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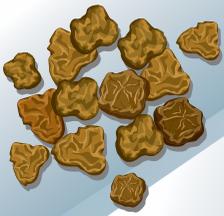
the
Startup
Saga



Shri Piyush Goyal

Powering the ag-tech transformation





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The Startup Saga

Agri-Startups have great potential in India. They can steer the shift from government-controlled agricultural markets towards demand-driven digital ones. Startups are creating a buzz by raising big money as they disrupt the traditional ways of doing business and leapfrog to efficiency by winning the trust of potential investors. In the last five years, agri-tech start-ups have been mushrooming like never before, building farmer platforms, B2B agri marketplaces, rural fin-tech enterprises and farm-to-fork brands, among others.

However, the role of agri-startups continues to be minuscule and limited, reaching out to less than 20% of Indian farmers. The pandemic helped them catapult. The 2020 farm laws could have given them further boost by providing a legal

framework to work with the farmers through FPOs, co-operatives and other collectives. Transformation of Agriculture to Agri-business is one of the important strategies for profitable and sustainable agriculture.

Currently, it is estimated that there are about 600 to 700 agritech startups in India operating at different levels of agri-value chains. Many of them use artificial intelligence (AI), machine learning (ML), internet of things (IoT) etc. to unlock the potential of big data for greater resource use efficiency, transparency and inclusiveness.

Over the last decade, the sector has become a magnet for educated youth fired by ideas, passion and innovations to launch newer

kinds of technology and business models to change the face of Indian agriculture and make it tech-driven. 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 ICT apps to farm automation; from weather forecasting to drone use; from inputs retailing and equipment renting to online vegetable marketing; from smart poultry and dairy ventures to smart agriculture and from protected cultivation to innovative food processing and packaging... agriculture startups are set to revolutionize the food and agriculture sector.

Here's to the power of agri-startups in India.

Happy Reading!

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TECH BUZZ

SATEESH NUKALA

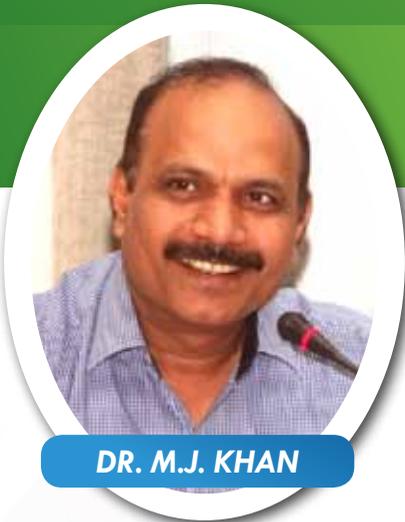


40 years of bridging the urban rural divide with rural infrastructure



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NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT



DR. M.J. KHAN

The Era of Agri Startups is here

The Union Budget 2022 has given agriculture its due. Our farmers and the many dependent on agriculture sector have seen the worst in the past couple of years. Despite the adversities, agriculture was one sector that delivered its level best during the covid times. This budget is what the sector has long waited for.

Natural farming, Kisan drones, revising syllabi of agriculture curriculum, “rationalised and comprehensive scheme” to increase domestic oilseed production, public-private partnership (PPP) model for the delivery of digital and high-tech services to farmers – all are in good faith. But what seemed to be the highlight is the unbridled support of the government to the agri startup segment. To finance startups and rural enterprises working in agri-space, the Finance Minister has assured that the government will facilitate a fund with blended capital raised under the co-investment model through NABARD which will finance startups for agriculture and rural enterprise relevant for farm produce value chain. The activities of these startups will include inter-area support for farmer-producer organisations (FPOs), machinery for farmers on a rental basis at the farm level and technology.

India has seen a cloudburst of agri startups in recent years. Most of them have survived their initial years of struggle and now are well established. There are more than 450 Indian start-ups in the agritech space with Indian start-ups featuring among one in every nine companies globally. Agrostar, Cropin, Jumbotail, Ninjacart and Stellops are well known names in the agri space. The agritech sector has effectively filled in the gaps in the agriculture sector. They have especially thrived in the area of developing and refining market linkages. Marketing farmer products directly to consumers, digitising agriculture, access to real-time information for farmers, value addition have all seen success through agri start ups. Custom hiring, rental services and micro financing are also other areas where we are seeing continued participation by the startups. All these

solutions indicate that improving supply chain is a key focus area for agritech start-ups. Farmers too are finding partners in these startups as their share in profits from crop sales have improved.

I feel this as the most opportune time to bring out a special edition on agri start ups of India. The February edition of Agriculture Today has lined up some very enterprising founders of start ups and will most certainly take away several myths associated with agri startups.



Change Of Guard At NAFED

End Of Remarkable Innings for Mr Sanjeev Chadha

A gri co-operative giant NAFED achieved a fantastic turnaround in the recent years. Not just the top brass, but even the rank and file of NAFED acknowledged the sterling leadership role of Managing Director Mr Sanjeev Chadha in pulling the cooperative out of the red and making it one of the top performers in the government sector. The bread and butter of lakhs of men and women associated with NAFED directly or indirectly was saved, thanks to the grand revival. It is natural that the man who makes this possible shall be loved by his peers and juniors alike.

Finally, it was time to pass on the baton. In January end, Mr Chadha bid adieu to NAFED at the end of his glorious five-year term. He was given a warm send-off by the top brass of NAFED. Mr Rajbir Singh of the Agriculture Ministry has been given additional charge till a permanent appointment is made.

Several prominent individuals in the top brass of NAFED participated in his farewell. "When he came, NAFED's reserve was zero. When he left, NAFED's reserves had swelled to Rs 700-800 crores!", said Nafed Chairman Mr Bijender Singh, showering fulsome praise on Mr Chadha.

Representatives of about seven national-level cooperative organizations participated in his grand farewell. Mr Bijender Singh noted that IFFCO MD Dr US Awasthi, NCDC Managing Director, Sundeep Nayak and even Dr Chandra Pal Singh who is busy campaigning for his son Yash Pal's election came on video-conferencing on the occasion. He made this observation to underline the high credibility enjoyed by Mr Chadha in cooperative circles.

Indiancooperative.com reported that Mr Chadha created many milestones at NAFED by initiating several new schemes. In January, he signed an MoU for the launching of six "One District One Product (ODOP) brands". The Ministry of Food Processing Industries signed an agreement with NAFED for developing 10 brands of selected ODOPs under the branding and marketing component of the PMFME scheme.

"NAFED and its MD also figured recently before the Prime Minister when a farmer from Rajasthan described how Nafed has helped him in doing the business of Honey effectively. Under his leadership, Nafed vowed to set up 100 Bio-CNG plants recently," wrote Indiancooperative.com.

Among his many initiatives, efforts to get a market for Arunachal Kiwis and J&K Saffron were noteworthy. Nafed under his guidance also focused on the professional cultivation of apples in J&K and Makhana in Bihar. In his last AGM, Nafed got its profit doubled and it also offered the highest ever dividends to shareholders. Mr Rajbir Singh takes the baton from a highly distinguished predecessor.



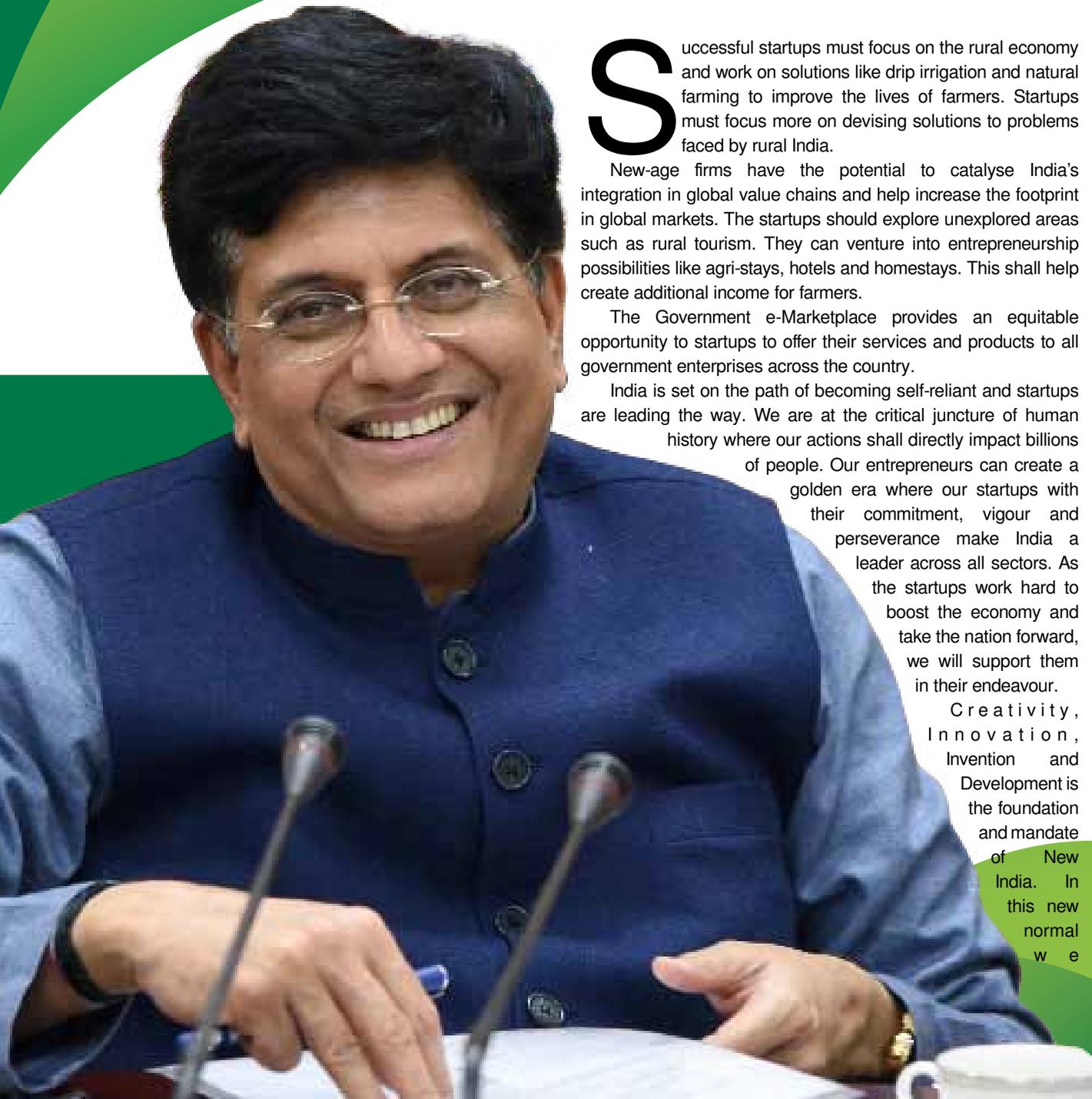
RAJNI SHALEEN CHOPRA



Former MD Mr Sanjeev Chadha was given a warm send-off by the top brass of NAFED

STARTUPS MUST FOCUS MORE ON DEVISING SOLUTIONS TO PROBLEMS FACED BY RURAL INDIA

Commerce and Industry Minister Shri Piyush Goyal



Successful startups must focus on the rural economy and work on solutions like drip irrigation and natural farming to improve the lives of farmers. Startups must focus more on devising solutions to problems faced by rural India.

New-age firms have the potential to catalyse India's integration in global value chains and help increase the footprint in global markets. The startups should explore unexplored areas such as rural tourism. They can venture into entrepreneurship possibilities like agri-stays, hotels and homestays. This shall help create additional income for farmers.

The Government e-Marketplace provides an equitable opportunity to startups to offer their services and products to all government enterprises across the country.

India is set on the path of becoming self-reliant and startups are leading the way. We are at the critical juncture of human history where our actions shall directly impact billions of people. Our entrepreneurs can create a golden era where our startups with their commitment, vigour and perseverance make India a leader across all sectors. As the startups work hard to boost the economy and take the nation forward, we will support them in their endeavour.

Creativity, Innovation, Invention and Development is the foundation and mandate of New India. In this new normal we

India has now become the hallmark of a trailblazer and is leaving its mark on global startup landscape. Investments received by Indian startups overshadowed pre-pandemic highs. 2021 will be remembered as the year Indian start-ups delivered on their promise, fearlessly chasing opportunities across verticals - Edtech, HealthTech & AgriTech amongst others. Startups should leverage modern technologies for local and global markets

need long term sustainable solutions to become self-reliant. We had launched Startup India initiative in 2016 to create an ecosystem of innovation, invention and enterprise. India now houses the third largest startup ecosystem in the world.

Startups must help bring about spirit of entrepreneurship, even in our remote villages and towns. The Prime Minister has correctly called the startups as the engines of exponential growth, manifesting the power of innovation.

The government has undertaken multiple initiatives in every sector of agriculture so that our farmers can prosper. By helping the farmers to engage with technology, agri-startups shall open new doors of opportunities for farmers by providing them with more options.

Startup To Startup Collaboration

Startups have ideas. They show enthusiasm and come up with innovations. They can also explore startup to startup collaboration, with exchange of ideas and young minds working together collectively to solve problems and assuring prosperity and growth in the nation.

The youth of today show entrepreneurship inclination. They are no more job seekers but have become job creators. India has thousands of startups registered with the Government but there are many more which are working at the grassroots level and doing a good work. It is highly creditable that Indian capital is encouraging and supporting the startups at an early stage.

India will certainly experience unprecedented growth in the post Covid pandemic world and start a global area of development. Prime Minister Narendra Modi's encouragement to our startups


 The logo for Startup India features the word "startupindia" in a lowercase, sans-serif font. The word "startup" is in orange, "india" is in blue, and the "i" in "india" is in green. Below the text is a green graphic element consisting of a horizontal line that turns 90 degrees downwards and then 90 degrees to the right, forming an L-shape.

and efforts to create an ecosystem full of innovation, invention and enterprise will surely work like a battery. A positive attitude and tremendous ability powers the future of startups.

Skill development is another important area which plays a very important role in boosting the entrepreneurship spirit and giving confidence to our entrepreneurs. I want to encourage Indian investors to work towards greater engagement so that we can truly demonstrate to the world our commitment to make startups the pillar, on which future economic development will prosper.

Startup to startup collaboration has huge potential. With this, the new idea will prosper and young minds will come together to work collectively. We will see new ideas prospering and young teams working together to come up with new ideas, new innovations, new inventions.

The Startup India initiative has created a ripple effect across Central Ministries and States to come up with well-crafted programs to support the startups. We are now at a stage of development when startups can learn from each other's best practices and benefit. The government is fully committed to support the startups and play the role of enabler and facilitator.

Our government is fully committed to create conducive environment for the growth and development of startups. In this regard various reforms and initiatives have been taken. Atmanirbhar

Bharat is fully connected to the Startup ecosystems. The government has been striving towards creating an environment for all the startups to come together, handhold, cooperate and grow.

Whenever the humanity has faced challenges, the human ingenuity and resilience has helped the world to overcome it. Globally, the economy, jobs, livelihood, business, trade and commerce have been badly affected due to Covid pandemic. Startups provide a ray of hope with a capacity to innovate and respond quickly to any problem.

We have added 43 unicorns in 45 weeks, since the start of Azadi ka Amrit Mahotsav on 12th March, 2021. Let us aim for at least 75 unicorns in this 75 week period to 75th Anniversary of Independence. Startup India started a revolution six years ago. Today 'startup' has become a common household term. Indian startups are fast becoming the champions of India Inc's growth story.

India has now become the hallmark of a trailblazer and is leaving its mark on global startup landscape. Investments received by Indian startups overshadowed pre-pandemic highs. 2021 will be remembered as the year Indian start-ups delivered on their promise, fearlessly chasing opportunities across verticals - Edtech, HealthTech & AgriTech amongst others. Startups should leverage modern technologies for local and global markets.

PUTTING NDDDB ON THE VENTILATOR

GOVERNMENT TO DECIDE WHEN AND HOW IT CAN BREATHE!

The Economic Survey 2021-22, states that dairy is the single largest agricultural commodity contributing 5% of the national economy and employing more than 8 crore farmers directly. India is ranked first in milk production, contributing 23% of global milk production. Milk production in the country has grown at a compound annual growth rate of about 6.2% to reach 209.96 million tonnes in 2020-21 from 146.31 million tonnes in 2014-15. The all India per capita availability of milk is 427 grams per day in 2020-21 (provisional). Economic Survey shows that dairying is one of the major drivers of growth in the agriculture sector.

The status of the dairy sector today is a clear and transparent result of the autonomy granted to National Dairy Development Board and the total confidence shown in it by GOI. Since its establishment in 1965 until 1987, NDDDB was a non-government organization established under the aegis of the Department of Animal Husbandry and Dairy Development (DAHD). Even then, NDDDB abided by the orders and instructions of GOI. The Indian Dairy Corporation was a companion of NDDDB to manage the commodities and control the finances of the Operation Flood Programme (OFP). NDDDB Act 37 of 1987 merged the IDC-NDDDB.

Importance of Autonomy to NDDDB

NDDDB had full autonomy. So much so, that the funds for OFP-I between 1970 and 1981 were not even reflected in the

budget by the Planning Commission or the DAHD. GOI appointed the Chairman. All other directors were appointed on the recommendation of the Chairman. NDDDB was a sole decision maker to identify states and districts to take up various projects, sub-projects, decide the funds required, the loan or grants to be given. Such autonomy made OFP an internationally acknowledged and highly successful development program. Acknowledging the success, the World Bank evaluation team recorded its regret that the fourth phase was not approved.

The success in dairy prompted GOI to empower NDDDB to take up programs for oilseeds and vegetable oils, fruits and vegetable, tree growing and fodder cultivation. To support that autonomy was mainstay for success, I quote Dr Aneja, former MD, NDDDB, (The Hindu Business Line, September 11, 2012): "When he presented NDDDB's plan to make India self-sufficient in edible oils in five years, Rajiv Gandhi questioned his targets by saying, 'You took 20 years in milk, how can you do this in five years?' Kurien's reply was, 'This time we are asking for a complete package of policy and powers to implement it.'" "But what are the guarantees?" quipped the Prime Minister. "Our heads," replied Kurien. He got what he asked for and delivered self-

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sufficiency in three years instead of five.”

That government control hampers the growth is evident in the final evaluation report of OFP, wherein the World Bank (Candler and Kumar, 1998), concluded that the principles of Anand pattern for full farmer control have been facing a continuing problem of “rejection by the politicians and bureaucrats... politicians continue to harass the co-operative system... issues of governmental interventions, cost control and subsidies are intertwined... lead to...mixed ownership and control... of co-operatives which has a... subtle and corrosive effect of government intervention”.

The key to success of co-operatives, as demonstrated by the Gujarat Co-operative Milk Marketing Federation (Kurien, 1983, National Dairy Conference) is “that co-operatives assisted by competent professional managers can attain levels of achievement far surpassing that of many an established enterprise in the Indian corporate sector. The competence displayed by the Federation should demolish all too frequent criticism of co-operatives that their divided and shared management prevents the attainment of the highest achievements in production and marketing”.

