

Avenues of agri-business entrepreneurship in India

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The agribusiness word integrates two different yet cohesive domains that have various gears to make it compatible with each other. The economic activities that are derived from or connected to farm products and its supply chain are often named as Agribusiness. In India, agriculture is one of the principle economic activities that are carried out by majority of the population. Employing the widest population base, agriculture is the main source of income for many living below poverty line. It may play a significant role in alleviating poverty if done with utmost precision with optimum utilization of resources along with least wastages. Thus, a lot of intervention and investments are needed to ensure a sustainable livelihood for many people employed in agriculture. India has a rich biodiversity in its account, making it one of the largest producers of many commodities across the globe. At the same time, this diversity in the landforms, soils, crops, cropping patterns along with cultural and demographic variability of the manpower carrying out the farming and related operations creates few unstandardized protocols and inefficient value chains. The poor yet developing infrastructure is one of the biggest hurdles in realization of the maximum efficiency of these operations. Due to perishability of the produce, wastages during handling is another issue that creates a heavy burden on the economy. Improvement in productivity becomes an important factor for the country's food security in the light of the constrained availability of agricultural land.

Keywords: Agribusiness, Agribusiness avenues, Value chains

INPUT output interfaces for the market development have become significant for better price realization and an incentive for people to venture into agriculture. In literature, infrastructure, literacy, extension and research have been noticed as the most important sources of growth in productivity. It is observed that there is a whole new breed of people venturing in agribusiness to create such conditions for achieving the highest efficiency throughout the value chain. The conversion of different disciplines has also been witnessed in the previous years either in the form of science or resources. Only 16% of the human force coming in agricultural entrepreneurship has agriculture as an educational background. Alternatively, the novel solutions for

the long standing problems of agriculture have a deep application of the principles of other disciplines referring to new avenues.

In this article, we are going to discuss about the landscape of agribusiness entrepreneurship from the perspective of understanding its various avenues. For the better understanding of the readers, we have divided these avenues into ten major sectors (Fig. 1).

In Fig. 1, a sectoral division of the areas in which agripreneurs are venturing has been shown, although several times the boundaries do not restrict the start-ups to stick to a particular area rather a need is felt to address the problems by creating a synergistic solution in few areas. The avenues have been discussed one by one.

Farm mechanization and agricultural engineering: This sector addresses the problems of farmers' drudgery, carbon emissions through the use of machinery, manual or cumbersome controls and no mechanization points. User innovations are predominantly being witnessed in this area that shows the entrepreneurial orientation and innovative capabilities of our farmers. They tend to come with their own engineered solutions to specific problems like uniform seeding, weeding and on-farm waste management. On the other side, solutions that are making the machinery energy efficient are widely seen including battery and solar energy operated farm implements. As advancement, all new agricultural machinery start-ups are incorporating



Fig. 1. Sectoral depiction of agribusiness avenues.

electronic controls and have entered the digital age, thereby enhancing their current performance. They are also addressing the farming operations critical points at which no or less mechanization is available at the farmers' level like rice stubble management.

Crop protection technologies: A narrow genetic base dependent crop variety cultivation along with on-farm biodiversity loss is leading to new insect pest emergence, weeds and diseases. If they are left unmanaged, they will affect the crop yield adversely. The overall crop production plan includes significant crop protection strategies to minimize losses and attain sustainability of farming operations.

This sector is witnessing a steady growth with the product innovations as well as its deep co-integration with the modern age technologies like big data, artificial intelligence, machine learning and augmented reality. Data and computer scientists are getting

fascinated with the role of these tools in early pest and disease detection. There is an emergence of various devices that are either built on primary *in situ* data collection or on the basis of the data depositories made up over the years. These devices and softwares are being prepared by keeping the majority landholding size and the payment capacity of an average Indian farmer. Alternatively, the innate sciences of Ayurveda and tribal nature are also gaining popularity these days by creating different herbal crop protection products.

Precision farming and natural resource management: The food security needs are tried to be met with a substantial increase in food grain production over the years, but, at the same time, it is leading to abiotic and biotic stress in certain regions in the country affecting the overall health of the soils. In order to combat these challenges, plenty of technologies are being developed with the application

of smart sensors and natural resource mapping. The dynamic youth of the country is developing smart AI and sensor based soil testing devices, automatic integrated irrigation and fertigation modules. The devices for controlled application of crop nutrients and their management are being developed integrating its user mobile applications. In all the ventures, a check on making it user friendly is being kept. This carries utmost importance as the fancy solutions are difficult to be adopted by Indian farmers if they are not vernacular and easy to understand and operate. The drones and satellite based imagery to identify abiotic stress is also gaining momentum these days and a component of crop advisory is also being associated either with precise estimates or in general. It is observed that in each kind of development, a handy mobile application is there to connect the farmers with the system ensuring wider adoption of the technology.

