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Making Technology Relevant

Interventions for Enhancing the Efficiency of the Indian Agricultural Sector

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As the world is grappling to survive the COVID-19 pandemic, both literally and figuratively, technology is providing the means to sail through this crisis. In the present scenario, technology is both omnipresent and omniscient. With the limitation and restrictions on scope of physical economic activities, technology is being leveraged to make various ends meet. While both manufacturing and services sectors are fast adapting to technology and leveraging its benefits, story of the agriculture sector is slightly different.

India's agriculture sector suffers from several paradoxes. While the sector provides employment to nearly 50 per cent of the workforce in India, it has the least contribution to India's gross value added. Moreover, while India is one of the largest producers of various food grains in the world, the per capita calorie intake in both urban and rural areas is less than the average calorie requirements, particularly in the case of the rural poor. According to a government report, among the lowest 30 percent of the expenditure/income class, the average per capita consumption of energy in rural areas is 1,811 kcal/day, which is much lower than the 2,155 kcal/day prescribed by the Indian Council of Medical Research. Furthermore, official government statistics reflect that in the last 2–3 years, India has recorded bumper crop, yet it has not been successful in feeding the poor, while if one is to believe media reports, food grains are rotting in warehouses. Thus, there is an obvious disconnect between the demand and supply centres, which can be bridged by harnessing technology.

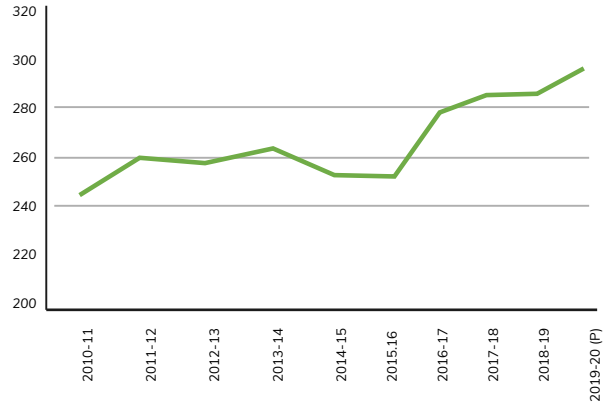
A classic case of success of the use of technology at the farm level was the Green Revolution, which led to an increase in agriculture production in India and entailed technology deployment essentially at the farm level, including the use of high yielding seed varieties, fertilizers, pest control methods, and controlled irrigation, among other things. It not only promised higher incomes to the farmers, but also to some extent helped in tackling the food security challenge of the country. Yet, apart from a similar white revolution in the dairy sector that followed, the use of technology at the farm level has since then been rather limited and erratic in nature.

In the present scenario, the adoption and use of technology as an enabler throughout the agriculture supply chain from farm to fork is needed more than ever. There are opportunities for breakthroughs and investments in various verticals of the agri-business value chain. The following paragraphs discuss three broad targets that need to be achieved through technological intervention across the agriculture supply chain. These are acronymized as the 3Ps.

The 3Ps

Admittedly, although there has been a slight increase in food grain production over the last 2–3 years, if one looks at the decadal data, the trend, despite being upwards, is not a straight line. The year-on-year production, on the contrary, exhibits cyclical trend with occasional troughs of poor harvest. Moreover, an increase in production may result in improving the stock of food grains, but not necessarily generate higher income for the farmer. Thus, higher production solves only some problems. The bigger issue of increasing farmer incomes (which is also in line with the PM's Vision of doubling farmers' incomes by 2022) may be addressed through a three-pronged approach: enhancing productivity, profitability, and predictability – all of which may be achieved by leveraging technology at various levels, from farm to fork.

Foodgrain Production in India (2010-20)



Food Grain Production in India
Output (Million Metric Tonnes)

Productivity

High production may not always imply efficiency in farming methods, which is often measured by the productivity. Incidentally, India has a low yield per acre for food grains including rice and wheat, when compared to other countries. According to a report by NITI Aayog, while India is the second largest producer of rice (after China), the yield per hectare (kg/hectare) is much lower than that in China, Indonesia, Bangladesh, Vietnam, Philippines, Brazil, Japan, and even Pakistan. There are ways of addressing this through technological interventions at various stages of sowing through better seed quality, soil health, and water management, among other things.

For instance, agricultural research has been successful in developing advanced varieties of wheat, which are likely to improve the yield per acre. Technological platforms may be used for
making information available about the possible varieties and their usage and requirements. Apart from high yielding varieties, farmers can also consider mixed cropping and rotational cropping to generate high income and grow higher value products.

Technology may also be deployed for adopting sustainable farming techniques that help in conservation of water, soil health and fertility, and optimal land use – all of which have shown to bring down production costs. There are various technology-based initiatives currently in use. For instance, the Government of India has launched the Soil Health Card Scheme, which promotes soil test and balanced fertilizer use to ensure soil health and improve its productivity. For water conservation, farmers in states such as Punjab and Haryana (among others) are using direct seeded rice (DSR), a technique which also helps is reduction of labour and other costs. For example, some telecom operators have rolled out mobile applications targeted at the agriculture sector, such as the Vodafone Kisan Mitra App, which provided agricultural information such as crop advisory, weather forecast, and pesticide composition, among others.