Reforming NDDB

Though the growth in dairy sector is now sustainable, yet there is need for a strong and autonomous NDDB to meet with the newer and consistently growing domestic and international challenges. NDDB needs reformation to provide consistent and continued mediation for emerging challenges in the dairy sector for modernization, process upscaling, manpower upskilling, knowledge management for upgradation of technical, technological and quality systems, market innovation, diversification, development and growth. There is compelling need for a durable commercial and financial viability of dairy co-operatives and farmer producer organizations, consolidation of dairy farming systems to benefit farmers, support for modern applications in breeding, feeding and farm management,



Though the growth in dairy sector is now sustainable, yet there is need for a strong and autonomous NDDB to meet with newer and consistently growing domestic and international challenges. NDDB needs reformation to provide consistent and continued mediation for emerging challenges in the dairy sector

formidable structure to corporatize and stabilize the private dairy sector, international Intelligence, monitoring and vigilance on the impact of WTO and free trade agreements, building Brand India Dairy and explore export potential of dairy products and enter international consulting.

Proposed Amendments to NDDB Act

The DAHD through a letter of January 18, 2022, has sought views on the proposed amendments to the NDDB Act, 1987. The purpose, as stated is “of better management and monitoring functions of NDDB”. A first glance on the amendments indicates that the GoI seeks NDDB to have subdued autonomy, support private dairy sector in addition to cooperative and public sector, and be more accountable. The issues of amendments are discussed



one by one.

1. Appointment of Directors

It is proposed to amend section 8 and add subsection (f) to provide for one additional expert from the private dairy industry.

Suggestion: It is seen as a good move and would enhance the knowledge and management base of the Board of Director while framing policies for the NDDB.

2. Appointment of Chairman NDDB

It is proposed to amend Section 9(1) to provide such that (a) The Chairman shall be the Chief Executive of the NDDB and shall hold office for a term of three years or up to the age of 65 years whichever is earlier and (b) Provided that no person shall hold office as such for more than two terms and any person so nominated shall be eligible for renomination.

Suggestion: Since Chairman NDDB is appointed by GoI, this amendment curtails the power of GoI.

3. Wider role for NDDB

It is proposed to amend Section to widen the role of NDDB, 16(1)(b) It shall be the responsibility of the NDDB to adopt cooperative strategy and other plans for the development of the dairy sector in a more effective manner on an intensive and nation-wide basis and to take such steps as may be necessary for the

purposes aforesaid; and

Section 16(2)(b) to impart technical know-how to such organisations in the cooperative or public sector or any other organisation as are engaged in the production, procurement, preservation or marketing of milk and milk products

Section 16(2)(k) financing, in such manner as the Board may deem fit (including contribution to capital) of cooperative federations, cooperative unions or cooperative enterprises or any scheme in the cooperative or public sector or for start ups and technical innovations intended to stimulate the production, preservation, distribution or consumption of milk and milk products nation-wide.

Suggestion: If the intention is to expand the role of NDDB to include the private sector, it will be better to be clear and explicit. It is suggested that in the amended “16(1)(b) It shall be the responsibility of the NDDB to adopt cooperative strategy and other plans for development of the dairy sector” words “including private sector” are added.

4. Amendment Unclear

Section 16(2)(y) promoting and encouraging cooperative and similar other organised efforts amongst those engaged in the production of milk and milk products and other foodstuffs.

Suggestion: In the original clause the words “cooperative effort” are conjoined to indicate that the NDDB would promote cooperation amongst the institutions/ persons. Separating the word cooperative from effort has created a grammatical error. Amendment should be dropped.

5. NDDB to Report

Section 16 A. The NDDB shall furnish to the Central Government a report consisting of details of all the activities and projects undertaken by it with funds provided by the Central Government.

Suggestion: This is not necessary to add this clause. Such directives are normally part of the release of project funds that any project financing agency can give at the time of release of funds.

6. Ex officio Directors in Subsidiaries

New Section 43 (3) Directors of the NDDB nominated under clause (b) of subsection 2 of section 8 shall also be the ex officio shall also be the directors on the Boards of subsidiaries formed under this section.

Suggestion: This is not required as part of NDDB Act. Provision for the appointment of directors should a part of the statute prepared for the subsidiary. Also, subsidiary company is set up with specified and specialized tasks. NDDB is set up to identify, conceive, appraise, and finance projects. Directors on NDDB Board are appointed with such experience and background. Mother Dairy, a subsidiary of NDDB, is meant to process and preserve milk and needs specialists. Indian Immunologicals needs specialists in virology. An omnibus provision as suggested in the amendment would mean that all nine directors on the Board of NDDB would be on both the Mother Dairy and the Indian Immunologicals. Amendment should be dropped.

7. Constitution of NDDB Subsidiaries

Section 43 (4) Any company formed under this section shall not –

(a) Form any subsidiary company under the Companies Act 2013 or any other law, without the prior approval of the Central Government

(b) Transfer any part of the share capital to any person without the prior approval of the Central Government

Section 43 (5): No new subsidiary company shall be formed under this section unless the objectives of such Company shall conform to the objectives of the NDDB.

Suggestion: It is not necessary to make so many amendments. Just add that any subsidiary shall constituted with prior approval of GOI.

8. Provision of RTI and CVC

Section 43 A. The provisions of the Right to Information Act 2005 and the Central Vigilance Commission Act 2003 shall apply to the NDDB and subsidiary

companies under this Act.

Section 43 B. All subsidiary companies formed under this Act shall furnish quarterly reports of their activities along with the financial statements to the NDDB.

Suggestion: Agreed

9. GoI Binding Directives to NDDB

Section 43 C (1) Without prejudice to the provisions of this Act, NDDB shall, in exercise of its powers and in performance of its functions under this Act, shall be bound by such directions on questions of policy involving public interest, other than those relating to technical and administrative matters, as GOI may give to it in writing from time to time.

Provided that the NDDB shall, as far as practicable, be given an opportunity to express its views before any direction is given under this sub-section.

Section 43 C (2) The decision of GOI whether a question is one of policy or not shall be final.

Suggestion: It is important to note that in the preamble, the NDDB Act has declared the NDDB as an ‘Institution of National Importance’. Giving binding directives and making the NDDB accept unilateral decisions will mean that NDDB is neither an institution of national importance nor an autonomous body corporate. There are many provisions in the NDDB Act, wherein NDDB has to undertake actions and activities with prior approval of GOI. This amendment will make NDDB as ‘institution of national distrust’. Introduction of this clause is like putting a healthy individual on ventilator with the doctor controlling how much and when he breathes. Must be dropped.

10. Manner of Recruitment

Section 8(2)(i) conditions of service, and the manner of recruitment, of officers and other employees.

Suggestion: Agreed

11. Procurement of Goods and Services

Suggestion: Not necessary. DAHD has also rejected it.



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BUDGET BYTES

Thrust on millets, increasing domestic production of oilseeds are good moves

The Budget did not spell out any specific initiative for the biotech sector, however, it had a few things for the agri sector—especially the thrust on millets and increasing the domestic production of oilseeds. In the Economic Survey, the government underlined the need for enhanced research in agriculture as well as oilseeds in addition to need for crop diversification. However no announcements to boost research in breeding and biotechnology were made in the Budget. For instance, it would have been in the fitness of things if the government had said that modern science and biotech would be used to boost oilseeds production in the country. Also some incentives for crop diversification from rice and wheat to oilseeds would have been very appropriate. Our industry sought restoration of tax deductibility of research expenditure but looks like it has not been approved.



Mr Ram Kaundinya
Director General,
Federation of Seed Industry
of India (FSII)

Spectrum Of New Development Opportunities For Farmers

Firstly, I must compliment the government for the pro-agriculture budget. The government took important steps to boost the agricultural sector and it clearly reflects in the budget proposals. The involvement of Kisan drones for crop assessment, land records, and spraying of insecticides will not just drive the use of technology in the agriculture sector but also open up



Mr. Sanjiv Lal MD and CEO
Rallis India Limited (a
subsidiary of Tata Chemicals)

a spectrum of new development opportunities for farmers.

The digital delivery of hi-tech services to farmers using the PPP mode, with the involvement of public sector research, institutions, and other stakeholders of the agriculture value chains, is a key reform needed to keep up with the new era of digitisation.

The budget has been well thought through aiming to reduce the country's dependence on imports of oilseeds through a comprehensive scheme to increase domestic production. In addition to this, the exemption is also being rationalized on tools for the agri-sector which are manufactured in India. Lastly, the announcement of the fiscal year 2022-23 being the International Year of Millets bring a new ray of light for the farmers.

Comprehensive budget, covers all areas of growth

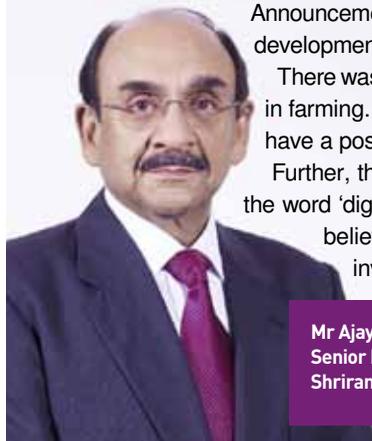
The way Budget 2022-23 has been presented, we should not forget that last two years have been highly impacted due to COVID and there has been lot of disruption in the economy. The tax collection from last year has shown a positive impact.

Announcements on capital expenditure, digital, PM GatiShakti infrastructure developments and inclusive developments were some high points.

There was a lot of focus on agriculture talking about procurement on MSP, research and use of drones in farming. There are 14 crore farmer family in our country and these new initiatives on agriculture will have a positive impact on them .

Further, there was a deep emphasis on digital initiatives. For the first time, there was lot of focus on the word 'digital'. This definitely shows a positive impact that the government is trying to bring in and I believe, they are going on a right path. Also, infrastructure is the heart of the economy and the investment on infrastructure to 35% from last year is a great move. There will be lot of jobs creation in this sector.

Overall, the budget was very comprehensive covering all the areas very well. Now, we have to wait and see how the government will implement these in future.



Mr Ajay S Shriram, Chairman &
Senior Managing Director, DCM
Shriram Limited

BUDGET BYTES

Focus on start-ups and AgriTech will boost Agri sector

The focus on start-ups and AgriTech in the budget will be helpful for the development of a digital ecosystem and technology inclusion in the agri sector. However, most industry aspirations remain unmet.



Mr. Ajay Kakra, Leader
- Food and Agriculture,
PwC India

Strengthening FPOs Through Innovation And Technology The Right Move

We welcome the continued impetus on agriculture in the Union Budget 2022. We hope that the measures to streamline the Agri value chain and enhance farm productivity through the PPP model will increase smallholder farmer incomes. Boosting domestic oilseed production, ensuring direct monetary benefits to farmers for their agricultural produce, encouraging the use of drones for agriculture and strengthening FPOs through innovation and technology are steps in the right direction. As a life sciences company with 125 years presence in India, we aim to spearhead efforts towards improving rural prosperity through modern technology and global best practices to support smallholder farmers."



Mr. Simon Wiebusch, Country
Divisional Head, Crop Science
Division of Bayer for India,
Bangladesh & Sri Lanka (IBSL)

Budget has prioritized agritech; push on DeepTech like AI and geospatial systems

It's revitalizing to see that the budget prioritized agritech, especially with the push on DeepTech like AI and geospatial systems. They will go a long way towards making the industry sustainable and bringing it into the 21st century.

A more positive aspect was monitoring agriculture with Kisan Drones as well as digitizing land records. They will be the biggest leap towards the adoption of technology, bringing change at a national level. Another much-welcomed part of the budget was the promotion of chemical-free and natural farming in the country. Taken together, all these measures will drive the sector and get the ball rolling towards higher growth.

I also expect the effort to increase the production of oilseeds will provide states like UP with high impetus, which, in turn, will help increase farmers' income. This, along with the announcement of public-private partnership (PPP) to deliver emerging digital services to farmers, will truly bring a ground-level change to agriculture, not only modernizing it but creating plenty of employment opportunities.



Navneet Ravikar, Chairman
& Managing Director, Leads
Connect Services - an agritech
company



SOME MAJOR AREAS THAT NEED POLICY THRUST

Budget must declare and demonstrate strong commitment to reduce food loss and wastage

A major policy thrust should be a flagship program on the lines Smart Village and Smart Farmer. Today we only have a Smart City. Why should rural infrastructure and facilities not be at par, if not better, than the urban? The woes of the agriculture sector are, to a great extent, the outcome of poor infrastructure. The government can initiate policy encouraging reverse migration: urban to rural. Make the village, the farming and the farmer SMART. How? Approach agriculture as more than a basic food production system. Incentivise it as an enterprise. Let an educated urban boy and girl pronounce that I wish to be a farmer.

The plethora of present schemes are good, but they compete rather than collaborate – not merely across ministries but also within the agriculture ministry – for resources as also for importance. Each scheme incharge claims that enhanced allocation for his particular scheme is the panacea of all ills afflicting agriculture. Later comes an alibi for poor performance: budgetary resources were inadequate. Can we not have one overarching policy and develop an umbrella programme engulfing directly at least four ministries viz. Agriculture, Fisheries, AH & Dairying, Food, and Food Processing Industries; and indirectly Rural Development and Panchayati Raj. Their edifices may be structured differently, the foundation is one. A policy statement, or even a statement of intent, would be a welcome step.

There are more areas that need to be policy thrust for the government.

Income support, yes. Subsidies to offset high cost of farming, yes. But let these not be the substitutes of investment. Invest as much in infrastructure, value addition, R&D, Digitalisation; basically in every activity that gives greater productivity and hence better monetary returns to the farmer. This wouldn't be in any conflict with the government's welfare and income support to the farmer. Let the investment be evaluated on the threshold of financial return. A rupee spent should return more than a rupee, and efficacy of this conversion should be measured by how much more. Treat agriculture as business and encourage financial returns on business principles. Let the focus shift from production to farmer, not merely in the idiom of welfare, but the measure of prosperity.

Government policy must declare and demonstrate a strong commitment to reduce, if not eliminate, food loss and wastage. It is indeed sinful that, when a vast multitude grapples with hunger and malnutrition, one third of the food we produce is lost or wasted. This loss is not only economic but a loss of humanity too.



Mr Tarun Shridhar
(Former secretary, Ministry of Fisheries, Animal Husbandry and Dairying)

GST rates of agriculture inputs like plant protection products must be at par with other agriculture inputs

Agriculture which has shown tremendous resilience during the Covid crisis needs further impetus as a minimum annual growth of 4 per cent is necessary to make a significant dent on poverty. Government policy should build on and compliment the measures announced thus far to create a good foundation for accelerated agriculture growth and more importantly to make farmers more productive, competitive and profitable. The government can provide higher allocations for agriculture especially for irrigation, soil health and insurance with adequate emphasis and resources for schemes especially to promote hybridization for major crops like rice and wheat as well as some direction on the need for rapid induction of scale neutral input technologies especially to combat climate change. This shall help increase productivity and profitability. Adequate emphasis is also required to encourage agriculture practices like drip irrigation, precision farming etc. to make agriculture sustainable. The government should bring GST rates of agriculture inputs like plant protection products at par with other agriculture inputs at 8%.



DR K C Ravi, Chief Sustainability Officer at Syngenta India Limited

GOI Must Facilitate transfer of technology by private sector to farmers

The following should be among the major focus areas for the policy thrust of the government.



Shri R G Agarwal, Chairman, Dhanuka Group

1) Transfer of technology by private sector to farmers: Direct budgetary allocation should be given to established big agri input companies like fertilisers, seeds, tractors – machinery, irrigation and crop protection chemicals. Specific districts can be allocated to them for transfer of technology. This should be monitored every year and reviewed regularly without interference from the government.

2) Agri inputs

a) Fertilisers: Government subsidy policy is not encouraging balanced use of fertilizers. Cash transfer may be a better mode. Subsidy benefit should be increased for all other fertilizers including micro and macro nutrients, bio fertilisers and MPK soluble bio fertilisers.

b) Crop protection chemicals: Crop protection chemicals play the role of insurance and are like medicine for the plants. The current GST of 18% on pesticides should be made nil, or should not be more than 5% which is charged on chemical fertilisers.

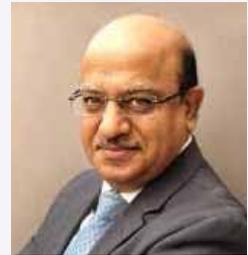
c) R&D: Jai Jawan, Jai Kisan, Jai Vigyan. It is unfortunate that no original R&D on crop protection chemicals is done in our country. We are dependent on imports from US, Japan and Europe as new pesticides are not manufactured in India. At present, 10% custom duty is charged on crop protection chemicals, and it should be reduced to 5% till we start manufacturing them in our country. This will promote new technology in the country.

3) Government should support national institutes like NCL, CFRTI, IPFT, universities along with private sector for promoting original research in the country so we are not dependant by allocating budgets for research to these institutions.

4) Support IT – Precision agriculture, Drones, IOT and IT sector including startups working for the growth of agriculture should be exempted from all the taxes for five years so that they can take the benefit to the maximum number of the farmers.

Set up National Agriculture Council on the lines of GST Council

Indian agriculture has proved its resilience by achieving a 3.4% growth despite the raucous pandemic. Government policy must look to leverage the resilience to enable the growth of agriculture by more than 4% in the coming years, while being more environmentally responsible. There are certain crucial aspects to be considered for this transformation.



Mr Raju Kapoor, Director-Public & Industry Affairs, FMC India Pvt. Limited

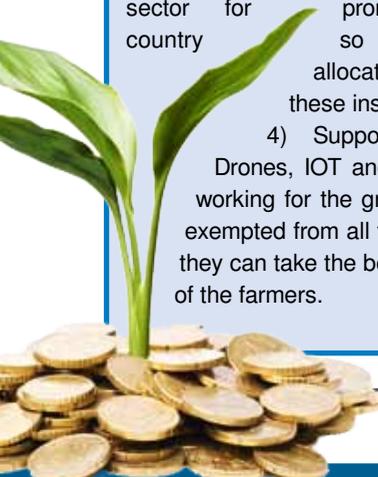
Setting up a National Agriculture Council on the lines of GST Council, comprising of centre and state representatives along with the representatives of the private Food and Agriculture sector to drive long term strategy can prove to be the stepping stone. Incentivising access to formal banking and financial services basis good loan repayment practices will help in uplifting the current state by means of enhancing the credit availability to agriculture to beyond Rs. 18 lakh crore at affordable interest rates for farmers and farm level processing infrastructure, instead of being consumed by corporates.

Incentivising private sector players in agriculture who handhold the formation and growth of FPOs/FPCs by offering tax breaks on substantiated investments can be beneficial in the long run. Further, upgrading the quality control infrastructure across the country to ensure availability of quality inputs to farmers and agriculture produce to processors and consumers will strengthen the backbone of Indian agriculture.

As the farmers look to navigate through the pandemic, bringing down the GST levied on agricultural inputs to a maximum of 8% and exemption of income tax on the investments being made by agricultural sector companies can be substantial considering agricultural extension is critical to technology adoption. Following that up, incomes three times the investment in R&D each year must be exempted from income tax levy.

Government policy can focus on special incentives for R&D, manufacturing, training and certification of precision agriculture mechanization including drones to encourage sustainable agriculture and developing India as a small holder farmers' precision agriculture hub.

To further the support, linking the PM Kissan Nidhi for purchase of advanced inputs by the farmers and decontrolling fertilisers from subsidy and starting a DBT system for bonafide farmers to enhance efficiency can be probable solutions. Having the technical grade pesticides import classification changed from the existing chapter 3808 HSN code to HSN 2909 aligned to the global norms can also iron out the supply chain for the Indian agriculture.



EMPOWERING THE FARMERS

The pandemic came with its highs and lows. But it certainly acted as a catalyst in pushing the agri-tech sector to innovate and the farmer community to adopt digital networks and apps to drive their transactions during covid times. The unprecedented crisis also led to emergence of new agri-tech startups to facilitate business transactions online. There are a few areas which still need the 'digitisation' focus.

