

Agri and Food Startup Ecosystem in India

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Government of India through different policies and schemes like National Intellectual Property Rights (IPR) policy, Make in India, Skill India, Start Up India, Smart Cities, Digital India policies trying to build a strong ecosystem for nurturing innovations and Start-ups/ entrepreneurship in the country. The country predominantly is agrarian as its majority workforce is engaged in it. This sector has a huge potential for promoting innovations as it has rich resources of traditional indigenous knowledge, biodiversity and human capital. The country has gradually started shifting from 'a producer-driven to demand driven and market-led' agricultural research and development (R&D) system. ICAR had established 24 Agri-business Incubation (ABI) Centers to nurture early stage innovative startups and entrepreneurs. Ministry of Agriculture's Rural ABI programme is also gaining momentum. In 2018 agri-tech startups raised around \$65.6 million, and food sector startups around \$516. The experience of two cases, indicates that the food and agriculture sector has been thronged by the streams of educated youth, fired by the ideas, passion and innovations. These entrepreneurs and start-ups are providing missing links in the agri-value chain and delivering efficient products, technologies and services to the farmers on one hand and the consumers on the other hand. Through two cases it can be inferred that there are better opportunities for nurturing and building innovative enabling platforms for agri-business and agri-entrepreneurship in the country.

Key words: Entrepreneurs, Skill India, Startups

THE “National Intellectual Property Rights (IPR) policy in 2016, is to promote a holistic and conducive ecosystem for catalysing the economic, socio-cultural development. The policy aimed at strengthening the national initiatives such as Make in India, Skill India, Start Up India, Smart Cities, Digital India. The flagship programme of the Government like Start Up India aims at building a strong ecosystem for nurturing innovations and Start-ups/ entrepreneurship in the country. Under this, Atal Innovation Mission (AIM) is the action plan envisaged with the focus on promotion of entrepreneurship and innovation in sectors such as manufacturing, agriculture, health and education.

India has a huge potential for promoting innovations in food and agriculture. This is due to the fact

that has rich resources of traditional indigenous knowledge, biodiversity and human capital. Besides the country has progressed in terms of agriculture, India has become self-sufficient in production of many commodities. Still the major part of workforce depend on agriculture, farmers' incomes are still low, output markets and input markets are operating in sub effective ways, Many asymmetrical development in production and consumption systems are there. Recognizing this, the NARES has gradually started shifting from 'a producer-driven to demand driven and market-led' agricultural research and development (R&D) system. In this transition, issues of technology transfers through commercialisation from public research, gaps of knowledge in new product development (NPD)

processes for the markets and attracting entrepreneurs to this sector have emerged.

This led to development of Incubators, who are nurturing early stage startups and entrepreneurs, besides big corporates getting involved in these new product development more specifically in agri-technology and food technology. The agri-technology startups in India are trying hard to get to a scale for sustenance and growth. The majority of these startups are under three years of age and have made their model in such a way that they wanted to be the unicorn in the stiff competition. Off late innovations in new product development has been seen in private sector also, this is more in food sector. Lot of processing industries with national and international licenses have been set up in India.

Many companies are innovating on their own and lot of entrepreneurship is emerging in this sector. The face of the Indian food processing industry is redefined by the startups. We want to now clearly participate in this market, Sanjay Sharma, CEO of MTR Foods told PTI. According to RedSeer's Foodtech Market Updates, the foodtech industry has seen an overall GMV growth of close to 140% in 2018, with order volumes increasing by a whopping 176%.

The ecosystem needed to enable the growth of startups started with incubation support. Incubators are the technology-led and knowledge-driven entity to help in commercialization of innovations and research outputs. Technology business incubators not only help in growth of technology based new enterprises but also improve their survival rate from 30-70% (NSTEDB, 2016a). These also help in mustering support services for start-ups, finding funding such as venture capitalists, angel investors and better networking opportunities for locating good markets.

National Science and Technology Entrepreneurship Development Board (NSTEDB) of Department of Science and Technology, Government of India was promoting technology transfer in India through Science and Technology Entrepreneur Parks (STEPs) programme since 1982. Since 2000, NSTEDB initiated Technology Business Incubators (TBI) programme for nurturing technology and knowledge based start-ups. These incubators provide services such as developing business plan, market research, technical assistance, other support assistance such as obtaining approvals, arranging legal and IPR services, using facilities of host institute at minimal charges and providing workspace for initial period.