The IFFCO Kisan Agriculture App is another such initiative – a partnership between IFFCO and Bharti Airtel – to enable farmers to improve their farm-level practices. Initiatives by companies such as Reuters in the field of dissemination of information to the farmers through SMSs are also crucial in terms of providing them assistance, which is especially important for undertaking sustainable farming and enhancing productivity. Sustainable farming methods not only help increase the productivity, but also, by optimizing input usage, help in improving the profitability of the farmers.

Profitability

Profitability may also be improved by adding value to the crops through simple methods such as primary processing techniques. These include sorting, grading and packaging products as per their qualities. Often farmers sell their output at a lower than average rate without identifying quality grades of products. There are mobile application-based initiatives that help farmers with post-harvest value addition to crops. For instance, companies such as Crofarm provide a wide range of services such as on-demand procurement, quality checks, packaging, and delivery of products, which add value to the products and help the farmers with better price realization, especially for superior quality/variety products.

Apart from this, profitability can also be increased by growing high value crops and undertaking rotational and mixed farming. Among many other factors, one of the reasons that most farmers in India grow food grains as opposed to other potentially higher value crops is due to the certainty of procurement by the government. The public procurement system for food grains in India ensures that the farmer has a buyer. Thus, there is a need for deployment of technology for bridging the gap between the farmers and the markets, and also for providing product and market information to the farmers. While there are initiatives on market information, there is a need for more wide-based and far-reaching platforms that allow the farmers to

establish direct contact with buyers – whether these are intermediaries or wholesalers or retailers or consumers. Techniques such as DSR, which save cultivation costs, also ensure better profitability for farmers. However, use of technology to disseminate these and other similar techniques is very limited at present. Finally, the use technology for monitoring and reducing food loss and wastage may also help in reducing losses and, thereby, improving the profitability of the farmers.

Predictability

The third important aspect is predictability, which entails predictability about both farm production and crop prices. At the farm level, there is a need for the adoption of climate smart technologies as well as providing early warnings for any anomalies that may affect the output of the farmer. This will not only prepare the farmers but also enable them to take necessary actions at the right time. Similarly, price discovery is important for farmers for better price realization and receiving the true worth of their output. The new law on the Farmers' Produce Trade and Commerce (Promotion and Facilitation) Ordinance, 2020, allows farmers to sell outside the Agricultural Produce Marketing Committees mandis. While this breaks the perceived monopoly of the APMC mandis, it is likely that the farmers may still rely on these for price discovery. In such a scenario, it is important to provide alternate and robust architecture, using technology based platforms, on the lines of the existing e-Nam portal (which served a national unified market for APMC mandis) for the farmers to access information on markets and prices. Apart from these aspects, predictability through data and other agriculture inputs and resources will also be useful for the crop insurance market by providing timely and reliable data for a well-running system.

Although there are existing initiatives for both market information as well as weather-related information, there is a need to scale up the use of these technologies. One of the first few companies to foray in this domain was ITC, which started the IT (V-sat linkages) based e-choupal network, consisting of village level real time information dissemination on price discovery. There are several other digital technology-based platforms that provide a wide spectrum of services to farmers. Some examples include: Eruvaka for monitoring of ponds data; MyRML for providing agri information on weather, mandi rates, crop advisory etc.; AgroStar, which is a helpline for farmers for weather information, among other things; AgriAPP, which provides information on crop production, crop protection, smart farming with agriculture and allied services; and CropIn for providing a range for farming solutions. The pros and cons of most of the above mentioned interventions are now well-documented.

Despite the large potential user-base, most of the agriculture technology start-ups and initiatives have not been able to scale up due to the vast size and spread of agriculture sector in India; fragmented land-holdings, seasonality and perishability challenges; and socio-cultural and lingual differences. One has to be mindful of the fact that the Indian agriculture sector is a heterogenous group; policies and application of technology has to be targeted. Therefore, there is a need for a great degree of customization, which makes scaling up both costly and difficult. Scaling up requires private sector participation with the right impetus from the government and certain considerations by businesses. Further, to achieve these objectives, it is important to consider pilot projects that are ongoing within India and make use of these technologies.

Considering that the concept has several operational challenges and entails high cost, initial support from the government is important – both for developers and for producers. Further, setting up and maintaining mobile network infrastructure in rural areas is costly and arduous and, thus, there is scope for public-private partnership.

Finally, there is a need for learning from the best international practices and through international cooperation. Internationally, there are several technology-based platforms and initiatives. For example, there is Agriculture Market Information System, which is an international agency platform. There are initiatives by Consultative Group for International Agricultural Research on wheat and maize research, and by the Group on Earth Observations for agricultural monitoring to support the farmers and provide timely inputs. India can participate as well as learn from these international efforts for better outcomes and realization of objectives set for the Indian agricultural sector.

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