The government has been proactive

in its efforts to improve efficiency, yield and improving access to credit for the farmers via 'collective approach'. This involves forming and engaging with larger groups of farmers as Self-Help Groups or FPOs. While these clusters continue to benefit the group of farmers involved, there is a need to empower and mainstream the 'individual' farmer. Each farmer with access to technology and smartphone should have the agency to put technology in their best interest with direct impact on their incomes and quality of life. The farming community needs better access to agri innovation, credit and seamless market linkages to ensure better profitability.

From services to sensitisation

Better access to the internet, availability of smartphones, a booming startup ecosystem – these have been key enablers in bringing

technology at farmers' doorstep. Most agripreneurs are making rapid strides in connecting with large groups of farmers. Accessing information from various sources can be misleading for farmers. It is important to provide information about various relevant platforms in the form of simple messages, in their local language if possible.

Fluid credit limit for fragmented 'demand of credit'

The ideal cash flow for the farmer should be mapped carefully. With almost 80% of farmers being small and marginal, most farmers need revolving credit, a smaller amount to fulfil immediate requirements like buying seeds or fertilizers. Most farmers need small ticket-sized credit. The amount can be as small as Rs 10,000 - 15,000. Lean fragments of credit inadvertently lead to subsequently reduced rates of interest. Ease of accessing the required amount instantly will help the farmer make the most of



About the AUTHOR

Mr Kishor Jha is Founder & CEO, ERGOS- The GrainBank. He is part of the journey to digitize US\$300 Billion worth of farmer produce at farmer gate to empower each farmer to take informed decisions and increase their incomes every year



these services.

Future lies in ‘Data-led’ choices

With continuous evolution of technology, the transformation of the agricultural landscape is inevitable. Farmers who adopt technology right from soil profile based crop advisory to monitoring the growth of their crops via satellite, taking informed decisions corroborated by data about market price movement and sell digitally in tranches to average out the 30-40% higher price eventually will witness better yields. Agripreneurs who will enable this ‘powershift’ from intermediaries into their own hands through continuous building of trust powered by continuous engagement are more likely to make a mark.

Credit discipline: True test of efficacy of intervention

Despite multiple efforts for easing agri credit, except few secured borrowings, most of the farmers do not have a repayment track record. The ecosystem is expanding but is yet to evolve. With Pradhan Mantri Jan Dhan Yojana extensively covering rural India, banks play an important role in tracking transactions at the grass roots. With access to transaction records, they can reflect the payments received by the farmers after selling the produce. In fact, via rural marketing initiatives, banks should encourage farmers to transact or receive money in the bank. This will eventually lead to emergence of a whole new segment of customers.

Government The Best Ally

Agri-tech startups are busy providing the best technology-backed services to help the farmers with innovative farm-tech to help them take timely decisions at cost-effective services and help them enhance their productivity and profitability. The government could utilise the far and wide network across the country by setting-up incubation centers at district level. This can be done with the help of strong nation-wide network of NABARD.

Additionally, communication is key.



Agri startup will drive the next level of agricultural growth in the country through their innovative business models. The need of the hour is to build awareness about these innovations among farming communities and empower them

Being at the helm of every touch point of the farmer ecosystem, the government can also be the key instrument to sensitise farmers about the digital services available to them. It is a bottom-up approach which emancipates each farmer on ground will be instrumental to bring about a sustainable change. A holistic approach to hand holding farmers, encouraging faster adoption of technology, raising awareness about

the various services which are being provided by agripreneurs will hand over the power of knowledge in the hands of farmers.

Digitization-led agri-startups

Like digitization and smartphone helping them for browsing through various products and services and by them at a click of a mouse, digitising grains at farm-gate even for one bags will help farmers to keep track of their produce, maintain quality of their grains, get easy and timely access to instant credit on the same directly from bank at nominal interest rate and sell produce online to a wider market at the best price rather than depending on the local traders. Better inventory to store grains gives farmers the liberty to negotiate for the best average price in the market as opposed to conventional methods of buying and selling.

Creating multiple touch points for the farmers to access the knowledge about the technological innovations and how they can leverage the same for their benefits will enhance their productivity and profitability. It shall also ensure a sustainable, paradigm shift in behaviour. Agri startup will drive the next level of agricultural growth in the country through their innovative business models. The need of the hour is to build awareness about these innovations among farming communities and empower them.

fun FACT

I love to cook favourite foods for my family, listen to songs and go cycling with my 14-year-old son

INNOVATIVE, AFFORDABLE, SIMPLE, TECHNOLOGY-DRIVEN

Mantra for AgTech



A group of farmers from Taran Taran, Punjab, want to test their soil for any deficiencies quickly, but the available alternates take time.

Farmers from the potato-growing belt near Agra, Uttar Pradesh, have approached agri-input shops with their soil samples. They want to test their soil before the next sowing season. They do not have a portable device to conduct soil sampling.

A retailer from Karnal, Haryana, wants to investigate the problems that the paddy farmers faced in the previous season. There is no available tool to share farm histories, including weather patterns, pest infestations and soil & nutrition issues in the crops.

A few farmers from Changlang district, Arunachal Pradesh, and some tea plantations near Tinsukia, Assam, want to gain knowledge about soil deficiencies that may require redressal.

A government officer from an agriculture department wants a dashboard that shall provide him with accurate information on the primary diseases reported in previous years cropping season. He wants to assess the impact of different schemes, but there is an unavailability of a

About the AUTHOR

Mr Rajat Vardhan is an agriculture graduate from GB Pant University of Agriculture and Technology, Pantnagar and PGDM (ABM) from VAMNICOM, Pune. Rajat is highly experienced in agri-inputs commodities and microfinance. Before starting AgroNxt, Rajat worked for several years with SKS Microfinance (Bharat Financial Inclusion Limited), Monsanto and NCML



**fun
FACT**



Mr Vardhan loves to take long walks contemplating on the lives and works of great visionaries, entrepreneurs, and change makers. He also loves to play with his Rottweiler named Sherrie

Bhu-Parikshak's advanced technology will deliver soil testing results to the user within 90 seconds. Additionally, the user will also be offered advisory and knowledge support on the crops sown

actionable, localized advisory for farmers and help them obtain relevant Products and Services. AgroNxt Business+™ is a SaaS platform developed for Agri-Input Shops, FPOs, NGOs and Input companies allowing them to interact and engage in a profitable business with farmers and customers. AgroNxt Govt+ is designed for government officers, and front-line workers use.

During its journey of five and half years, AgroNxt has got tremendous and ongoing support from government institutions and industry. Today, AgroNxt's achievements include awards & recognition, commercial contracts, equity investment by IIT Kanpur, and grants support from the Ministry of Agriculture & the Department of Science and Technology. AgroNxt has won several awards during the last few years, including STPI Best Start-up of the year 2018, Finalist APSEM 2020 held at Itanagar, National Winner Mahindra Ag-tech 2020, to name a few.

There are multiple offerings in the pipeline for AgroNxt's SaaS platform. The future products/services will continue to be innovative yet affordable, simple to use, and technology-driven. We aim to be one of the largest tech & human intelligence powered platforms delivering farming products and services of significant value to our farming community and stakeholders. We have been fortunate to get such an overwhelming response from the farmers and stakeholders up until now, and this drives us to be more focused and responsive towards our market in future.

reliable platform.

All this and more are a few examples of how farmers require support in various aspects of farming and how data darkness in agriculture makes decision making inefficient, leading to less predictable productivity. Studies have estimated productivity loss to be a minimum of 10%, although this varies with crops, regions, farming practices etc.

Mou And Tech-Transfer Agreement With IIT Kanpur

To maximise efficiency and profitability, farmers and stakeholders need an integrated data-driven platform that has potential to offer reliable support and value via different products and services. The fundamental issue of data darkness and affordably improving farmer's productivity is the reason for AgroNxt's existence.

To work towards this mission, AgroNxt has signed an MOU and tech-transfer agreement with IIT Kanpur to manufacture IoT enabled smart chemical-free soil testing device, Bhu-Parikshak. Bhu-Parikshak's advanced technology

will deliver soil testing results to the user within 90 seconds. The results will be available to the user via the AgroNxt SaaS platform. Additionally, the user will also be offered advisory and knowledge support on the crops sown.

Actionable, Localized Advisory For Farmers

AgroNxt Farmer+™ pioneering technology is designed to capture meaningful and valuable data to generate



ORGANIC FARMING, AGRI-TECH AND HEALTH



Innovation in agri-tech is about imbining tech into a sector which was largely neglected for long.

Fortunately, now corporate and technologists have started eyeing the agri sector. There are multiple agritech start-ups trying to solve farming challenges like production issues, inputs supply (downstream), supply chain, market linkages, aggregation (upstream) etc. The downstream and upstream innovations shall derive the maximum benefit only when the mainstream is being taken care of in real sense i.e., real production on field. The technologies being developed are great, but the

adoption of tech in agriculture is still a far-fetched dream.

The adoption of technology in agriculture is still a challenge since farmers are not educated, not tech savvy and there are electricity and connectivity issues at the ground level.



Probably pure agri-tech companies are still 5-10 years away to create an impact in this space. Companies that are working with farmers at ground level with technology

About the AUTHOR

Mr Rahul Saria is a co-founder at Nimble Growth Organics (<https://nimblegrowth.in/>). He has served as head of finance for Rentomojo & Vendatu and also for District 92 of Toastmasters International. He has been awarded with 'CA Professional Achiever' by ICAI and RAJYA PURASKAR by the Governor of West Bengal



as an enabler shall create immediate impact and be the game changers. The immediate and effective solution is the hybrid model of offline and online. Just building great tech sitting in AC rooms and not understanding the ground level realities will not solve real issues.

Changing Food habits

The change in the food habits in India is evident over the last decade. The role of agri-startups is paramount in this shift. The recent pandemic also played a pivotal role in advancement in agrifood industry, especially healthy food considering immunity being the new buzzword. It's important to understand the value of alternative protein or organic food. A child can be fed a pizza or simple home food. In both the cases, the child will grow. No prizes for guessing what will lead to a healthier growth for the child. The same analogy can be applied to a plant, depending on what we feed the plant - chemicals or bio-fertilizers/natural. This decides the health of the plant and the quality of its output. Healthy organic food is the best way to improve health.

Organic Is The Way Forward

Agri startups are trying to bring a big change using technology as well working with the farmers at the ground level. Technology per se does not change the way we eat. Technology alone cannot bring in the ethos around production of good quality food. It only helps in terms of improved infrastructure, faster production, better processes in general.

For agriculture, what is more important is to work at ground level and understand problems first-hand, since we are dealing with Nature. The only way to transform the way we eat is by producing non-chemical organic food. Unfortunately, more than 99% of the horticulture production today across India (excluding Tea, coffee, rubber) is not organic or natural. This cannot be solved only through tech, but with a change in mindset. We need more farmers embracing organic and not using any chemicals in form of fertilizers and

Companies that are working with farmers at ground level with technology as an enabler shall create immediate impact and be the game changers. The immediate and effective solution is the hybrid model of offline and online

pesticides. The good news is that the Organic food industry is growing at more than 22% CAGR year on year.

However, generalizing health with agritech is not right. Tech is helping in improving the agri processes, but health and immunity can only come if we consume the right food, which can be achieved only with Organic farming. There must be no use of any chemicals in production from sowing to harvesting to the last mile delivery.

At Nimble Growth, we are very clear on our policy and ethos around authentic quality organic fruits & vegetables. Quality of food must always be non-negotiable. This thought process will help in improving health of the consumers, create sustainable income for our farmers, improving soil fertility and creating a positive impact on the environment.

fun FACT



Mr Saria is the author of a book on Startup Finance titled FINCURIOS. He is a TEDx speaker. He likes public speaking, playing squash, watching movies and studying the stock market



Its time we tune our technology brains towards positive agriculture and not limit to mass production only. Consumers are realizing the importance of quality food and its impact on our health and immunity. Agri Startups need to do the same.

For us, the idea of getting into Organic farming was to attack all the problem three-fold. We care about health, authenticity, farmers, soil and the environment. This gives us real satisfaction. We are indeed solving a large problem of the B2B space in terms of supply of quality organic F&V with consistency at scale. We are also creating one of the unique solutions to the problem of production traceability in the Agri space, which is in the pipeline.

Huge Opportunities Ahead

Technological disruptions in the Agri space are welcome moves. It has its own set of challenges and should not be viewed from a typical VC lens expecting every company to grow at 10x Y-o-Y akin to a tech company. It must be a hybrid model. Companies need to collaborate in different parts of the value chain to add overall value. I strongly believe there is a huge opportunity in front of us to solve the food security to the ever-increasing population – but with good food. Even from the investors' perspective, what we are witnessing in the Ed-tech or fintech space will happen in the agri-tech domain in the next 2-5 years. If an Indian Agri-tech company is not there in one's portfolio, one is missing out on a big opportunity.

AGRI STARTUPS

CHALLENGES, TRENDS, IMPACT, OPPORTUNITIES

The agriculture sector is facing major challenges these days.

Climate change

The entire globe is battling deteriorating environmental conditions. When it comes to climate change, it has the most direct impact on the agriculture industry. Though, as per Indian Council for Agricultural Research (ICAR), the nation is blessed with around 15 agro-climatic zones. When the aftermath of climate change on the country's agriculture sector was studied, it was found that the yield of rice is expected to reduce by 10%, whereas that of wheat and maize by 6-25% and 18-23%, respectively. Apart from impoverishing the quantity of output, if left unchecked climate change can

add to problems like an increase in poverty and starvation.

A dearth of efficient, inclusive and sustainable food systems

The past few decades have noted several gaps in the Indian food supply chain systems. These hiccups are spread across the complex channels, right from production till last-mile de-

livery. This inefficiency leads to huge amounts of food wastage. Some problems that the supply chains are plagued with include lack of up-to-date technology, information sharing tools, trained manpower, traceability, accountability and storage capacity. The various new-age and emergent agri-tech startups have taken it upon themselves to change the face of these systems and leverage technology to eradicate these issues.

The need to address the requirements of farmers

Over the years, India has shown that if the country is progressing, then almost every section of its economy is moving ahead. With changing times, the needs, demands and requirements of people change. Maybe yesterday, farmers needed only the bare minimum to purchase farm inputs. However, today their demands have increased. To cultivate a field at its maximum potential, they require high-end technology and tools. These resources do not come cheap. Further, the farmers of today are even demanding hassle-free financial support for the fulfilment of their personal goals like completion



About the **AUTHOR**

Mr Thirukumaran Nagarajan is CEO & Co-Founder, Ninjacart

of a child's education, marriage, or construction of their house.

After taking a look at the challenges faced by the agricultural sector, let us now glance over the efforts made by different players in this industry to combat these issues and mitigate their after-effects.

TRENDS

Development of financial support

In recent times, India has noticed the arrival of multitudes of agri-fintech companies. These enterprises have revolutionised the availability of finance for farmers. Today, farmers can easily avail loans with flexible repayment periods and low-interest rates. Numerous financial-aid packages have been specially designed to meet both the farm and non-farm related demands of the producers. Farmers no longer have to depend on local moneylenders or run from one bank office to another seeking financial assistance. Even the central government is setting up local bodies that help develop a single-window system, wherein farmers can find solutions to all their problems at one point itself. Schemes like Paramparagat Krishi Vikas Yojana (PKVY), Micro Irrigation Fund scheme and numerous others are also introduced to provide financial support for farmers.

Introduction of farm technologies

A large number of disruptive technologies like the Internet of Things, Artificial Intelligence, Machine Learning and data analytics are employed to fight and mitigate the risks faced by the agricultural sector across all platforms. For instance, weather predictors and soil testing sensors are increasingly used to help farm-

The impact of tech-backed solutions can be seen in the form of a reduction in the cost of production. Farmers have been able to significantly bring down their losses as well as overhead costs. Focus has shifted towards using the available resources to boost production

ers avoid the issues posed by climate change. Automated irrigation systems are introduced to ensure timely and sufficient watering of crops. Even redundant farm practises like weeding have been automated with the help of tech-backed tools. Solutions like RFID and GPS are used for enhancing transparency across the food supply chain. Farmers can make use of numerous free apps available on their phones to get timely information about what to sow and how much to produce using predictive tools that project market demands based on past patterns. Drones and satellites are used to provide farmers with real-time information, thereby empowering them to make timely decisions.

Transparent market access

Traditionally, farmers often sold their produce to middlemen or at nearby mandis. In most scenarios, the money they received was much less than the worth of the goods sold by them. This disparity had crippled the farmers. However, many

agri-tech players have introduced online platforms and marketplaces, wherein the farmers can sell their produce at fair rates. Further, they even have increased autonomy as they can decide the mandi/market wherein they wish to sell the produce. Using predictive analytics, these platforms even help farmers set the price indent. Even the central government has introduced the E-NAM portal to connect the existing mandis and create a common online market. Since its launch, the portal has brought under its purview over 1000 mandis, spread across 18 states and union territories.

Looking at these trends, it is safe to say that the Indian agricultural sector is making moves towards a better future. The impact of these measures can be seen in the form of a reduction in the cost of production. By using tech-backed solutions, farmers have been able to significantly bring down their losses as well as overhead costs. At the same time, their focus has shifted towards using the available resources to boost production. The Indian agriculture ecosystem now stands stronger than before. As per a recent study, more than 90% of the Kirana stores across the country, will be digitised and function on traceable supply chain models. This means the journey from the farm to fork, is now accessible by all stakeholders, right from the producers to consumers. Indian agriculture is indeed making strategic use of data to drive innovation and improvements.

As the awareness about modern techniques reaches more and more farmers, their willingness to walk away from archaic models is on the rise. In the days to come, the opportunities in this sector will be booming. It is on us to identify and exploit them to further the growth of this industry.



STAGE SET FOR AGRI-TECH TO FLOURISH IN INDIA

Indian agriculture is going through a new wave of modernisation today courtesy agri-tech startups that are bringing new age technology to the fields. These initiatives are helping farmers improve yield, make data driven decisions and take heuristics out of the equation.

Startups like ours are working with farmers on a daily basis across the entire value chain to help them boost their productivity through implementation of technology at every stage of the farming process and then connecting them with the right buyers to help them get the best possible returns for their yield. While there are several types of players in the farming ecosystem, what sets startups apart is the fact that for them to make the kind of profits that would excite their investors (VCs), they will really have to drive deep impact in the industry and ensure their end customers – the farmers – benefit from the equation.

I have been involved with the Indian farming ecosystem even before we started Gramophone. During my earlier stint, I realized that the current farming practices were based on heuristics and opinion of retailers. There is a clear conflict of interest here - the retailers would be incentivised to push products that may not necessarily be in the farmers' best interests. Hence, there was a big white space for farmers requiring customized and scientific (data driven) support, along with genuine agri-inputs that can help them from sowing to harvest.

