility of extended lockdown measures, there couldn't be a more opportune time for stakeholders to explore digital agricultural solutions.

It is crucial to reform existing framework in Indian agriculture so that it becomes more market-oriented while at the same time enhancing a digitally-driven environment. In rural areas, digital connectivity is vital for distributing low-cost data and easy access to farming information. Digital literacy will allow open access to equitable markets that would benefit the farmers to increase their profitability. There is also a growing need for investment in the development of multidisciplinary digital skills and knowledge. Digital platforms and modern technology is the key learning from pandemic, which can be implement in agriculture sector and gradually improve further, which facilitate the sustainability of the agrarian sector in the Covid-like situations.

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