IIM-A CIIE, ICAR NAARM: aIDEA, Villgro and AIP- ICRISAT have done a creditable job in building the much-needed initial incubation support (mentoring as well as seed capital) in this sector. ICAR had taken the stewardship of promulgation of IP and technology commercialization process, by institutionalization of the

policy through development of operational guidelines and establishment of a governance mechanism in a three tier mode across all the institutes of ICAR. Further, support is being provided for

technology incubation activity and nurturing the techno-entrepreneurs in Agri-business Incubation (ABI) Centers established in 24 ICAR institutes, keeping in view the spectrum of technologies, available

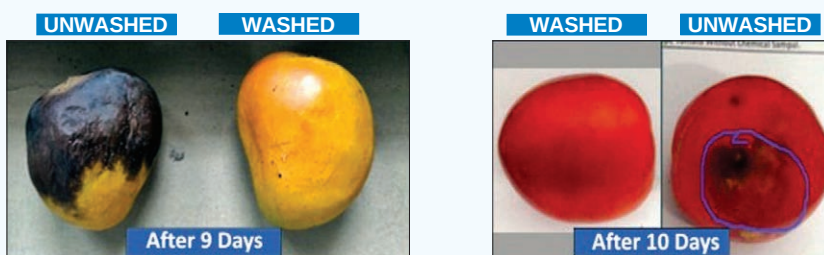
Case 1: Tazaa Agro: Ensuring fresh fruit and vegetable on your plate

Bikram Mehra, Managing Partner of Tazaa Agro after completion of his management studies joined in National Centre for Cold-chain Development, Autonomous body of Ministry of Agriculture & Farmer Welfare, Government. of India. After seeing the issues in post harvest losses, especially those of farmers he thought to do something and came up with the idea of Tazaa Agro. Post harvest quality and quantity loss is a very established fact in Indian Agri scenario. Normally 30-40% loss has been estimated in perishables like fruits and vegetables (F&V). Preventing the loss to cope up with increasing demand for these commodities would increase F&V farmers income contributing to the national goal of doubling the farmers income and preventing the national loss to the tune of 30% of GDP.

The F&V loss can be reduced significantly by using TAZAA AGRO Bio-degradable emulsion one can 1) extend the shelf life of fruits and vegetables for about 3 times in ambient temperature while preserving the quality (Table 1); and 2) Blocks the pores of F&V partially which slow down the metabolic activities of fruits and vegetables to reduces the physiological weight loss and loss of moisture. Features of TAAZA AGRO are: 1) It keeps intact the Appearance/Texture and brings shine to F&V which reduces the expenditure of edible wax.; 2) Maintain crispness, chewiness and aroma (Taste) in F&V for long period of time and preserves the original quality of juice content and flavour; 3) It can effectively resists the contaminants of micro-organisms (bacteria, fungi, viruses) when used with a combination of Ozone technology; 4) Treated F&V can be consumed directly without water wash (Easy Operation); 5) Tazaa Agro keeps F&V hydrated and prevents from drying; 5) Low cost technology and can be used by small land holder farmers, traders, retailers or cooperatives to extend the shelf life of fruit and vegetable at ambient temperature; 6) Tazaa Agro is mobile in nature and capable of being transported from one place to another.

Table 1. Difference between untreated and treated F&V at ambient temperature as follow:

F&V	Normal shelf live (days)	After treatment (days)	Increase in duration (times)
Apple	10-12	25-30	2-3
Grapes	2-3	6-8	2-3
Plum	2-3	6-8	2-3
Mango (Alphonso)	3-4	10-12	3-4
Mango	2-3	6-8	2-3
Capsicum	3-5	10-12	3-4
Tomato	5-7	14-15	2-3



infrastructure and the core competency of the institutes. Incubators of ICAR and other organizations provide an effective platform for fostering the growth of sustainable business endeavour and provide a wide range of services such as research support; business planning; office space; access to information and communication technologies; and advice on management, marketing, technical, legal, and financial issues. Realizing that novel approaches of developing new entrepreneurs and startups are a prerequisite to accelerate the process of access to new technologies by farmers.