How Deep Mobile Penetration Helped

In 2012 India had 100 Mn mobile users in urban areas. By 2016-18, we achieved the same number in rural and semi-urban segment. We saw this as a turning point and realised that the sector is now ripe for innovation with the basic ingredients of technology in place. The time had come to build solutions for farmers that assure risk mitigation and enable scientific farming. This was the moment of alignment with existing farming issues

Farmers require customized and scientific (data driven) support, along with genuine agri-inputs that can help them from sowing to harvest. This creates a huge space for start-ups to enter and prosper

About the AUTHOR

Mr Tauseef Khan is spearheading growth at Gramophone - India's Leading Full-Stack Agri Tech Platform for Farmers, and trusted by more than 7 lakh farmers currently. He earlier worked as a product engineer at John Deere, consulting for agri input and food companies and finally has been a venture capital investor, investing in AgTech companies



Startups Should Have Access To Govt Research Facilities, Experts

It is encouraging to see the national and state governments taking up initiatives to support the farmers. The National Agricultural Market (eNAM) initiative aims to remove information asymmetry in pricing through an electronic trading portal. We are confident that we will see more collaboration between the government, startups and other stake holders over the years. Startups can really benefit from easier access to capital that can be routed into the sector through state led incubators for startups or through monetary policy. Another big help could be provided by enabling startups access to government research facilities and the experts therein. Talent shortage is a barrier that the entire startup ecosystem is currently dealing with



that we had been waiting for. We could visualise how in a decade from now, the Indian agri-scenario will change drastically and new age companies focusing on solving farmer-related challenges will lead the next level of growth in Indian agriculture.

This is when we started Gramophone, a full stack technology platform that acts as one-stop solution for farmers, to provide them scientific and intelligent agronomy advice, access to a wide variety of farm inputs at the right price and online market linkages which help farmers connect with the larger supply side ecosystem to get the best price for their yields. All our solutions are based on modern age technologies like data science, AI, ML that reduces heuristics from the entire farming process.

Advantage Farmers

Farming is a complex process and farmers need to make several decisions that require consideration of hundreds of factors, for example soil, weather, crop type, pest, disease and so on. Our algorithms consider all these variabilities and our proprietary

recommendation engine gives all the relevant information to farmers in easy to understand regional language. Similarly when it comes to output business, we capture a lot of data points - we know when farmers will harvest the crop, we know when and how much quantity is going to get produced and this helps us offer intelligence to farmers and other ecosystem players on the impending price and demand. Today, we have over 1.2 million farmers associated with our platform across Madhya Pradesh and Chhattisgarh and will soon expand into Uttar Pradesh, Maharashtra and Rajasthan. Majority of them have doubled their incomes through our platform. On the supply side, we are present on 100+ mandis across the country and have already onboarded 5000+ traders from across the country on our platform. Overall, we have been overwhelmed by the positive feedback that we have received from the entire ecosystem for our efforts.

The stage is set for agri-tech to create tremendous impact. The startups in the sector have barely scratched the surface and we will see the sector grow at a tremendous pace over the next few years. The need of the hour is for all stakeholders including the startups, incubators, accelerators, investors and the government to work closely and create solutions that will take Indian agriculture out of the rut it is stuck in.



Redefining THE AGRICULTURE SECTOR

Modern agriculture has evolved through continuous innovation in technology & data and the collaboration between farmers and researchers across sectors. Despite this, the industry struggles with structural instability, resulting in higher raw material prices, workforce scarcity, and changing customer expectations for ecological sustainability. Furthermore, biodiversity, food security, nutritional needs, and farmers' livelihood are also pushing massive problems across the industry. Authorities worldwide are increasingly looking for long-term solutions to this predic-



ament by leveraging technology.

According to Omnivore and AgFunder, investments in the agritech sector doubled to \$2.1 billion in the financial year 2020-21. These investments have fuelled innovations in the agritech industry, enabling traditional farming operations to be digitized and optimized while advancing the adoption of climate-smart farming solutions.

Steering Technology Adoption

While slow, agriculture has seen a technological transformation from simple tools to sophisticated machinery, chemicals, seeds, and farm data management, coupled with advanced technologies heralded precision agriculture. Today, Farms are using IoT-based sensors,

About the AUTHOR

Mr Kunal Prasad is the Co-founder and COO at CropIn. He has extensive experience in working with government bodies, development agencies, co-operatives and farmer groups globally





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FACT**

Mr Prasad enjoys traveling and discovering new places. He is interested in discovering rural locations since they are close to nature. He also enjoys taking part in sports and other adventurous activities



Leading The Next Revolution In Agriculture

Robots: The adoption of Agribots will lead the next revolution in agriculture, as they solve many challenges faced at the farm level, such as utilizing digital image processing to detect and eradicate weeds or spray chemicals directly with their robotic arms. Agribots also facilitate labor-intensive tasks like plowing and even assist in intricate tasks like picking fruits and vegetables. This technology will help address the growing farm labor shortage.

Drones: Drones integrated with sensors and cameras are used in agriculture to capture images, map, and monitor farms. Agricultural drones are of two types: ground-based drones and aerial drones. Data obtained by drones is analyzed to provide insights on various parameters, including crop health, irrigation and pesticide schedule, sowing time, soil and field conditions, plant count, and yield estimates.

Sensors: Sensors are placed along farms to collect data using IoT-based remote sensing, which is then analyzed to build predictive intelligence around aspects like soil moisture critical for yield estimation. The sensors also monitor crops, estimate weather patterns and assess soil quality.

drones, robots and cameras, AI, Machine Learning, GPS, cloud computing, and advanced analytics to boost food production sustainably and welcome an era of farmer empowerment.

Farmers continue to rely on conventional methods since disruptive agricultural technologies are inaccessible to small-holder farmers or not user-friendly. Capital access also has been a challenge, with agri-lending considered a risky proposition by banks, characterized by poor or non-existent credit records, gaps in monitoring yield potential, and overall income uncertainty. However, all this is changing as barriers to access farming technologies are reducing, with emerging ag-tech players building cost-efficient and easy to adopt digital services to small land-holding farmers.

Ag-tech start-ups are revolutionizing agriculture across the food system value chain. One such company is Cropin, which delivers digitization and predictive intelligence solutions through the convergence of cutting-edge technologies like satellite imaging, GPS, IoT sensors, cloud, AI/ML, among others, to accelerate progress in the agriculture sector. Ag-tech players are also leveraging technologies like blockchain to build data-driven insights to improve food security, supply chain transparency and promote sustainable food production. Traceability solutions make food supply chains more transparent by detecting anomalies,

making the entire process more efficient. As a result, stakeholders have more control over operations and quality compliance, potentially avoiding millions in losses.

Technology also plays a significant role in agri-financing as it enables better targeting of credits and risk diversification. Financial institutions can now leverage data-driven insights to determine growth and yield potential at a country, state, village, pin code, and plot level. Recent technological advancements can make finance more accessible to the underserved sections within the farming community.

The Future Looks Bright

The agriculture sector is undergoing significant advancement. The

emergence of ag-tech bodes well for improving productivity and efficiency for farmers worldwide, especially in developing economies. Ag-tech start-ups are gearing up to deliver sustainable, long-term farming solutions with support from impact investors and growth investors. With more and more start-ups joining the mission to accelerate progress in agriculture, the sector is witnessing the next era of revolution.

Technology will continue to shape the agriculture business for the foreseeable future, allowing farmers to embrace more sustainable yet profitable practices and ensure that we can feed the next billion mouths that we will add as a planet over the next couple of decades.

TAKING TECHNOLOGY TO GRASSROOTS

Agriculture is most vital sector of Indian economy. It is contributing about 18% of total GDP and one tenth of total exports of our economy. More than half of Indian population is employed in the agriculture and allied sector. It is not only ensuring food security to the country but also has double effectiveness to reduce poverty as compared to non-agriculture sector. This was highlighted by World Bank in World Development Report 2008.

Despite its vitality to the nation's economy, Indian agriculture is facing many problems. It is at the mercy of weather and markets. It lags because of inadequate research and developments, lack of mechanization, quality supply of inputs, irrigation, storage, transport, marketing, insufficient capitalization and many more challenges. These certain and uncertain key players make the agriculture value chain very complex.

As we are young nation, inviting youth to agripreneurship through the startup ecosystem may lead to fastest technology developments that can ease complexities in the agriculture value chain. Agriculture is a socio-economic issue, and the youth are the key productive workforce of any socio-economic development.

Dedicated efforts by Government/ policy makers have rapidly developed the startup ecosystem in India. All above-mentioned problems in agriculture might prove opportunities for Agritech startups. The 3E: easy, economical and ecofriendly solutions to wisely chosen problems can deliver efficiency, productivity and sustainability in Indian agriculture. The strategic combination of young India and the startup ecosystem can ensure food safety, alleviation of poverty, employment



About the AUTHOR

Dr Praful Gadge is a well-known scientist-entrepreneur & industrial consultant in the field of Agricultural Biotechnology. He is Managing Director, Biome Technologies



The strategic combination of young India and the startup ecosystem can ensure food safety, alleviation of poverty, employment generation along with economic growth

generation along with economic growth.

Opportunities For Startups

Each value chain segment in agriculture sector has own problems and hence opportunities for startups! The government is focusing on rewarding the youth for Agripreneurship through several startup schemes such as Rs 10,000 crore venture capital fund, RKVY-raftaar like programs, exemption of income tax for three years, rebate on filling patents etc.

This is further supported with with infrastructure facilities like 50+ Atal Incubation centers and dedicated Agritech Incubation Centers across the country. The opportunities for startups include consumable and non-consumable agricultural production through innovative approaches that should reduce production

costs, mitigate abiotic stress along with residue free yield.

At input level: R&D and production in seeds, seedlings, agrochemicals, agri-biologicals for high yield, better quality through ecofriendly approach.

At input supply level: Startups may supply online and offline inputs, real time advisory for pest control and maximizing profitability through technical support to farmers at extension level.

At veterinary level: R&D & production of feeds for better growth, improved immunity for dairy, poultry and fish farms. Realtime management through IOT based precision farming for health records, farm-resources, farm-data, weather forecast, crop health and pest management for accuracy to improve accessibility and increase profitability.

Startups can deliver mindful production, harvest and post-harvest operations

fun FACT
I renew myself through amateur astronomy and stargazing. It helps to realise that life is transitory and we must focus on something lasting

through robotics and mechanization, custom hiring services, labor management, post-harvest processing services, pack-houses etc. Automation and digitalization in animal farm operations, crop production, harvesting, processing and packaging processes.

At output level: Food traceability,

cold-storage, agri-logistics infrastructure development and networking, Block Chain technology application in efficient supply chain management, food processing etc.

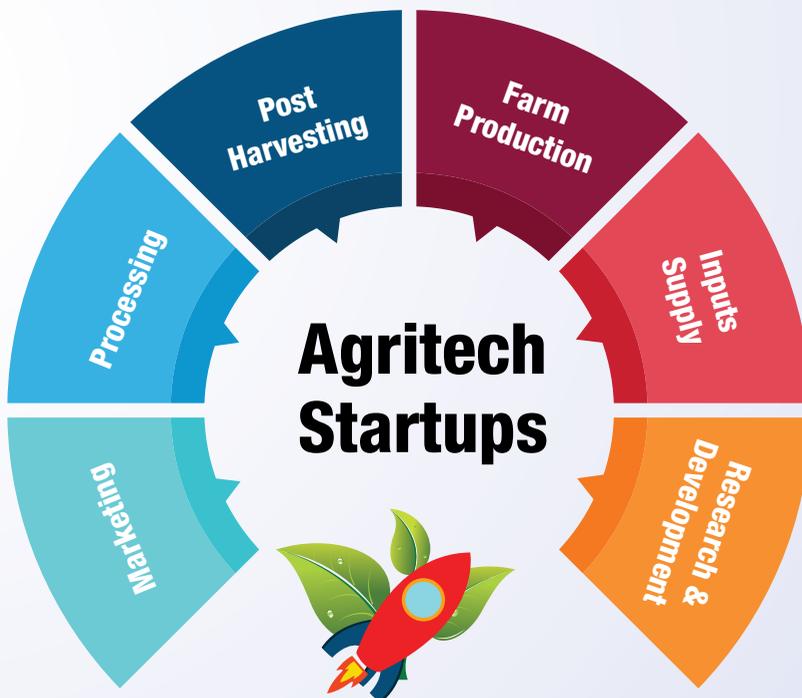
At marketing level: Farm to fork, farmer to customer linkages, development of digital trading applications and networking for produce to customer etc.

At procurement level: Sourcing and supply of certified organic and residue free produce to local customers and exporters. Startups can fulfill bulk demand of farm produce by directly linking farmers. Advisory based demand driven harvest schedule can minimize wastage in supply chains. Development of digital platforms will provide real-time market update for traders and farmers to take accurate decisions and prevent losses.

In India, productivity and profitability determines the livelihood of the farmer. Majority of Indian farmers are at or below poverty line. They need access to low-cost, user-friendly technologies to reduce their production costs, to enhance yields and to achieve best quality along with market linkages.

Agri-tech startups are creating buzz and attracting huge investments in India. However, large chunk of investment is moved in Indian Agri-tech startups which are more focused on farm to fork supply chain solutions and output markets. Focus is also needed on farmer and farm-centric innovations, essential for healthy farming practices. It should be taken into consideration that yield and quality of the produce may become a limiting factor in the growth of front-end working startups.

In addition to the government's relentless efforts, promotion and support for development of agri-startup ecosystem in India, its growth and popularization need to be accelerated to a greater extent to address systemic blockages in the agriculture value chain. We can combine young India and the startup ecosystem to encourage agripreneurs for innovative solutions for improved farming. If done so, we can reshape Indian agriculture for sustainability and profitability along with increasing employments and enhanced livelihood of farmers.



Startups And FPOs

The startups can work in association with Farmer Producer Organizations for advisory, extension, production, post-harvest and procurement. They can bridge the gap between industry, farmers, policy makers and academia. It may help to better understand needs of agriculture sector. This linkage will make innovators address field level issues directly from their laboratories in real-time, will guide investors for appropriate investments and policy makers for needful regulations.

BECAUSE DREAMS MATTER

Impact and opportunities of start-ups in the agriculture sector of our primarily agrarian nation. This makes me both thoughtful and nostalgic. I am taken back to my childhood when Doordarshan would air the infomercial of Films Division of India - *Ek, Anek, aur Ekta*. Immensely popular among children for years, the animated short film focused on how even the smallest of entities coming together can become a force to reckon with.

It's the same with start-ups in the agriculture sector. It is exciting to think what lasting change the numerous start-ups coming up can create in the industry at a macro level. Today Sid's Farm works with and impacts the lives of more than 2,000 dairy farmers. This may sound miniscule before the millions of dairy farmers across the nation.

For all these individual farmers, it is big. We are trying to make a difference by helping them build azolla growing tanks in their backyard, which is giving them an economical and nutritious feed option for their livestock. There would be many other start-ups promoting such interventions. If all this intelligence from the numerous start-ups in this sector is pooled together, the industry will have a much heightened awareness. Newer entrants will have a ready frame of reference that they can adopt, develop further, and give back to the repository as a part of the think tank.

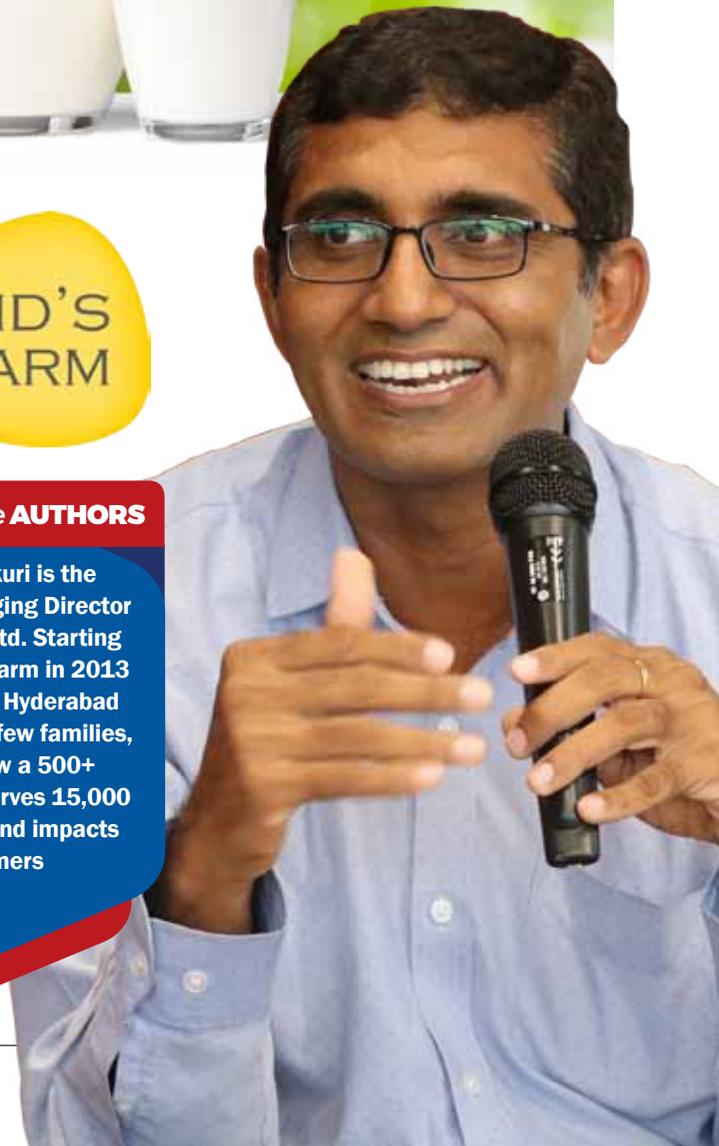
Robust Growth

India has the third largest start-up ecosystem in the world with about 60,000 start-ups. 1,436 new start-ups were launched in 2021, which is a 15% growth over 2020. A recent report by Orios Venture Partners also says that Indian start-ups raised \$42 Bn in 2021, which is nearly 4 times of what was raised in the



About the **AUTHORS**

Dr Kishore Indukuri is the Founder and Managing Director at Sid's Farm Pvt Ltd. Starting from a small dairy farm in 2013 on the outskirts of Hyderabad supplying milk to a few families, Sid's Farm is now a 500+ strong team that serves 15,000 households daily and impacts 2,000+ farmers





previous year. These are good signs. While one mostly reads about ed-tech, fin-tech, and health-tech start-ups, with several players like us in the arena, the lines between technological and traditional ventures is getting blurred. We are heavily dependent on technology in every aspect of our enterprise – from procurement and processing, to delivery and customer service.

No scalable venture is truly hyper-local. Digital platforms make servicing remote customers and markets possible. With scalable infrastructure and plans in place, Sid's Farm is looking to expand to other cities and markets in near future. Currently, it is estimated that there are about 600 to 700 agri-tech start-ups in India operating at different levels of agri-value chains. The use of ML, AI and IoT is now common. In a market like ours, more and more young as well as seasoned individuals are starting their own ventures. With the right support and incentive, hundreds more of new start-ups in the agriculture sector can make a true difference to the industry as a whole.



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FACT**

Dr Indukuri's CV: Bachelors degree from IIT Kharagpur. Masters and Ph.D. in Polymer Science & Engineering from University of Massachusetts, USA. Many years of work experience at Intel Corporation, Arizona. Dairy Farmer with mission to provide pure unadulterated milk, Hyderabad

Enabling Policy Structures

Government policies have been very conducive. State Governments are being encouraged and are very participative too while implementing model laws like Model Agricultural Land Leasing Act of 2016, Model Agricultural Produce and livestock and Marketing Act of 2017 and Model Agricultural Produce and Livestock contract farming and services promotion and facilitation Act of 2018. Bodies like NABARD are coming forth to implement Dairy Entrepreneurship De-

velopment Scheme (DEDS) to positively impact the sector and the economy. Such schemes strive to bring about several desirable changes like promoting the setting up of modern dairy farms for production of clean milk, bringing structural changes in the unorganised sector so that initial processing of milk can be taken up at the village level, and upgrading the quality and traditional technology to handle milk on a commercial scale. Strengthening India's dairy sector is one of the Government's top priorities today.