Post-harvest and food technology: An efficient post-harvest system ensures the quality and safe food manufacturing and delivery to the consumers. A significant food insecurity is indicated for India as per the Global Hunger Index of 2014 where India is ranked 55 amongst 120 hungriest nations. Reduction of post-harvest losses is the most essential step to combat this challenge. At the same time nutritional security is another important dimension that needs a lot of attention. Ready to eat, consumer centric nutritional products as a replacement to junk food available in the market are gaining wide popularity these days. The entrepreneurs are developing micro- and nano-formulations to advance the synergistic effect of certain nutritional components in a food product. Various enterprises are trying to develop alternative nutritional compositions by utilizing underutilized crops of the country. It becomes more important from the perspective of regional development highlighting an imperative step as sourcing directly from the farmers. The energy efficient preservation methods like innovative drying techniques, minimal processing methods to be adopted at farmgate, cost effective farmgate storage structures are gaining popularity. In case of storage structures, low cost and sophisticated controlled atmospheric solutions, both are being developed at the opposite ends to capture the whole landscape. Environment friendly smart

packaging solutions for primary and secondary storage along with edible cutlery is another dimension which start-ups are exploring to create a sustainable ecosystem.

Farm inputs and crop production: A big change in the methods and inputs of crop production has been witnessed in the last few years showing the paradigm shift from traditional forms of labour, seeds, and manure to modern inputs including precision of labour applications, high yielding hybrid seeds, water binding gels and new methods of irrigation. In this modern era, this sector witnesses the ventures engaged in developing biofertilizers and growth promoters to enhance yield and producing safe to eat commodities. There are few ventures that are creating sensors for timely detection of harvesting based upon harvesting index. These kinds of ventures are making the farm operations very precise thus resulting into higher yields, less losses and increased income of farmers. The farm advisory is again a big component coming under this domain where start-ups are linking the farmers either with real time expert advisory or AI based in-prompt advisory services. These are generally subscription based models.

Another domain that exists in this wide sector is of seed variety production through licensing from agricultural research institutes. These are small enterprises that get the technologies licensed, multiply them and make them reach to the farmers. These kinds of enterprises serve as a

very important link in between the research institute and farmers to properly disseminate the technology.

Agricultural supply chain management: The traditional complex agri-food supply chains are evolving into the modern, simple networks that are highly automated. Earlier the chains were centralized and were dependent upon the third parties for trading which were inducing lack of accountability, traceability and auditability. Now enterprises are developing block-chain based traceability systems to ensure the right quality product with traceable origin. The start-ups are also moving towards the development of infrastructure like storage houses, fleet management, etc. The application of AI is also playing a big role in supply chain management of various commodities through material sourcing, processing and delivery. This sector is also witnessing various price discovery platforms for better price realization for both buyers and farmers. Apart from this, plenty of online trading platforms, e-marketplaces, and specialized commodities, i.e. GI tagged products, specific tribal commodities supply chains from backend and frontend integration are also mushrooming.

Veterinary sciences and dairying: Rearing of livestock is an integral part of the lives of small and marginal farmers to ensure the security of their livelihood to ultimately alleviate poverty and food insecurity. From the economic perspective, large ruminants are playing a significant

Bee-keeping—An income generating enterprise for smallholder farmers, district North 24 Parganas, West Bengal

KVK, North 24 Parganas, Ashoknagar conducted total seven numbers of training courses on beekeeping enterprise to train 120 rural youth and farmers from 10 different blocks of the district during the years 2016–19. Out of these, 25 adopted bee-keeping as a continued activity. Major expenditure was involved on the purchase of bee boxes, colonies, honey extracting machine, gloves, veil and other tools. Bee-keepers got income from sale of honey, wax and pollen. Small scale bee-keepers having average 28.75 colonies and medium scale bee-keepers having average 83.57 colonies could fetch annual average net return of ₹ 52,163.33 and ₹ 1,50,157.14, respectively, while large scale bee-keeping entrepreneurs with average 187.5 colonies could achieve annual average net return of ₹ 2,75,525. The net return of bee-keepers increased with the increase in the number of colonies.