In the recent past, we saw acceleration programmes of NAARM-aIDEA and CII joint programme of India's first accelerator in Food and Agri accelerator in 2015 and Agri Udaan in 2016, Yes Bank, Gastrotope, etc. gaining momentum. Grand challenge and awards from Ministry of Agriculture, Ministry of HRD, Marico Innovation Foundation, Rabobank, ID Capital, etc. have also opened doors for many new entrepreneurs. Now Ministry of Agriculture's RABI programme is also gaining momentum.

Since 2016 has been more promising for the agricultural sector in terms of entrepreneurship development and startups - which has traditionally been less or misunderstood sector by different stakeholders, viz. including majority of investors, on account of lack of visibility of scale and higher perceived risk on account of government policies, climate risks, high degree of fragmentation at the farming end, and lack of data and transparency in the supply chain. However, it seems to be changing now. According to YourStory Research(w2), at least 13 agritech startups raised total funding of around \$65.6 million in 2018, up over 21% from total investments of around \$54 million in 18 agritech startups in 2017. Clearly, the increase in number of deals and larger size of investments in Indian agtech marks an inflection point for the sector. Investment in food sector is \$516 million across 70 deals in 2018 (W3). The entrepreneurial activity in

Case 2: BharatRohan: Precision farming with Indian farmers.

A company by two young Aeronautical Engineers Mr Amandeep Panwar and Mr Rishabh Choudhary, helps farmers attain their greatest potential using hyperspectral remote sensing- based Decision Support System (DSS). The BharatRohan CropAssure™ is a subscription-based service package that provides support to the farmers from sowing to post-harvest, with periodic alerts on early diagnosis of pests infestation, disease outbreaks and supports in cultivation through IPM practices. This service also helps food companies procure pesticide residue free or IPM agriculture-produce for which they pay good incentives to the farmers. BharatRohan also provides seed companies with valuable aerial intelligence data for their Hybrid Evaluation Trials, besides serving agri-chemical companies for their product testing experiments toxicity studies, evaluation trials and data compilation for approvals, geography and bio-efficacy studies.

Their technology and proprietary algorithms are capable of gathering miniscule colour changes occurring in the plants due to different biochemical changes occurring in different phenological conditions. The company is serving more than 2,000 farmers directly across Uttar Pradesh, Andhra Pradesh, Telangana, Karnataka and Maharashtra. Also, serving one of the biggest agrichemical companies, seed companies and food companies in India.

Project 1: Peppermint Cropping System in Barabanki: BharatRohan is working on Mentha cropping system which is a very significant revenue source. The cropping system involves Mentha, paddy and potato crop. Bharat Rohan built spectral libraries in association with CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow. These libraries are correlated with and applied on Drone/UAV based Hyperspectral Data acquired from farmers field using various proprietary unmixing models. CSIR- CIMAP, also provides their phenomenal support in creating precision agriculture advisories for the local farmers for Aromatic Crops. BharatRohan's Crop Assure™ services help peppermint farmers save INR. 3,620 per acre by precisely applying the agriculture inputs where they were required. Moreover, the productivity of Peppermint oil increased from 50 kg per acre to 70 kg per acre. The company provides unprecedented advisory services through a proprietary ICT Platform, diagnose pest attacks, disease outbreaks in the crops of interest and suggest control methods, promote use of sustainable precision agriculture practices, and acquire, process and analyse farm level precision agriculture data and support farmers in implementation of precision agriculture advisory from the stage of sowing to the harvesting.

Project 2: Serving seed companies with aerial intelligence for Hybrid Evaluation Trials (HETs) and High-throughput Phenotyping Experiments. Seed companies carry out (HETs) and High-throughput Phenotyping to understand various genetic traits of the newly developed varieties. These experiments also help them in selecting the best variety to be released for farmer use. Companies spend a lot of manpower in collecting Crop Height Information which is often imprecise and bound to be biased.