We are in the midst of very exciting times. The livelihood of 8 crore families of the nation is run by livestock and dairy produce. Some concerns keep riddling the sector like lack of uniform awareness levels or things like 3% of annual milk produce that is wasted.

Changing demand due to increase in incomes, globalisation and health consciousness is affecting and going to impact production. More competition will be there among private companies, giving rise to innovative products and affordable solutions. There will be better use of waste materials. Retailing in agriculture is getting largely digitalized. With digitally backed progress in the sector and with new entrants every year, the future is bright.



DeHaat
Seeds to Market

AGRITECH IN INDIA

SOWING THE SEEDS FOR AGRIREVOLUTION



About the AUTHOR

Mr Shashank Kumar is Co-Founder & CEO, DeHaat, India's largest full-stack AgriTech platform. A 2008 IIT-Delhi graduate, he has been felicitated with Ashoka fellowship, and is a winner of Forbes 30 under 30 and BWDIsrupt 40 under 40 awards

India is a nation known for its agri-dependent economy. Despite large-scale industrialization efforts, agriculture accounts for 15% of India's GDP which places the country in seventh place globally in terms of net exports. Agriculture and allied sectors put together account for the primary source of income for about 68% of the population, with up to 14 crore registered farmers across the country. Regardless of the industry's size, the fact remains that the system is riddled with inefficiencies.

Despite the industry being valued at about 350 billion USD, the regular Indian farmer earns only about Rs. 80,000 per year which is hardly a decent enough remuneration for the effort that goes into it. Low earnings thus become a major deterrent towards more individuals entering this field of work. Many farmers still struggle with the inertia of agriculture having been a largely traditional industry for years, which warrants their instinctual reaction towards change to be resistance.

Even today, a large section of farmers are ill-equipped to deal with unforeseen obstructions to their harvest cycles, such as pests, unfavorable weather, crop diseases etc. The faults aren't nestled solely in the farmer's hands. A large part of agricultural losses is incurred post-harvest, with supply chain inefficiencies causing as much as 40% of food to be wasted even before it reaches the end consumer.



Opportunities Amidst Challenges

Where there are challenges, opportunities aren't far behind. The AgriTech sector, which operates at the intersection of agriculture and modern tech-enabled innovations, has been a ray of hope for the farmer community. Agri is an extremely prominent space in India, and after a long period of resistance farmers are finally warming up to the adoption of new technology. Each of the many sub-verticals of AgriTech, be it agri-input, advisory, or exports etc. are big growth drivers within themselves and help improve farmer incomes, not only by assisting them in producing better yields but also by providing them with autonomy over the end-to-end process.

After an initial period of structural and geographic challenges hindering revenue generation, the conditions within the market segment have finally begun to improve, creating better infrastructure, more primary research data, better connectivity etc., which has led to a spike in the number of operational AgriTech startups. Factors such as growth in Indian agricultural exports and increased technology adoption have added to the attractiveness of this space. Without a doubt, increased digital connectivity across rural India has served a significant hand in this. India is poised to see a 45% growth in active internet users over the next five years, driven by higher adoption rates across rural belts.

Adapting to the vastness of India's geographical sensitivities and terrain will be significant in determining the success of AgriTech startups. Roping in regional players and their expertise will prove to be essential as startups aim to scale

Empowering Farmers

While many factors lead to the increased adoption of AgriTech services among farmers, most of it boils down to one simple value – 'Access'. AgriTech players have been successful in providing farmers with access to the kind of technology, education, financial aid and market linkage that was hitherto unfathomable. Farmers living in the remotest hinterlands of India are now able to apply state-of-the-art precision farming techniques and other AI-driven innovations to monitor their farms better,

improve yield, and thus, revenue. Furthermore, AgriTech startups, to a large extent, have been successful in weeding out supply chain inefficiencies, caused by the presence of one too many intermediaries. Farmers now enjoy a lot more transparency and agency across the value chain than ever before.

Despite all the growth so far, we aren't at the utopian end goal for agriculture in India yet. The scope of improvement in each of the aforementioned categories is immense, followed by the potential to unearth new territories of innovation. Projections of Indian AgriTech funding hitting record highs of 1 Billion USD in 2022 should definitely enable this further.

Agriculture is by no means a "winner takes all" endeavor. Each element is intrinsically linked and dependent on the subsequent steps in the value chain. Government support towards improving farmer income through the facilitation of AgriTech adoption and growth has played a huge role in the milestones achieved thus far and will continue to do so. Apart from harnessing tech capabilities, adapting to the vastness of India's geographical sensitivities and terrain will be significant in determining the success of AgriTech startups. Roping in regional players and their expertise will prove to be essential as startups aim to scale.

All things considered, it is safe to say that the future of AgriTech in India is poised for an upward curve.



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FACT**

Mr Kumar is a fitness enthusiast and loves running and hiking. He also enjoys reading in his free time

INDIA COMPETING WITH CHINA AND US

AGRITECH SEGMENT SET TO OBSERVE MAJOR GROWTH CURVE

Farmer financing needs a '3D' approach – Data, Digitisation and Demand. Demand aggregation with assurance of purchase price and payment are the key drivers for timely loan collection. Market linkage startups can play an important role by helping banks in efficient recovery of loans through tripartite agreement between farmers, bankers and buyers. Agri-fintech can also utilize the opportunity to deliver through local presence and partnership with local



panchayat, CSCs, FPOs, NGOs and village-level entrepreneurs.

Various Agritech startups are using their field representatives for this purpose. Rural tech startups and frontier markets with strong first/last mile connect with farmers are also well-placed in partnering with banks for efficient farmer onboarding.

Most Agritechs who have built supply chain models including farm to fork and direct-to-farm typically have the opportunity to interact with farmers for less than 3-4 months in a year. Engagement is more in case of vegetable farmers due to short duration crops. It is much higher in dairy/egg/fisheries supply chain. Additionally the socio-economic impact experienced by farmers with increase in their disposable income is significant to improve their livelihood.

A critical understanding in the rural market is distribution of the product at village level. This can be solved by devising solutions with hyper-local delivery models. This involves innovatively built technology and integrated own logistics solution catering to upstream agri-supply chain. Agri-techs in this space are bridging the gap between manufacturers

About the AUTHOR

Mr Taranbir Singh is Co-founder & CEO of Faarms. He was earlier Country Head of Rural Retail Banking in Yes Bank. His core areas are farm mechanization, driving financial literacy and inclusion, and financing micro and small enterprises



and farmers. They are facilitating regional based SMEs with their product to reach to customers in rural market.

Every Threat Or Challenge Is An Opportunity

The startup ecosystem has been facing new challenges since the start of the pandemic. The agritech ecosystem envisages every threat or challenge as an opportunity. This virtue has helped the industry witness a flourishing number of agritech startups in India.

Despite being hit by the pandemic, the industry has exponentially raised over \$300 million in a series of investments. According to Ken Research report, the agritech segment in India is all set to grow at a CAGR of 32% from 2020-25 as India competes on a global scale with China and US. This growth has been catapulted by technological innovation and investments in agricultural biotechnology, remote sensing, IoT, big data, and FaaS. These technological solutions help farmers in risk mitigation as they are able to keep themselves abreast of the market development.

Supportive Role Of Government

The facilitative environment provided through state and central government has helped agritech startups like FAARMS to work collaboratively with government bodies and institutions like ICAR, G.B. Pant University of Agriculture and Technology and Central Warehousing Corporation. Such collaborations act as enablers and incubators which scale-up the end-to-end capacities to deliver precision farming and streamline the supply chain linkages



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FACT**

Meditation keeps me going through the day. In my leisure hours, I love playing Volleyball and Badminton

with tech intervention and efficient value proposition. These initiatives increase the unit of economics for every aspect of the agricultural value chain – production, supply chain, processing, and marketing – input marketplace models and output Farm-to-Fork models. States like Punjab, Uttar Pradesh Karnataka and Maharashtra have devised favourable policies that work in tandem with agritech startups.

Challenges

The digital revolution is yet to be adopted by several rural farmers, especially from remote regions. This digital gap has made several financial and other services virtually inaccessible. Secondly, there is a prevalence of limited funding when agritech startups are at their nascent

According to a 2020 EY report, the Indian agritech market has a potential of \$24 billion by 2025, out of which only 1 per cent has been tapped

stage. There is high-gestation period involved in the agricultural sector. Several early-stage agritech startups end up losing the 'patient capital'. Thirdly, the seamless integration of forward and backward linkages in the agriculture sector is a daunting task towards logistics and last-mile delivery that seem economically unviable to many.

India has indeed ushered agricultural revolution 4.0 with agritech startups technological innovations that serve niche areas. India has been historically categorized with low levels of farm mechanization and this has been addressed with the adaptation of data analytics and AI that monitor the crop quality and improve productivity by providing keen insights on weather models and soil health. Farmers have now witnessed profitable returns through increased transparency to access the market know-how as they decipher corrective market prices through information portals. The reliability of the traditional middleman and dependency on traditional mandis has been eliminated to a greater extent as service portals provide the marginal farmers with information inputs and access to seamless markets.

Although the agriculture sector has been recognized for priority sector lending under budgetary allocations, farmers need door-step delivery of services through integrated phygital model. The role of agritech startups in agri-fintech has driven rural employment generation and has helped farmers to escape from the clutches of private money lenders that have penalized them with predatory interest rates.

With such disruptive technological interventions, India has immense untapped potential to become a food bowl for the world. According to a 2020 EY report, the Indian agritech market has a potential of \$24 billion by 2025, out of which only 1% has been tapped. The augmented investor interest has also incentivized the startup-FPO partnership which has propelled the network of think tanks and policymakers to smoothen the road for innovative functioning of systems.



TECH-POWERED IRRIGATION SOLUTIONS



I always wanted to be an entrepreneur but I was mindful of the fact that I wanted to have some unique solution to a real problem with a large market size. I did not want to be just another trader, do some value addition or be a vendor for a major engineering company or be in an advisory role. I wanted to be in a field where I had the scope to develop the product from an idea stage and take it through the entire lifecycle right up to the market. The opportunity was identified during a stray visit to my native place known as Yeola in Nashik district near Shirdi.

During my stay there, I observed my cousin. He is a farmer owning five acres. He has water source with an electric pump. He had to put in a lot of effort to operate the pump in the face of erratic power conditions. This included change in the power schedule from daytime to night time from electricity distribution companies, which compounded his problems. My cousin had to visit the farm at untimely hours because power was made available at that time.

Farmers Needed Solution For Pump Operations

During discussions with him, it was clear that a solution to address this problem on the farm

About the **AUTHOR**

Mr Tarang Patel is Founder & CEO, Intech Harness Pvt Ltd. He is a Patent holder and an optimist who is passionate about technology



would make life easy for him to irrigate his farm. An efficient solution would address his constant involvement with the pump operations. It would also bring in holistic automation at an affordable price.

Thus began our journey to develop a product that could operate the pump for a particular time whenever resources like water and power were available, and also shut down the pump on time attainment on a daily basis.

We moved from the prototyping stage and took the product from lab to fields. During the field trials, we had multiple iterations after as many failures. This was a testing time for us. We had to decide whether to continue or give up. We decided to continue.

We found that farmers need holistic automation at an affordable price. During the development stage, we explored the possibility for patenting this idea. After initial search of patents, we proceeded for the patent process which was granted in due course of time. A lot of uncertainty in terms of grant process knowledge, expense and other factors were a challenge. On further search we came across a government organization which is mandated to increase the IP of the country. They selected our idea and sponsored the entire patent process for us. We also identified the market which we found to be large enough.

Much of agriculture is labour-intensive. There is a lot of scope to bring in technology to automate the processes of various critical activities which directly affect the yield of the crop.

Challenges We Encountered

One aspect of agriculture technology is the need to have some kind of hardware sitting on the farm that can talk to the technology layers through IoT, Bluetooth etc. This shall empower the farmer through on-demand decision making information. It shall lead to empowerment through intelligent hardware capable of executing those decisions on the farm.

During our journey, we learned that developing technology is the easy part. Making hardware reliable and durable in



With GOI's boost to Startup India and Make in India, a lot of support is provided by incubation centers that have been setup across India. Their purpose is to nurture the startup ecosystem and provide support to new and budding entrepreneurs who want to develop new technologies for the market

the volatile environment of Indian farms is the tough part that we achieved.

There is a lot of scope for the new generation to take up activities that can help farmers do better agriculture. Identifying the right technology for them is very important.

Thomas Malthus, an 18th century scholar and cleric, argued that population growth is exponential while food growth is linear. Hence there will be an inevitable food shortage at some point in time.

Digital Technology Is The Way Forward

Statistics talk about a growing population putting more pressure on the farming land. Digital technology is the only way forward that can help us to grow more with fewer resources. Hence there is immense scope for the youth to come up with innovative ideas for a pressing



problem. Difficulties in farming have become a way of life for the farmer. We will have to educate them regarding the solutions so that there is easy adaption.

A recent report from Goldman Sachs pegs the precision farming domain to around 240 billion dollars. Many tech firms and start-ups have begun to explore this business opportunity as the next big area of growth. There is enormous opportunity to apply AI, ML, drone technology, IoT and robotics to precision agriculture.

With GOI's boost to Startup India and Make in India, a lot of support is provided by incubation centers that have been setup across India. Their purpose is to nurture the startup ecosystem and provide support to new and budding entrepreneurs who want to develop new technologies for the market. India has a vibrant startup ecosystem right from academics to research institutes including grassroots level entrepreneurs like me.

There is an enormous effort being put in at every level of the education system to nurture the youth, support them to come up with an idea and handhold them in developing the idea to a marketable product. This will help the economy immensely by providing jobs driving efficiencies in terms of resource utilization and contributing to the GDP.

SIGNIFICANT GAINS IN SERVING MEDIUM AND SMALL FARMERS



About the AUTHOR

Mr Praveen Rajpal is CEO & Founder, Behtar Zindagi

The ability to provide high-quality inputs and machinery close to the farmers in a timely and at a reasonable cost remains the biggest challenge as well as an opportunity in the Rs 3 lakh crore agri-input market.

Given the geography of India, there obviously is a huge challenge to serve the markets pan-India. Even most national players do not have a pan India presence. The unpredictable nature of agriculture also creates huge demand variability. This increases seasonal risks of stocking inventory for sellers. Hence farmers often do not get the right agri-inputs required during the crop cycle.

Technology can significantly address many of these problems. Technology use has been focused on making forward linkages

primarily to get fair prices for farmers' produce.

Technology can play a far significant role in creating backward linkages of farmers to suppliers and sellers. There exists a big gap, as even the biggest of sellers do not have a digital presence. They do not have means to connect to farm situations and the crop context.

Technology can play a significant role across two major dimensions. One is to aggregate demand and create a logistics mechanism to serve the farmers. The other is to fill up the wide knowledge gap about crops, varieties, weather, new products, prices-value equation, which can impact the demand for quality of agri-inputs.

Internet-based Direct-to-Farmer Marketplace

Currently the agri-input system behaves like hundreds of micro markets with its own stocking pattern, thereby creating huge inefficiencies across these markets. Internet-based Direct-to-Farmer marketplace can



The last mile delivery offers a great opportunity to create employment in the rural sector pretty much like Amazon, Flipkart and Swiggy have done for urban India. This can be done by leveraging village level entrepreneurs for last mile delivery as well as a service network in each district.

The role of marketing will not be about persuasion alone, but also about education and empowerment. Fin-tech sector has done a good job of educating consumers and shopkeepers, and helped them migrate to newer payment and business platforms through technology adoption. Success won't come by just creating solutions but winning over farmers by handholding them to migrate from old ways of doing farming to newer more empowering ways.

integrate them into one large accessible market and remove some of those inefficiencies.

Most players in the agri-machines business are small and medium enterprises. They do not have the wherewithal for servicing a pan-India market. Giant leaps in logistics enabled by technology over the last 4-5 years can help overcome this challenge in a big way by helping a large milking machine manufacturer in Gujarat reach a farmer owning four cattle in Haryana. This will save the farmer labour costs. It will provide more and better quality milk, and thereby helping him to fetch a better price.

It will be over-simplification to assume that we need physical presence to establish farmer trust to get them to buy agri-inputs online. The assumption that the farmers will not come forward and buy expensive machines is like the early e-commerce era when we doubted whether people would ever buy clothes, refrigerators, televisions or jewellery without checking them out physically. Farmers are intelligent and willing to adapt. YouTube farmer visitors will bear testimony to this fact.

There are significant gains in even serving the medium and small farmers



if the platforms can win the trust and loyalty of the farmers. Once you have enough demographic and cropping data about each farmer then the Life-Time-Value of each farmer can be very high, as farming is a repeat operation. Given three cropping cycles, it is more than the lifecycle of most consumer goods.

Implementation guidance is one key area where platforms can help farmers as well as sellers. Digital medium can be used effectively to create easy to use content to hand-hold farmers with regard to implementation and usage. A robust implementation guidance through audio and video broadcast with service helplines can take care of the absence of physical reach but can be significantly better in terms of quality and timeliness. At Behtar Zindagi we have created hundreds of hours of content and live video chats to assist farmers.

Empowering Farmers With Right Knowledge

One of the big

**fun
FACT**



Listening to music is the go-to stress buster for Mr Rajpal. Nothing like Hindi music and a drive to get back into groove.

challenges is the knowledge about right inputs required for better crops outputs. Empowering farmers with the right knowledge of what is good for them is one of the key things that any platform can offer.

With the expansion of 4G across the country and the cheapest data rates in the world it is now easier than ever to be connected to farmers 24X7 through video calling etc. We can learn from the political parties on how to use technology to reach to the remotest corners and effectively communicate using a combination of WhatsApp, Facebook, YouTube and tele-calling.

One of the most significant usages of technology in the farming sector would be the use of data.

By using cropping data as land size, varieties, time of sowing, soil and weather conditions we can help farmers makes smarter decisions about inputs. With that comes the need for trust building for farmers to share that data with such platforms.

It is now clearly established that rural customers can take a lot of time to shift to newer platforms and new brands. But once a platform earns this trust they will not shift out from such platforms and appropriate the life time value of their cultivation.

The sector is ripe for direct to farmer intervention using technology in the input side of agri-production, to disrupt and change the fortunes of the 160 million Indian farmers.



NAFED

More than 60 Years in Service

NAFED INTERVENTIONS FOR AGRI-STARTUPS

National Agricultural Cooperative Marketing Federation of India Limited (NAFED) is a national level cooperative organization set up in 1958 with a vision to support the marketing of agri-produce across the country. It is the nodal agency of Government of India for procurement of pulses and oilseeds at Minimum Support Price (MSP) under Price Support Scheme (PSS). NAFED is also the designated agency for creation and management of buffer stock of onion, potato and pulses under the Price Stabilisation Fund (PSF) Scheme.

NAFED maintains a national buffer stock. Regular supplies are made to Army, Central Para Military Forces (CPMFs),

State/UT Governments under PDS, MDM, ICDS etc. NAFED is the central nodal agency for undertaking seed production programs and distribution of certified seeds, mini kits of pulses & oilseeds under National Food Security Mission (NFSM). NAFED is also appointed as the Program Logistics Agency for National Animal Disease Control Program (NADCP).

NAFED is designated as Implementing Agency under Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs), a scheme of the Ministry of Agriculture and Farmers Welfare (MoA&FW). In order to provide market linkages for farm produce and agri inputs, NAFED has acquired a subsidiary in the name of Federation of Indian FPOs and

Aggregators (FIFA). The objective of FIFA is to support the FPOs by providing incubation support and access to markets through technological innovations.