Source: ICAR-Annual Report, 2020

role in India. Real time android based applications for tracking of the animals, e- medicine platforms, veterinary education platforms, veterinary disease diagnostics, ML based precise artificial insemination devices are gaining popularity in this domain. In the context of dairying, the user friendly dairy advisory, AI based dairy farm management services, milk trading platforms, milk supply chain development, innovative dairy based products and by-products utilization are the areas that are gaining momentum.

Waste to wealth and green energy: Waste can be considered as an extremely valuable resource that is not being realized with its true value. Precise waste management strategies converting waste to resources are required throughout the value chains. This area is witnessing a rapid growth in the number of technologies developed by entrepreneurs to cater the whole canvas of waste management starting from the management of rice stubble with an innovative wheat seeder to AI based waste management systems. Few enterprises are also coming in with integrated farming solutions to manage waste of different farming and allied operations. Post-harvest waste management is another domain which is getting a lot of attention with solutions like biodiesel production from waste cooking oil, etc.

Fisheries: Ineffective fisheries and aquaculture management system reduces biodiversity, alters ecosystem functioning and jeopardizes the food security and livelihoods of hundreds of millions of people. Hence, this sector is witnessing a variety of technologies including offline and

product based technologies to AI and ML based data driven technologies. The start-ups are venturing with fish and aquaculture disease detection modules, harvesting grid development systems, bot based fish waste management systems, aquaculture health tracking devices at the sophisticated end. All these technologies are associated with a user-friendly data feeding and management system in the form of either an enterprise resource planning (ERP) software or a mobile application. At another end, fish and aquaculture based processed and value-added products, RAS and biofloc based fish rearing systems are also gaining popularity among the entrepreneurial community.

Institutional support for agri entrepreneurship: From the last several years government is trying to empower various central government and state government institution to convergently work for providing various kinds of support and facilities for the development of Agribusiness-entrepreneurship. ICAR with its 4 deemed universities, 65 research institutes, 14 National Research Centres, 6 National Bureaux and 13 project directorate fostering the process of agribusiness entrepreneurship through technology validation, training and capacity building along with a deep SAU based research and education system. Apart from ICAR, there are many government recognized private incubators focusing upon agri business at the core by incubating promising start-ups to provide them required mentoring and support. There is also a funding ecosystem based upon the grant-in-aid and

equity provisions which is there to meet their financial requirements.

Over a period of time, the importance of enterprises for the socio-economic upliftment of the farmers has been realized. These enterprises are solving the problems of Indian agriculture by making it more efficient and organized. Simultaneously, a wide population is getting employed in these enterprises based upon their skills and competencies. They are helping in realization of the dream of 'Make in India' and increasing the share of the country in net exports which ultimately strengthens the economy.

Promoting more attractive and profitable business enterprise in agriculture and allied Agri-entrepreneurship is the need of the hour. There is a lot of untapped hidden potential in agriculture in terms of effective management of soil, seed, water and market needs and agri-entrepreneurship has a great scope to harness. As agricultural growth and development has direct impact on reducing poverty, it is indeed an essential step to drive the spirit of entrepreneurship among the youth. Entrepreneurial actions associated with agriculture will generate innovative practical solutions for increasing farm income, employment and rural prosperity. Further, the right mix of managerial skills and entrepreneurial expertise imparted through various institutions and interventions would facilitate accomplishment of the growing needs of agri-business.

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Horti-Animal Husbandry-Apiary IFS Model: A successful intervention by KVK, North Goa

Shri Vinod Gopal Barve, Satode, Valpoi, Sattari, Goa, is practising Horti-Animal Husbandry-Apiary integrated farming system model for last seven years under the technical guidance of KVK, North Goa. He has 6 ha area under Integrated Farming System model. The main component comprises of Arecanut 6,000 plants, Banana 2,000 numbers, and Black pepper 3,000 numbers, Nutmeg 5 numbers and Cinnamon 2 numbers. He has 4 indigenous cows which he mainly uses for production of organic manure. In addition, he has put up 08 Honey Bee boxes. Total annual production from this model is Arecanut 12.9 tonnes, Banana 135 tonnes, Black pepper 4.7 tonnes, Coconut 3,00,000 nuts, Organic manure 3 tonnes and Honey 15 kg. Net income obtained from this IFS model was ₹ 40.77 lakh/annum (₹ 6.80 lakh/ha).



Source: ICAR-Annual Report, 2020