Indian agtech in 2017 reached a new peak with more than 600 start-ups working for solving problems of Indian agriculture (AgriUdaan Experience of ICAR_NAARM). This number was less than 50 about five years back. Most of these entrepreneurs/startups are not formally studied agriculture but have family roots in agriculture, which makes them ideal candidates to spot the opportunity and develop solutions. Many of these startups have emerged independently, they have been mentored by industry itself. The experience, indicates that the food and agriculture sector has been thronged by the streams of educated youth, fired by the ideas, passion and innovations to launch newer kinds of technology and business models to lift the face of agriculture from primitive to hi-tech one. These entrepreneurs and startups are providing missing links in the agri-value chain and delivering efficient products, technologies and services to the farmers on one hand and the consumers on the other. From apps to farm automation; from protected cultivation to innovative food processing and packaging (Case 1); and from smart poultry and dairy ventures; From conventional farming to precision and smart agriculture (case 2). The proliferation of all innovations and technology driven powerful startups is set to revolutionize the food and agriculture sector. This not only speaks about millions of hopes associated with agriculture but also points out to the huge scope for agritech startups in the country to make those hopes of Indian farmers come true.

Sustainability of business models:

The scale of agtech start-ups (unlike consumer internet/ecommerce) is not driven by discounts, GMV and eyeballs. For example, the value proposition in case of direct-to-farm models is around right quality of agri-inputs at right price and right time. Likewise, for tractor rental models – it is around optimisation of assets, efficiency and timeliness of farm operations in labour-starved market. The sustainability is integral to

agtech business models and that is the reason most of them have survived without external funding. The sustainability on the back of margin improvement opportunity through dis-intermediation and efficiency is unique to this sector.

Despite the progress, there is still lot of scope to improve the ecosystem and attracting the capital in the area. The low level of seed funding, incubation centers, less number of mentors coupled with lack of access to supply chains for prototyping innovations is responsible for sub-optimal growth and premature death of worthy startups.

Both public and private ecosystem necessary for agtech scale is showing green shoots. The government realizes that target of doubling farmer income can not be achieved without making innovations accessible to farmers, so they want farmers to adopt innovations. There are several other government programmes, which can also give startups enough room to innovate.

Many state governments in India have also taken giant steps to provide agtech start-ups a public platform to scale. Andhra Pradesh government clearly stands out among all state governments who have demonstrated commitment to agtech through their AP Smart Village programme (in collaboration with University of California, Berkeley) as well as organising the agtech event of the year – AP Agtech Summit, (organised in partnership with Bill & Melinda Gates Foundation), which gave many start-ups an opportunity to work closely with the government to scale innovations in the state for the benefit of farmers.

Then there are initiatives from other states, viz. Rajasthan, Madhya Pradesh, and Karnataka governments to build Custom Hiring Centres in partnership with agtech community to provide farming as a service. Karnataka government's focus on promoting millets as superfoods to get it back on consumer plate is also unique and praiseworthy.

Private sector participation is also on the rise with an intent to collaborate with agtech community

to learn more about the sector and how it can impact their tried and tested businesses. Companies like Mahindra, Mahyco as well as some forward-looking SMEs are deeply engaged with agtech startups. Many insurance companies are working with ag-data startups for determination of risk profile of farmers and farms for determination of risk premium and claim settlement. Likewise, banks including Yes Bank, Rabobank have also started to work closely with many agtech startups, which can enable banks to lend efficiently to the sector.

The country paper through two cases clearly indicates enhanced opportunities for nurturing and building new enabling platforms for agri-business and agri-entrepreneurship in the country. Considering the large diversity of players in the entire agricultural production-consumption systems, there are focused areas for improving the system through R&D. The technologies and products need to be transferred through systematized approach and by forging more business partnership between technology developers and the seekers. The journey of NARES into technology transfer process has started only in 2006 as compared to initiatives in other sector. However, it may be pointed out that ICAR initiatives are in synchronization with recently announced national IPR policy of Government of India. Forging formal links and developing partnership with schemes and projects operating under other agencies of GoI (DST, DBT), successful NGOs, professional bodies and associations is one way to take forward the early initiatives and success gained. Entrepreneurs bring a new vision to the forefront of economic growth. Policy makers may consider improving conditions for entry of resource poor farmers into these modern markets, which might become much more dominant in the years to come as has happened in other developing countries.

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