Federation of Indian FPOs and Aggregators (FIFA)

FIFA has more than 700 FPOs as its members, and NAFED has more than 900 member cooperative societies. FIFA is working extensively to support the FPOs by linking them to markets for their agriculture produce as well as supply of quality agriculture inputs, skilling and training of farmers and FPO functionaries on production, marketing, finance, business opportunities, processing, value addition and networking with other stake holders for



business growth.

NAFED and FIFA together will create nationwide network of FPOs and Agri-startups for creating win-win business relations among them. It will cater to any forthcoming opportunities in the area of incubation and promotion of Agri-Tech Innovation. Both FPOs and Agri-Startups start with a business idea and need incubation support. NAFED and FIFA are working together on supporting the broader agricultural and allied sector entrepreneurial ecosystem through capacity building, convergence with Government schemes, credit and market linkages.

FIFA promotes and strengthens FPOs by addressing the challenges of access to investment, technology, quality inputs and market linkages. NAFED gets requests from various Agri-startups to introduce their market ready viable products/services including technological solutions for crop production, value addition, quality assaying, processing, storage, logistics, marketing etc. After thorough assessment, NAFED offers these technologies to FIFA member FPOs in order to strengthen their business models. NAFED also partner with the startups for providing Agri-tech solutions through Request for Proposals (RFQ) or Expressions of interests (EOI) and enter into Memorandum of Understanding (MoU) or Commercial Agreements with them.

Overall objective of the Incubation support by NAFED for FPOs and Agri-Startups is to improve the socio-economic condition of small farmers by creating commercial business opportunities. The FPOs and Startups can identify technological gaps, business opportunities and provide innovative technical/marketable solutions to bridge these gaps leading to the development of sustainable local enterprises.

The Agri & Food sector provides huge opportunities to the Agri-Tech Startups. There is a real need of providing business incubation services to the FPOs as well as budding rural entrepreneurs. NAFED as an Apex Marketing Organization for Agri-Produce and Implementing Agency for FPOs provides tangible and intangible services to new



NAFED team led by its AMD Mr Pankaj Prasad on the occasion of signing an agreement with the team of technology company NeML, a subsidiary of NCDEX

technology entrepreneurs with the aim of helping the FPOs and promotion of technological solutions to increase their chances of survival in the early stages of development and promotion of technology in Agri & Food sector.

NAFED identifies suitable technology startups in Agri & Food sector and provides them with the opportunity to showcase their technology for bridging the technology gaps in and around business verticals of NAFED. The startups with original and meritorious ideas and working on providing innovative solutions with proof of concept are offered business opportunities with NAFED at pre-revenue stage. It helps the startup at a critical stage between development and commercialization of innovative technologies/products/services.

Agri-Produce Quality Assaying

In the recent past NAFED has engaged Agri-Tech startups like AgNext and Intello Labs in the field of agri-produce quality assaying. Agri-Marketing/Logistics Technology service providers like NeML, Star Agri and Agri Bazar were engaged for aggregating agri-inputs demand. The technological solutions provide better price realization to the farmers and enhance business opportunities for the start ups. They get more valuation for their enterprises and further scaling of their business. Ultimately it leads to employment generation for the nation. This self-sustaining

mechanism of technology development, employment generation is crucial for the economy.

With a mission of transforming farmers to entrepreneurs, NAFED is working with FPOs through Cluster Based Business Organizations (CBBO) empanelled with NAFED at the ground level. The CBBOs under the Central Sector Scheme of Formation and Promotion of 10,000 FPOs, handhold the FPOs for a minimum of five years and put them in a strong foundation. They build their capacity and link with the different ecosystem players for technology, credit and marketing support. In addition they also provide support by linking various warehouse and cold storages to the FPOs. NAFED has taken a step further by bringing various startups in close connection to FPOs where startups work with them to understand their challenges and provide solutions to them.

The FPOs have immensely benefited through this support. The startups get the opportunity to work and leverage the extensive network of NAFED/FIFA across the country. They get access to a vast network of innovators, investors, partners and building revenues and strengthening their business models. NAFED would like to scale the Incubation support for Agri & Food sector Startups and FPOs through convergence with Government schemes so that FPOs and Rural entrepreneurs benefit and reverse migration happens from Cities to Rural India.

FOR THE SOIL, FROM THE SOIL DISPOSABLE TABLEWARE FROM AGRICULTURAL WASTE

Sustainability is a word that is now popping up everywhere as consumers, businesses and governments look at a way ahead that is more responsible as we head into the 21st century.

Sustainability is the capacity to endure in a relatively ongoing way across various domains of life. In the



21st century, it refers generally to the capacity for the Earth's biosphere and human civilization to co-exist.

There has been a growth in the number of ventures coming up that seek to be more climate conscious. There is also a growing awareness of and interest in the circular economy. Quadrat does both of these.



About the **AUTHOR**

Mr Rishabh Suri, a third generation entrepreneur, was 20 when he dropped out of the Institute of Chartered Accountants of India to sell cars and bikes. At age 24, he embarked on a completely different journey of propagating sustainability, one plate at a time

Creative Solution For Pressing Problem

I started my journey in the world of business in 2016 in Uttar Pradesh running my family's automobile franchise business. The automobile industry is itself undergoing a paradigm shift as we move away from fossil fuels to ensure relevance in the years ahead. This prompted me to do further research on the problems of waste management and associated challenges. The push by the government to ban single-use plastics provided an opportunity for creative



Compared to single use plastic and paper, the products are 100% backyard biodegradable within 45 days. Their rigidity and strength make them easier to use and offer a higher water holding capacity, giving a good solution for holding lip-smacking gravies on disposable plates. The products are microwave safe

solutions to a very pressing problem. Our philosophy at Qudrat is simple - creating disposable tableware from plastic, paper and such sources is no longer a viable option - especially if they are to be disposed off after a single use. Instead, we can use some form of agricultural waste and residue that was destined for burning or composting anyway and try to create value out of it.

While engineering the products, we also stumbled upon the problem of animals consuming plastic disposables from landfills and water bodies. Finding opportunity in adversity, we chose our raw materials in a way to make a plate that is safe for the animals who may inadvertently consume it while grazing. Using no form of chemical, laminate, adhesive and binders increases the impact of qudrat further.

Challenges We Faced

Not everything has been very bright for us. The prevailing price of plastic and paper is something that we will find difficult to compete with in the short run. Other than that, enforcement of legislation and placing a ban on non-degradable products can be an extremely cumbersome process to practically implement. Also, being an absolutely new and differentiated product carries with it the burden of a high lead time for converting a prospect into a sale.

However with legislation deadlines already planned in the times to come against single use plastic, growing concerns around paper primarily coming from the felling of trees and lastly the awareness and significance around

the carbon footprints of manufacturing plastic and paper are all signs of huge opportunities and light at the end of the tunnel for us. Eventually, with consumers becoming a part of the sustainability movement and opting to bear the cost that the environment currently does, the bottom lines of circular economy oriented businesses will start shooting into green.

While basic tableware is where we begin our product journey, we have also developed takeaway container prototypes under the same range keeping in mind the rise of the food aggregation Industry. There is also continuous Research and Development around using other Agricultural residues like Water Hyacinth, Banana Stems, Pineapple Leaves and Rice Straw to solve problems like Gardening Plastic Plant Bags, Styrofoam & Thermocol packaging.

Well, while we are the first generation

to feel the effect of climate change, we automatically become the last generation who can do something about it.

Carbon Emissions Reduced

Alongside turning trash into cash for the company, solving these problems also creates Climate and Social Impact. Burning 1 kg of agro-waste and manufacturing 1 kg of plastic put together, release close to 7.3kgs of carbon dioxide into the atmosphere. When dining out of a qudrat plate, these carbon emissions are reduced by more than 90% as incineration. The huge carbon footprint of manufacturing single use plastic gets eliminated. It also gives an opportunity to the farming community to sell the agricultural residue to earn an incremental income alongside creating employment opportunities for the local communities.

Last but not the least, with this waste being converted into value, pollution on the fronts of air, water and land reduces significantly having an enormous impact on Climate Change and Biodiversity. Even on the manufacturing front, the technology leveraged by the company has been improvised in such a way that no form of solid or liquid waste is produced during production of goods which helps amplify the qudrat impact further.

Often on Sundays when I'm out surfing at the beach on the outskirts of Trivandrum, I come across chunks of plastic in the sea. I'm once again reminded that the greatest threat to our planet is the belief that someone else will save it.



fun FACT

On a train journey across Kerala, I read about Elon Musk's biography by Ashlee Vance and his quest to save the planet while getting paid for it. A light bulb lit up, and my brother and I decided to create viable alternatives for plastic tableware

INDIAN AGRICULTURE NEEDS AN ORBIT SHIFT

START-UPS ARE BEACON OF HOPE

India has the third largest Startup ecosystem in the world, hence it is important to understand the reason behind the Startup culture in our country. India is the seedbed of parsimonious and basic innovations with a population of over one billion. Scalability is positively assured for all startup businesses. Majority of youth are entrepreneurial in their outlook. They are usually passionate about their ideology and beliefs.

Youth entrepreneurs are one of the key contributors to the startup segment. There is also a faction that comprises of corporate workers who want to make a difference to their lives and that of others and basically break free from the “rat race”. Tech forms the basis of most startups and hence we witness Fintech, Edtech, Healthtech and Agritech startups. Then there are startups based on innovations in various arenas like health, agriculture, lifestyle etc.

One would wonder that in a country like ours, where Agriculture is the oldest known occupation, how startups fit in. Owing to its importance in the nation’s history, economy and development, it would be right to assume that this sector would be performing astonishingly well. Agriculture sector contributes only 16 percent to the country’s GDP despite engaging more than 50 percent of the population. This is a huge oxymoron which is worth pondering over.

Antiquated Agriculture Practices

On close observation, it is evident that agriculture in India is still done in an antiquated manner. With minimal systems in place the sector is very far from its ideal state, despite the long history and association. Apart from farmers, the stakeholders in this sector come from varied backgrounds like academia, entrepreneurship, banking, policy making, science etc. Most key participants continue to be non-savvy when it comes to technology and modernization.

The vast gaps in this sector incongruously also draw our attention to the huge untapped potential it holds. Many startups have emerged

About the AUTHOR

Mr Yash Kotak is Co-founder & Chief Marketing Officer, Bombay Hemp Company. He is instrumental in setting up BOHECO’s direct-to-consumer Health & Wellness brand – BOHECO Life





Harnessing Industrial & Medical Applications Of Cannabis

At Bombay Hemp Company (BOHECO), our focus has been on a crop – Hemp/Cannabis that is at the center of the triple bottom line impact chart that blends the best of agriculture, technology and medicine. We aim to harness the industrial and medical applications of the crop to work towards a future that is environmentally sound, socially inclusive and economically equitable.

Cannabis has over 25,000 proven uses from tree free paper to biofuel to food, clothing, shelter and even medicine. In our endeavor, we have taken a very collaboration driven approach working with various partners to unleash the versatility of the plant. We are a vertically integrated organisation with a direct involvement in the entire supply chain from Lab to Market, thereby not just enabling a pathway for ourselves but the whole industry at large. Unbeknown to most of us this wonder crop can transform the future of agriculture and can also support various other industries.



Agri-startups face constant financial challenges. This journey continues to be an uphill task for various Agri-Startups despite the immeasurable growth, potential and promise

with revolutionary outlooks and ideas, to take measures and metamorphose the sector. The promise of opportunities that agriculture offers is too colossal to be left unattended.

many aspects of agriculture that are technology led. These could include weather forecasts, automated irrigation, light control, and heat control, software analysis for pest and disease control, soil management etc.

Complete Overhaul Holds Key To Advancement

Like most sectors that need an orbit shift, with out of the box solutions, agricultural sector also demands the intervention of Startups. Complete overhaul not only holds the key to the advancement of this sector but the whole nation. Agri Startups are now the beacon of hope to tap this immense potential that is being wasted decade after decade. They are systematically identifying, understanding and then solving the numerous stumbling blocks by relevant and innovative solutions

Agri-Startups get involved in



fun FACT

Football and yoga are some activities I indulge in for some down time. I'm a huge nature and animal lover so I make sure to take some time off to indulge in treks and safaris

There is a lot of room for innovation in the agriculture sector, need for zero-waste crops, need for efficient utilization of the secondary and tertiary parts of the crop/s. Despite all the above arguments, the challenges faced by Agri-Startups are multifarious. There are many socio economic and environmental factors that have a bearing on agriculture. There are aspects of land ownership and tenancy and fragmentation of fields that loom large over this sector. Manpower and labour issues have always bedeviled the field of agriculture. The Agri-startups, over and above these problems face constant financial challenges. This journey continues to be an uphill task for various Agri-Startups despite the immeasurable growth potential and promise.

AGRI-TECH IN INDIA

TRANSMOGRIFYING AGRICULTURE

Agriculture in India is going through revolution since the last one decade. There is a change in consumption patterns. Agricultural production has been diversified from grain to high value agri commodities including horticulture, pulses and fruits. To understand and create an impact in the farming and agricultural sector, we need to address India's smallholder farmers and the fragmented agriculture value chain.

As a result of various tech-enablers, the agri industry is once again experiencing an irreversible evolution. Realizing the potential of India's Agri-tech sectors depends on how effectively India tackles the challenges

holding it back. Factors inhibiting agritech growth include:

- Inaccessibility to quality inputs and technical guidance required for managing the crop in the pre-harvest and reducing cost of cultivation with increased yield and quality of crop

- Limited penetration of digital infrastructure and digital records. Robust digital infrastructure in the country, consisting of satellite imaging, soil health information, land record, and cropping pattern and frequency, can help make the value chain more effective.

- Lack of financial services. Adoption of financial services (e.g., credit and insurance) is limited in Indian agriculture. In 2019, RBI estimated that only about 40% of farmers have access to formal credit despite many initiatives to include farmers in the banking system.

- Issues in market linkage. Today, 85% of Indian farmers get prices 40% of, or lower than, the minimum support price, with no access to buyers outside the mandis. Issues in market linkage must be solved to strengthen the economic conditions of farmers.

Increase of internet footfall in rural India has boosted demand for devices and access to technology, but there has been a rise in challenges in supply chains. Agritech startups are troubleshooting and fixing issues regarding high interest loans, non developed cold chain and inefficient supply chain with the help of technology and innovative ideas.

In the last five years, funding has grown nearly 10 times, with more than \$400 million of investment in 2020 from

About the **AUTHORS**

Mr Sateesh Nukala is the CEO of BigHaat. He has over seven years of agri-entrepreneurial experience. He founded BigHaat with another founding team in 2015 and built the organization to become the leading agriculture full-stack digital platform in India. Mr Nukala earned five patents during his career at Honeywell with his constant focus on innovation



Mr Parth K. Tripathi is Head - Operations, Customer & Process excellence at BigHaat. He has won a presidential award in the field of agriculture for increasing farmer income and creating farmer clusters across the country. He has successfully launched many agriculture startups and has worked with GOI for creating various SHG, FPOs & co-operative of farmers, beekeepers and artisans



\$40 million in 2016. The trend is expected to continue. Funding could grow to \$10 billion by 2030. Yet the potential of the Indian agritech sector has barely been tapped.

Industry estimates of the total addressable market for food processing and agritech amounts to \$24 billion. Going by these estimates, current penetration of agritech in India is less than 1% of overall Indian agritech potential. Adequate investment, infrastructure, and innovation could help India create 25-30 million entrepreneurs in agriculture, increasing rural prosperity by an order of magnitude.

INNOVATION, INFRASTRUCTURE, INVESTMENT

Technology-led innovations supported by investments can bring India on par with its global peers. The focus needs to be on the 3Is: innovation, infrastructure, and investment.

There is a need for innovative business models that provide viable digital solutions for small-scale farmers. Developing disruptive agritech business solutions will need more capital and the ability to link them with the market and consumer.

Innovation Clusters

Forming “innovation clusters” in regionally contiguous zones can enable a wider ecosystem for innovation by driving inter-firm linkages, collaboration, and networks. With heightened economic activity and technology advancements, the clusters provide a budding platform to technology start-ups. To raise productivity, ensure food security, and become a net exporter of food products and intellectual property, India needs to promote innovation clusters with goal-oriented efforts.

Infrastructure

Indian agriculture is characterized by a high level of pre-consumer waste, which partly explains why many in India still go hungry even though the country is a leading food producer. Food waste also harms the environment as it ends up in landfills.



Agritech startups are troubleshooting and fixing issues regarding high interest loans, non developed cold chain and inefficient supply chain with the help of technology and innovative ideas

Large-scale investments are needed in post-harvest infrastructure, including near-farm warehouses and captive cold chains, to reduce waste. Supply chains between farmers and consumers need to be transformed. They are notoriously opaque and inefficient with numerous intermediaries, poor data collection, and institutionalized practices of adulteration and pilferage. Enabling digital technologies can improve traceability, reducing waste and operational delays for supply chain players.

Innovation clusters in action

The Netherlands Food Valley, a region where international food companies, research institutes, and the Wageningen University and Research Centre are concentrated, is home to many food multinationals. Within the Food Valley, about 15,000 professionals engage in food-related sciences and technological

development.

Agri-horticulture Park Innova was set up in Malur, Karnataka, India, with the motto to double farmer's income by 2020. Horticulture parks bring best-in-class technologies/infrastructure to create and deliver value to both farmers and businesses by linking farmers and consumers. The food park's focus is on making a positive and meaningful difference to farmers' lives through business.

A very low percentage of India's farmers have access to finance from formal sources. Apart from micro lending, extensive investments must be made in farmer training at the grassroots level.

Platforms like BigHaat are directly engaging with more than 6 million farmers across India to digitize the journey of the farmers and providing a highly convenient access to high quality and wide range of farm inputs and technical guidance. BigHaat free agronomy assistance to farmers and best quality farm input products are delivered in remotest rural villages of India. BigHaat was founded by a team of avid entrepreneurs in the year 2015. It is India's leading agri full-stack digital platform transforming the agriculture value chain from pre-harvest to post-harvest leveraging science, data and technology.

NEW-AGE AGRITECH STARTUPS AND AGRI FINTECHS

BUILDING SOLUTIONS FOR CRUCIAL NEEDS



Agriculture forms one of the key elements for the Indian economy, contributing to more than 16% of GDP and about 46% of workforce. While a lot of work has been done on increasing productivity through agricultural research, the country still lags in productivity per hectare. We are currently at 50% in most of the crop's productivity per hectare vis a vis high productivity nations. Even within the country, the yield differences between the research centre and the farm are high. This has been a big loss to the farming community. The existing inefficiencies in the value chain contribute either to increased cost or decreased price realisation. This adds to the woes of the farming community.

The last decade has seen a great inflow of talent in this sector. There has been increased focus on addressing the inefficiencies in the value chain. Developments in tech and the support of venture capitalists has garnered interest in the sector. 40% of rural households own smart phones. This has led to greater access to internet and digital engagement, which in turn has enabled a swift change in the agricultural landscape. This is just the beginning. There is a long way to go.

The problems are going to compound with further division of land holdings leading to fragmentation.

The logo for arya.ag, featuring the text 'arya.ag' in a lowercase, sans-serif font. Above the 'y' in 'arya' are three stylized green leaves.

About the **AUTHOR**

Mr D. Chattanathan is Managing Director of Aryadhan Financial Solutions Pvt Ltd. Earlier he was with ICICI Bank for two decades and was the Group Product Head in Rural and Inclusive Banking

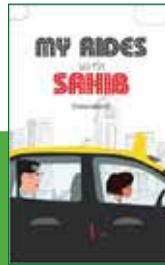


86% of India's landholdings are now with small and marginal farmers. Keeping this in consideration, there are broadly three ways to improve farm incomes. One, by improving efficiencies in the value chain. Two, by reducing the number of intermediaries in the supply chain. Three, by increasing transparency and providing access to agri-services and information. EY projects a market potential of about 25bn dollars across the value chain to increase efficiencies. The new-age Agritech startups and Agri fintechs are trying to build solutions towards this crucial need.

Interventions Across The Value Chain

Most startups in the Agritech space have been primarily driving interventions across the value chain. These include improving quality sourcing, precision farming, quality management, market linkages and access to financial services. Most of these are in a very nascent stage. Some have moved from pilot to proof of concept while a few have established revenue models. Each of these interventions work towards improving farm incomes either through reduction of cost or by increasing revenues from 5 percent to 30 percent at the bare minimum. In time, digital platforms that are emerging in this space will integrate each of these services so that the farmer does not have to go

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FACT**



Mr Chattanathan is fond of writing. He has authored a bestselling novel titled *My Rides With Sahib*

around scouting for individual services.

Manifold Challenges

While on paper this looks very simple, challenges in this segment are manifold. Agriculture may seem a unified term. However, each commodity and agriculture produce has a separate value chain. Hence, interventions cannot be uniform. Geographical differences crop in. Hence it is important to take into cognizance the culture and living patterns of the geography.

EY projects a market potential of about 25bn dollars across the value chain to increase efficiencies. The new-age agritech startups and agri fintechs are trying to build solutions towards this crucial need

Agriculture forms a part of the concurrent list, and each state has its own laws. This can be challenging for Agritech startups that are looking to scale. Any disruption they attempt to achieve must be created keeping in mind individual frameworks of every state and the existing rural fabric with its cultural nuances.

Adaptation to new methods of doing things while building a scalable business model is a constant dilemma for those working in Indian agriculture and looking to disrupt it profitably. Even when new systems designs and frameworks are established, is it possible to create profits with these changes? At one end, burn models are too expensive. On the other, availability of capital on a continuous basis may become a big deterrent in creating sustainable models. This puts the sector in a precarious situation. With a few failures, the fledgling interest in Agritech could be affected, potentially reducing the flow of money.

Subscription models and margin differentials

Subscription models and margin differentials have been the source of income for most of the Agritech companies. Which of these can be scaled and sustained is yet to be seen. While some players have proven business models with integrated services, these are far and few. Stand-alone service models are yet to create a big mark. Policy frameworks around the Agritech business are yet to be formulated defining the liabilities if any which bring in inherent dangers to quality and growth.

Within this existing framework and the current market play, there is great scope for financial services, market linkages and precision farming. With increased flow of capital, interest of venture capitalists and supportive policy frameworks that allow for inflow of investments into the agricultural community, business models that create efficiencies can thrive. These shall impact the farming community at large, creating significant increase in interest and farm incomes.



AGRI STARTUPS: IMPORTANCE, TRENDS AND CHALLENGES

Agricultural tech startups in India are working towards improving the productivity of farmers through innovative solutions such as Precision Agriculture, Remote Sensing and GIS, Irrigation and Water Management. These technologies include drones, robotics, IoT devices, big data analytics, etc. They may be involved in research and development, product design, marketing, distribution, or some combination of these activities. Some companies focus on agricultural technology while others provide management systems for large farms.

Indian farmers are using these technologies to improve crop yields and reduce costs. For example, they're using drones to monitor water levels and soil moisture. They've also developed robots that can pick out weeds automatically. If



About the AUTHOR

Mr Chaitanya Anant Badave is the founder of Agrihub, an informative platform with global community of agri knowledge seekers, agripreneurs and for people interested in agriculture.

The start-up is engaged in building agricultural podcasts, hosting agri talk shows, blogs and agritech courses



these devices are provided on rent basis, it can be beneficial for farmers.

The pandemic has caused companies to rethink their business models. Investors are looking at agritech startups as potential solutions. Thousands of startups are listed in agritech platforms across the country. A large number of them have been successful. Some agr-

itech startups have entered into lucrative partnerships with global majors such as Nestle.

TOP TRENDS IN AGRI STRATUPS

Food Processing and Distribution

India's food processing sector includes the manufacture of fresh, frozen and ready-to-eat products as well as the distribution and sale of packaged goods. The major products include snacks, beverages, milk,





dairy products, condiments, processed foods, etc. This sector is one of the fastest growing industries in the country. The market is segmented into four major markets based on the products they produce - Snacks, Beverages, Dairy and Processed Foods.

Use of AI, ML, Drones and IoT

Machine Learning and IoT are equally important. They enable farmers to plan production and distribution of food products according to the season. ML is helping farmers improve their yields and make better use of their land. Remote sensors are providing them with information on things like temperature, humidity, and soil moisture to make farming more efficient. This could lead to more successful strategies for dealing with farm challenges.

Various types of modern agriculture machineries are developed for primary and secondary tillage, seeding and planting, cultivation, fertilizer application and distribution, pest control, harvesting, irrigation, drainage, transportation, storage, handling the residues of earlier crops etc. The farm machinery companies are in the market since long. Applying AI, ML and IoT will be the game changer in the agritech sector.

Vertical Farming

An increase in population and landscape utility is affecting the cultivable and arable land available for food production. Many startups are working on innovative solutions to facilitate indoor agriculture using minimal land space. This is where vertical farming comes into account.

Some of the advantages of vertical

**fun
FACT**



I love listening to music,
watching Sci-fi movies and
exploring software and tech

There is big opportunity in India for start-ups to come up with innovative solutions to address problems faced by small farmers, especially in terms of crop planning and water management. They have the opportunity to be part of major initiatives for the growth and development of agriculture

farming include increased production, better control over conditions, reduced maintenance costs and reduced land need, improved nutrient absorption, and higher yields. The technology is relatively new. There are still many obstacles that need to be overcome before vertical farming is adopted widely. The major problem is that most indoor agriculture methods are highly capital-intensive and need proper knowledge and setup. They require specialized equipment which is not affordable for the average farmer.

Agricultural Biotechnology

Earlier farmers relied upon natural selection to produce superior crops. As human activities disrupt natural ecosystems, farmers are no longer able to rely upon natural selection. The introduction of genetically modified (GM) crops has become a major agricultural technology. Genetically modified crops allow the production of food that is better suited to the environment in which it is



grown. This technology also makes it possible to produce food with higher nutritional values.

New Agri-biotech startups are headed towards providing biofertilizers, bioherbicides, and biopesticides to reduce the need for pesticides and fertilizers which are harmful and impact soil productivity. They are also developing biofuel products and bioplastic from agricultural waste products.

Challenges for Agri-Tech Startups

There is a big opportunity in India for start-ups to come up with innovative solutions to address problems faced by small farmers, especially in terms of crop planning and water management. They have the opportunity to be part of major initiatives for the growth and development of agriculture

The growth of agri-tech startups in India faces various challenges. These include:

- The lack of knowledge and tech skills among Indian farmers
- The high cost of initial investment, lack of management expertise and proper guidance
- Climate change, lack of effective farming model and crop distribution, restricted farmers purchase potential, water availability and uncertain drought and floods
- First Move Advantage: Startups which have been around for some years are getting stronger and bigger. This can be a barrier for newbies trying to enter the market. This might make competition tough compared to opportunities in other sectors.



INDIAN AGRICULTURE

AGRI-TECHS BRING HOPE AND INSPIRATION

The agriculture Industry holds a large stake in the Indian economy. Yet it contributes only 16 percent towards the country's total GDP.

Agriculture is a core part of the Indian economy. Along with being the biggest employment providing sector, it also largely contributes towards the nation's economy, keeping the foreign currency flowing. However in spite of it holding power and influence of this caliber, it continues to remain unorganized and under-developed.

Agri-Techs in India today are bringing hope and inspiration to the table for agri-stakeholders and the government. They have immense potential to revamp the agriculture sector while addressing the current critical gaps that exist in the industry. This shall ensure that every little pain point is touched and not overlooked. With the help of technology agri-techs receive data that is further used to find and explore solutions to a number of problems experienced across the entire agriculture value chain.



About The **AUTHORS**

Mr Sanjay Borkar is CEO and Co-Founder, and Mr Santosh Shinde is COO and Co-Founder, FarmERP



Governments continue to prove grants to motivate innovation. But since these are available in limited capacity, many agri startups face a tough position. If a collective entity works towards the success of agri-startups, the key contributor to the National Income will tend to increase. With the right government policies, their timely execution, adequate funding, and quality workforce, the agri sector will soon be able to see a metamorphosis in the way India does agriculture

Artificial Intelligence Has Taken Every Industry To A New Level

Technology has stepped into every industry today. From food to beauty, Artificial Intelligence has taken every industry to a new level. The thorough use of technology everywhere is a major indicator of advancements and developments. The audience has today become far more receptive towards technology and the advancements that it brings to the table.

Agriculture is another industry that with technology has simplified business operations and radically improved the decision making process. Today in respect to agriculture there exist many aspects to technology such as climate forecast, automated irrigation, pest identification, farm management and so on.

Technology has simplified agri-business operations, management of machinery, labour optimization and so on. It continues to improve farm management efforts and assists agri-tech companies to address untapped issues efficiently.

Challenges As Large As Opportunities

The challenges seem to loom as large as the opportunity itself.

Startup ecosystems are controlled by both external and internal factors. External factors are financial climate, market disruptions and company transitions. These control the ecosystem and its functioning. Startup ecosystems being dynamic entities are initially on information stages. Upon development these are



subjected to periodic disturbances such as financial issues. Startup ecosystems are more likely to function differently due to their entrepreneurial culture and resource pool.

Let us talk about the internal factors. While some of the resource inputs are generally controlled by external processes, the availability of resources within the ecosystem is controlled by internal factors such as the ability of people and organizations that contribute towards the ecosystem. Success and failures of agri-startups is another internal factor that heavily influences the sector.

In the last five years, only nine percent of all the funding was focused on the growth-stage startup. The government has started make a shift in their policies

in favour of the agriculture sector, but a bare minimum of them converge at farm level.

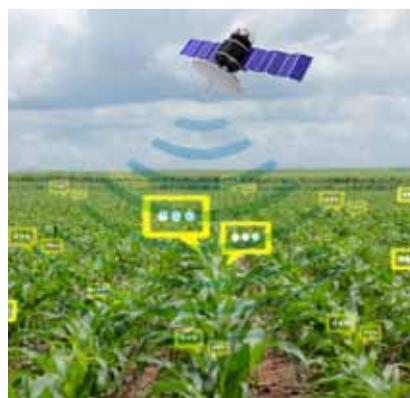
Challenges For Agri-Enterprises

Agri-enterprises continue to face difficulties to expand due to a lack of commercial guidance. Such support is normally provided to the start-ups by the project incubators by helping them in capacity building, networking, accessing knowledge and resources, and other kinds of needed expertise. However, not many of the existing 300-odd incubators and their advanced version called accelerators have the expertise and competence to guide farm-oriented enterprises.

Funding continues to lag many industries because they are geographically far from the areas that are flush with funding. Governments continue to prove grants to motivate innovation. But since these are available in limited capacity, many agri startups face a tough position.

Introducing agriculture to technology is the key to a future with immense possibilities, leading to higher yields, better efficiencies, maximum business profits, and happier farmers.

If a collective entity works towards the success of agri-startups, the key contributor to the National Income will tend to increase. With the right government policies, their timely execution, adequate funding, and quality workforce, the agri sector will soon be able to see a metamorphosis in the way India does agriculture.



AGRICULTURAL DEVELOPMENT AND POVERTY ALLEVIATION

CASH TRANSFER AS POLICY INSTRUMENT

In view of the ever growing importance of social protection instruments, the present article explores the different dimensions of impact of these instruments in the global context with a special reference to ameliorating livelihoods of resource poor farmers. Also, giving an insight to how India has been implementing policies and schemes of direct cash transfers like PM-KISAN to better the rural scenario and easing agriculture based livelihood, provides a set of key messages to the policy makers and development agencies working in this very direction.

Cash transfers, a form of social protection, are direct, regular and predictable non-contributory payments that raise and smooth incomes intending to reduce poverty and vulnerability. The hypothesis underlying such policy intervention is that the unprivileged individuals can be trusted and empowered to use available resources effectively as a means to raise their living standards through conditional or unconditional cash transfers. The Or-



Cash transfers, a form of social protection, are direct, regular and predictable non-contributory payments that raise and smooth incomes intending to reduce poverty and vulnerability

ganisation for Economic Cooperation and Development (OECD) has referred social protection to the policies and actions directly enhancing capacity of poor and assisting the vulnerable population to escape from poverty and manage risks and shocks in a better way. The governments of different countries across the world have been increasingly

About the AUTHORS



Dr Bhaskar Ghosh



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Dr Rabindra Padaria



Dr Sudipta Paul

adopting a range of policy measures especially to achieve the sustainable development goal – 2 (SDG2) which is destined to end hunger and malnutrition by the end of 2030 by promoting sustainable agriculture. The social protection programmes in general and cash transfer policies in particular are essentially targeting the food-insecure and rural poor.

Need for cash transfers in agriculture sector

Poverty is the most prevalent among all social evils existing across countries. Owing to the fact that most of the low and middle income countries depend on their primary sector i.e. agriculture for livelihood, they are vulnerable to a range of risks which makes it difficult for them to sustain their livelihood in long term. Evidences suggest that the vulnerable poor are seldom able to insure themselves against these kinds of shocks. This is when policy interventions like cash transfers come to play. Cash transfers can be linked to livelihood interventions and thus potentially serve as an important complement to a broader rural development agenda, including a pro-poor growth strategy focusing on agriculture.

Impact of cash transfer on agricultural growth, a global perspective

The emergence of cash transfer programmes on the international agenda trace back to the 1990's when many developing countries like Mexico, Brazil, Indonesia, and South Africa revolutionised the provision of cash transfers for poor and vulnerable section of their population. Two types of cash transfer programmes are known to be existing: 1. unconditional cash transfer (UCT) which does not have a prescribed requirement for utilization of the cash transferred, and 2. conditional cash transfers (CCT) in which the cash transfer process is conditional upon certain predefined criteria of cash utilization by the recipients, e.g., health check-up, school enrolment



In India, Telangana government introduced the Rythu Bandhu, or farmers' investment support scheme, which was India's first cash transfer scheme. It arose against the backdrop of widespread agrarian distress across the country

of children etc. Some of the major cash transfer programmes around the globe are briefly discussed here.

PROCAMPO (*Programa de Apoyos Directos al Campo* or Program for Direct Assistance in Agriculture)

The programme was introduced in Mexico back in 1994 with the purpose of compensating the Mexican farmers for an anticipated negative price impact of trade liberalization (North American Free Trade Agreement, NAFTA) on the basic crops. The programme also aimed at managing political acceptability of the free trade agreement among farmers and thus preventing rapid outmigration of small holder farmers. PROCAMPO in Mexico reports positive multiplier effects.

PROGRESA (later as *Oportunidades* now as *Prospera*)

The CCT programme in Mexico was introduced in 1997 and is conditional on

the recipient households participating in activities that improve their health and nutrition – preventive medical care, nutrition monitoring, nutrition education, and prenatal care. The country successfully reduced the poverty gap by 20% after implementation of the programme and has had a significant impact on improving people's health standards, including lowering the maternal mortality rate.

Programa Bolsa Familia (PBF)

PBF, a federal government sponsored well recognized CCT programme began in Brazil in 2003; it aimed at improving the coherence and efficiency of people by reducing poverty and inequality through a cash transfer conditional on their children receiving proper health care in times of need and enrolling their children (6-17 years old) in school. According to studies, the programme dealt with the country's poverty and income inequality in a sustained manner without jeopardising economic development.

SCTP of Malwai

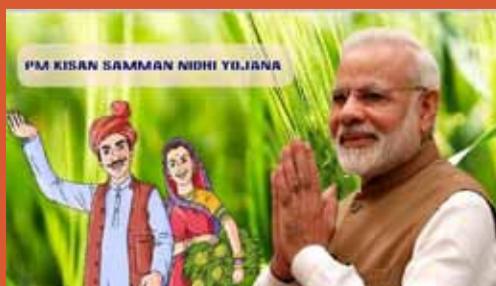
Malwai's Social Cash Transfer Programme (SCTP) initiated in 2006 on pilot basis is an unconditional cash transfer programme aimed at reducing poverty and hunger among vulnerable households and increasing school enrolment. The size of the transfer is adjusted to the number of household members and their characteristics. The programme shows

Context of India regarding Direct Benefit Transfer in Agriculture

In India, currently there are 319 schemes under 54 ministries using the mechanism of direct benefit transfer. They include pension schemes, maternity benefits, scholarships, the MGNREGS, and subsidy on LPG cylinders etc. Earlier talks in India about cash transfers revolved around the National Food Security Act (NFSA), with the question of whether food subsidies should be supplied in the form of cash transfers or subsidised in-kind transfers. When the idea of a Universal Basic Income (UBI) was raised in the Economic Survey of 2016-17, the issue over cash transfers resurfaced. The Telangana government introduced the *Rythu Bandhu*, or farmers' investment support scheme, which was India's first cash transfer scheme. It arose against the backdrop of widespread agrarian distress across the country.

Pradhan Mantri Kisan Saman Nidhi

The PM-KISAN (*Pradhan Mantri Kisan Saman Nidhi*) was launched at the national level within ten months, based on the *Rythu Bandhu* Model. PM-KISAN is a Central sector scheme implemented by the Government of India under the Ministry of Agriculture and Farmers' Welfare (MoAFW). It is an income support programme designed to complement farmers' financial requirements in order to ensure proper crop health and yields. For every four-month period, all small and marginal landholding farmer families (SMFs) receive a direct annual cash transfer of Rs. 6,000 in three equal instalments of Rs. 2000 each. The financial infrastructure built via the *Pradhan Mantri Jan Dhan Yojana* (PM-JDY) is critical to fund disbursement. In the context of agriculture, an income support scheme like PM-KISAN has a different role to play for farmers, acting as a debt relief during the initial sowing season and assisting investment. According to government data, the PM-KISAN scheme had reached about 10.99 crore farmers nationwide by November, 2021. The highest number of beneficiaries comes from Uttar Pradesh (28%), followed by Maharashtra (11%), Madhya Pradesh (8%), and Rajasthan (7%).



The financial infrastructure built via the *Pradhan Mantri Jan Dhan Yojana* (PM-JDY) is critical to fund disbursement. In the context of agriculture, an income support scheme like PM-KISAN has a different role to play for farmers, acting as a debt relief during the initial sowing season and assisting investment. According to government data, the PM-KISAN scheme had reached about 10.99 crore farmers nationwide by November, 2021. The highest number of beneficiaries comes from Uttar Pradesh (28%), followed by Maharashtra (11%), Madhya Pradesh (8%), and Rajasthan (7%).

Krishak Bandhu Scheme

The *Krishak Bandhu* Scheme, which was unfolded in West Bengal by the state government in January 2019, is another arrangement that works on the similar idea of aiding small and marginal farmers. More than 65 lakh farmers in the state benefit from the programme. Farmers with up to one acre of cultivable land receive Rs. 2000 per year, while farmers with more than one acre of cultivable land receive Rs. 5000 per year. Aside from that, the beneficiaries are granted a life insurance policy worth Rs. 2 lakhs as a death benefit to farm families, which includes suicides. Besides, states like Jharkhand, Andhra Pradesh, Odisha, and Chattisgarh, have established their own income support plans to supplement the income of their farmers, owing to the favourable results seen via numerous surveys.



that targeting households with children led to 5% increase in school enrolment among children aged 6–17 whereas, targeting orphans yielded 4.2% increase in school enrolment.

SCT of Zambia

An unconditional cash transfer programme, Zambia's flagship government-run social protection programme, began in 2003 and had been pilot tested five times by 2010. A community-based selection mechanism dictates beneficiary selection. The programme resulted in increasing goat ownership from 8.5% to 41.7% of households. It also resulted in four times the number of households participating in investment activities, with multiplier effects.

Cash transfers or direct benefit transfers have enormous consequences in a developing country like India in managing rampant corruption and middleman involvement, which obstructs policy measures from reaching the intended recipients. Conditionality in cash transfers has mostly achieved its goal of reducing poverty, and its performance is largely determined by the context, the trade-off between conditionality, coverage, and targeting. The policy ramifications of the many UCT programmes implemented in India aimed at agriculture have yet to be determined. It is a government-run initiative that must be continuously monitored and investigated in order to keep track of the advantages and costs. Until now, the experience with un-conditionality has been positive, sending strong signals that it is a better tool for public finance.

WOMAN POWER!

Naario is an end-to-end women led and run brand. Each and every role and opportunity is open to each and every woman

The food space in India has seen a constant surge. The post pandemic boom has been especially intense. From ten minutes grocery delivery to ayurvedic coconut water, the industry is seeing a wave like never before. The space is especially promising for anyone betting on people's overall well-being. Despite having these challenges and gaps in the sector, we see that educated youths are inclined towards becoming entrepreneurs.

Naario is the story of educated young girl who left her job to pursue her dreams of becoming her own boss and supporting many others. It all started with a simple conversation with my mother over chai- "Why do you not launch your Lucknawi masala as a product? I see people getting crazy about homemade food these days." My mom crushed my happy expectations when she replied, "Log kya kahenge ki ab Pandeyji ki bahu ko paise kamane ki zaroorat lagi hai!"

That was when I started working on this problem statement. A large number of consumers want to marry health and taste in everyday food items. I wanted to capture this niche. I visioned of Naario to be a revolutionary brand, all run and led by phenomenal women and some men. A brand that not just sells daily wellbeing to people but also makes them feel more and be the best version of themselves.

When it comes to food, we don't compromise on health or taste. By developing a business model where women can be involved from home with whatever talents they have, we are bringing



About the AUTHOR

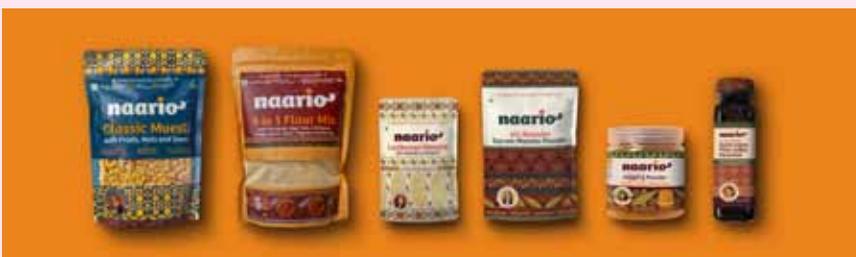
Ms Anamika Pandey is the Founder of Naario

financial independence and the sense of an identity to a woman.

If they are phenomenally good at a specific recipe, they can launch that recipe with us. If they think they're good at marketing, they can become Naario partners and make an income out of it. If women think they are good at content creation, they can earn as a content cre-

If a woman is phenomenally good at a specific recipe, she can launch that recipe with us. If some women think they are good at marketing, they can become Naario partners and make an income out of their ideas and initiatives

ator too. Naario is an end-to-end women led and run brand, which means each and every role and opportunity is open to each and every woman. Naario is mission to empower every single woman that touches base with Naario in any way possible. We help women to create an identity and draw monetary benefits being a part of Naario or simply by helping her serve her family better. We need more young minds who are willing to change the game by changing the rules of Indian societies.



AGRI ECOSYSTEM PHYGITAL IS THE KEY WORD

Only physical or only digital cannot deliver the best result. End-to-end Phygital technological solutions will have to be generated and adapted locally to make them compatible with socio-economic conditions of farming community and address the challenges

Agritech start-ups are proactively playing their part in developing the agriculture sector. All factors facilitate new opportunities for innovations in this sector. There are 1000+ Agri start-ups in India operating at different levels of Agri-value chains. Many of them are doing well.

Governments and some institutions are helping the start-ups. They are providing expertise, infrastructure and financial support. Start-ups need to appreciate and utilize these resources efficiently because time is critical in growth cycles.

When we talk about start-up, it means a start-up taking responsibility to solve a prevailing problem. Start-ups have been mushrooming in the Agri field, building digital support centres, B2B and B2C aggregators, Farm to Fork platforms, Agri fin-tech enterprises, logistic and warehousing solutions and many more. Most start-ups focusing on technological solutions must know that technology is just a tool. Without physical intervention agriculture can't be organized.

Many start-ups are performing well in their verticals and creating positive impacts, while helping farmers and agri communities. A long and arduous journey is ahead to build a sustainable agricultural ecosystem. The horizon of Agri space is far larger than a single-point solution.

Technological tools and solutions provided through mobile, web or apps for real time data capturing and analysis improve existential viability of small farmers. They generate employment and limit migration of human resource



to urban areas. Improved availability of real-time viable data about farms and farmers have provided access to credit driven solutions. A lot of on-ground understanding about farming and rural social structure is now possible to understand real-time ground realities through technologies, with the farmer as a partner in Agri start-ups.

About the AUTHOR

Mr Parikshit Sampat Sai is Founder & CEO of Pranam Kisan. He is passionately working on a cutting-edge AI-driven Agritech platform to provide end-to-end Soil to Sale solutions for the farming community through a centralized Internal Control System. www.pranamkisan.com



Rural Credit System Needs Attention

The agri finance system in India is geared around finance for traditional cycles like cereals etc. It needs to be directed to meet the changing requirements of value-added commercialization agriculture.

Revolution in information technology has bypassed the defective rural credit system. The banking system may also have to address the problem of financial partiality. It should be characterized by faster modernization of rural financial markets. The digital divide which separates modern AI and Omni-communication technologies should also benefit the rural financial system. Financial partiality could result in benefiting the agri-business houses, big agri industries etc in obtaining financial services from modern urban financial institutions. Small and marginal farmers and landless labourers may have to depend on micro finance and personal savings.



holistic practice in the entire lifecycle of farming, which includes four pillars. These are Farmer, Ecology, Markets and Technology.

There is a need to improve farm mechanisation and skilling of labour. Availability of utilities such as power and water along with quality seeds, bio fertilisers and pesticides – all these are vital considerations.

Availability of storage for pre and post-harvest with efficient supply chain management reduces farm waste. There is a need to organize middlemen so that farmers can earn fair profit for their crops.

Farming as a Service (FaaS) powered by Blockchain technology for Total Transparency and Total Traceability (TT & TT) should be infused to facilitate transformation in various processes of rural credit.

Pranam Kisan is our proverbial Peepal tree which works for the growth of all humanity and focuses on building a sustainable socioeconomic ecosystem. The theme behind Pranam Kisan is Organizing The Most Unorganized Sector. As the team started working on this idea 15 years back, they found that to achieve their goals they need to solve unsolved puzzles. At least seven key steps from Soil-to-Sale in Agri value chain, where the farming community is facing sustainability challenges have been addressed. Once all these steps are covered, real growth will begin.

Catering To Climatic Diversity

State of the Art and cutting-edge AI driven Agri-tech solutions required to solve problems will be increasingly location-specific and matched to the huge agro-ecological/climatic diversity.

The detailed indigenous knowledge and greater skills in blending modern and traditional technologies to enhance productive efficiency will be valued more than ever before. It is key to farming success and sectoral growth. These end-to-end technological solutions will have to be generated and adapted locally to make them compatible with socio-economic conditions of farming community.

The new technologies are needed to push the yield frontiers further, utilize inputs more efficiently and diversify to more sustainable and higher value crops and cropping patterns. These are all knowledge-intensive technologies that require strong a research and extension system, and skilled farmers. It is a reinvigorated



fun FACT

I play with small children. If I don't find a single child around, I do gardening. If I can't find a place to gardening, I use a treadmill or go for a walk while listening to old romantic songs

interface where the emphasis is on mutual exchange of information bringing advantages to all. The potential of less favoured areas must be efficiently exploited to meet the targets of growth and poverty alleviation.

Holistic Way Forward

Sustainability in farming needs a

ROAD AHEAD FOR HORTICULTURE FARMERS

TECH-LED REVOLUTION



The lack of sufficient and relevant advancements within technology has for long made the farmers suffer the consequences of information asymmetry. Lack of technology to determine the communicable quality assessment of the produce, lack of technology to provide real-time and broader market linkages have led to post-harvest loss through deterioration of quality or a colossal supply-demand mismatch. All of these impact the price realization for the farmer.

fun FACT

Mr Sharma is a numbers and data enthusiast who never says no to a chess game and has countless stories of his travels through rural India

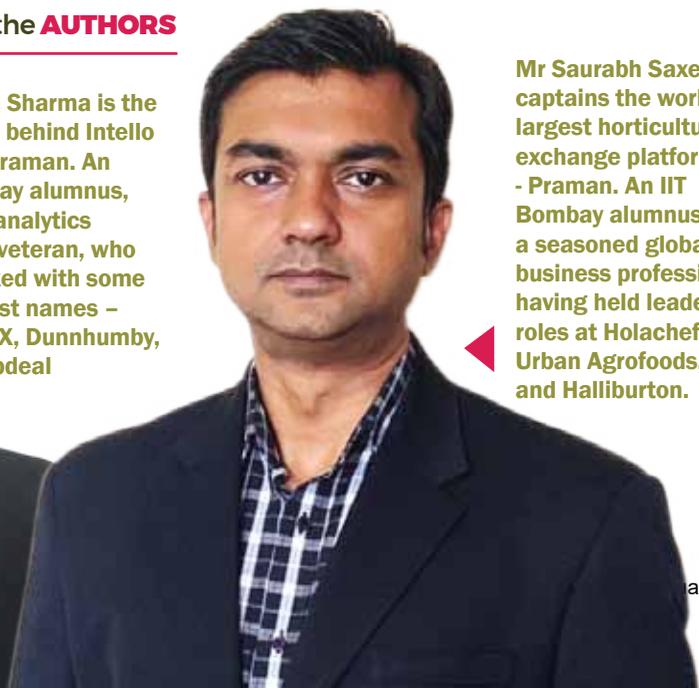
Traditionally, these markets have operated in places where sellers-buyers are physically present at one location. The underlying reason is that there is no way for the seller and buyer to objectively communicate the quality of the agri-produce being traded. Physical presence is used to ascertain the quality of produce. Fundamentally, this necessity of physical presence has limited the ability of the markets to equate supply-demand based on quality and geography.

The onset of Covid 19 forced

About the **AUTHORS**



Mr Milan Sharma is the visionary behind Intello Labs & Praman. An IIT Bombay alumnus, he is an analytics industry veteran, who has worked with some of the best names – MarketRX, Dunnhumby, and Snapdeal



Mr Saurabh Saxena captains the world’s largest horticulture exchange platform - Praman. An IIT Bombay alumnus, he’s a seasoned global business professional, having held leadership roles at Holachef, Anirit Urban Agrofoods, Toppr and Halliburton.

all physical markets to close down leading to huge losses for farmers as they couldn't find markets to sell their produce. This resulted in consumers paying a hefty premium in retail. This shortcoming has acted as a catalyst in bringing sweeping changes within the sector. The result is ground-breaking technology applications which can empower farmers with the ability to ascertain the quality of their produce as well as access broader markets at the click of a button. These applications have also made the process of traceability, warehousing, logistics, and access to formal credit much easier, potentially opening up several export routes for the farmers as well.

Agri-Tech Is The Future

Constant technological advancements are crucial to creating an equitable and symmetric trading market between the buyers and the sellers. As per research reports, technology-aided innovations

fun FACT



Mr Saxena is a coffee connoisseur, vegan by choice and an avid sports fan, who doesn't miss out the opportunity to play a game or two of cricket

(agri tech) will drive the next green revolution in the country. According to a recent EY study (2020), the Indian agri-tech market is still in its nascent stage with a paltry 1 percent penetration by value. EY estimates that it could grow to \$24.1 billion at 90 percent + penetration in the next five years. These numbers make us certain about the hidden potential of this sector.



Technology-aided innovations will drive the next green revolution in the country. Integrating the agricultural and technological sectors together has a positive and lasting impact on all the beneficiaries, but more so on the farmers

Integrating the agricultural and technological sectors together has a positive and lasting impact on all the beneficiaries, but more so on the farmers. There are a number of ways in which the farmers benefit through this integration.

Communicable Quality Assessment and Digital Market Linkage

Communicable Quality Assessment technology will help create an inclusive food value network that helps in bringing buyers from all over the globe and sellers come together. The network helps eradicate the need for on-location auctions and trade which helps bring geographic expansion and market outreach. This fusion helps the farmers in discovering the right market for the quality of their produce and in the process get the most appropriate and fair price offer from the buyers.

Traceability and Transparency

Digital information recording gives farmers an easy way to manage their inventory, follow GAP and therefore be able to supply to export-oriented trades and larger corporates. Digitisation helps bring trust and dependability.

Eradicating Post Harvest Losses

Shortening the time to market and ready access to logistics helps eradicate post harvest losses to a great extent.

Reducing Rejections

The rejection rate on the buyer side immediately goes down when there is access to a larger market where buyers actually wish to buy the product and through objective and fast quality assessment they are able to ascertain that they will get the same quality of produce delivered that they have bought.

Technology has begun to scratch the surface of the agriculture industry. It is a matter of time now that it will revolutionise the way agriculture trade takes place. The trade will become as simple and as efficient as buying clothes from an e-commerce portal.

FARM EQUIPMENT

TRADITIONAL PRACTICES, NEW AGE MACHINES

Agriculture in India is driven by traditional methods and practices, and experiences passed on from one generation to the next, thus making it a regional distinctive implementation of farming. Every decision of the individual farmer is

completely dependent on the feedback from the co-farmers. Raising a crop is not an individual job for a farmer, it is usually collective wisdom.

In the modern age, with rapidly growing technologies and urbanization, mechanization of farming is inevitable. Although we stand second in the world in production, compared to our arable land or cultivated land, it is low in productivity. Fragmented lands of small and marginal farmers who constitute more than 80% of farmers, and lesser involvement of youth are two major hindrances in adaptation of new technology. Traditional practice needs to be given a modern touch by indigenous technologies customised for the Indian farmers. This is where Indian science and engineering graduates can play a big role.

We are building new age electrical farm machines by keeping traditional practices, making its adoption easier among our farmers. The idea was sparked when we took part in a challenge call by NIF India. We found the problem



Oscillo Transplanter can transplant four rows at a time, and has a current capacity of covering one acre in one day with the help of two labour

statement of 'Paddy Transplanter for Indian farmers' challenging, and we are still working on it.

From 2016 to 2018, we balanced both our studies and field trials. These trials were fueled by winning the LEAD Talaash-2016-Entrepreneur Event conducted by Nanopix and Deshpande Startups. After attending our college in the day, we hired a workshop and

About the AUTHOR

Mr Prajwal M is Founder and CEO, Oscillo Machines Private Limited. He has researched on weaver ants and built a mobile planetarium. He is presently building electric farm machines



welder from 5-9 pm, and used to iterate on the idea. During the season, we would conduct tests on the day of transplantation.

Farmer Feedback

We observed after many interactions with farmers that the urge and excitement of mechanization implementation on their own land is low.

We remember one feedback session with a farmer. He was sharing about his son's achievement in academics and he also shared that he didn't want his sons to work in the field.

Another incident relates to when we were collecting feedback from women labourers for transplanting. They were keen about knowing our education background. When they got to know that their sons are also pursuing similar education degrees, they worried about their future, as we are already on the field!

After initial few seasons and successful trials with farmers, we decided to incorporate the company in 2019 with the support from Deshpande Startups. We took part in many competitions and demo days to raise funds to fuel our projects. Finally, we had a breakthrough by participating and winning the Villgro iPitch 2019. Later, our project also got selected in RKYV-RAFTAAR 2020, at the University of Agricultural Science, Dharwad. These funds accelerated our trials and helped us set up our own workshop in Mysore.

Root Washed Paddy Transplanter

We are building a root washed paddy transplanter that can transplant

Electric-DSR (Direct Seeded Rice) Machines

In the future, we are building Electric-DSR (Direct Seeded Rice) machines with six rows, and intergered transplanter which can transplant both mat and traditionally grown seedling in a single machine. This way farmers have a choice of method based on the size of farm land, and can do timely transplantation.

Our motto is "Modernizing Farming with Indigenous Solutions for Local Problems". Our vision is to serve thousands of farmers with indigenously developed technologies contributing to the growth of mechanization of small farmer agriculture in India.



traditionally grown nursery paddy seedlings whose length is from 18-20 cm. In currently available technology, the nursery needs to be grown in trays or polythene sheets in mat type.

Oscillo Transplanter can transplant four rows at a time, and has a current capacity of covering one acre in one day with the help of two labour. The machine is light in weight, and women can also use the machines. We are working on increasing efficiency and conducting more pilots in different locations before launching it commercially.

Electric Poultry Racking and Weeder

Another product developed by us is the Electric Poultry Racking and Weeder, a two-in-one machine that can be used from paddy fields to poultry farms. A simple machine that is battery operated (Lithium Ion) with a backup of 2.5 hours, it can give a decent work time on the field. With multiple attachments, it can be configured as per local needs. We are marketing this product since July 2021, and getting good feedback. Recently we have supplied these machines to Andhra Pradesh, Tamil Nadu, Bihar and West Bengal. Our machines are being used in farms in Mysore, Davangere and Hubli regions.

Our first order from the first customer came with a set of scheduled payment and instructions. Fulfilling our first order fueled our confidence in the product. Our main source of marketing at present is social media, and we are directly delivering to our customers.

**fun
FACT**



**I love stargazing and going cycling
with good music**

TECH DISRUPTIONS EMPOWERING FARMERS

The Indian agritech space is buzzing now with more than 1 billion dollar investment in last three years alone. There are multitudes of factors that have increased the interest of investors across the board. The Indian agriculture sector has been the country's biggest employer as well as the most neglected segment since Independence. It took more than 70 years after Independence for this industry to walk down the road of technological disruptions.

The major drivers of agri tech have been several new-age agri-tech startups inclined towards changing the face of the country's agricultural system.

Scientific Way Of Growing In Challenging Times

Farmers faced huge

losses because they did not know how to tackle unprecedented situations in the past. The introduction of scientific advisory along with support tools like satellite imagery, Internet of Things (IoT), weather forecast, and agri input advisory have been critical in helping cultivators successfully overcome difficult farm situations. These aids are available right from the sowing stage till harvesting, thereby helping farmers to avoid yield losses, pest infections, and other damages. They even allow farmers to store their produce better so that the post-harvest wastage can be effectively reduced. Many companies

offer completely free services to farmers for them to enjoy the benefits that technological solutions bring with them without incurring any cost.



Structured way of market linkage

This is the essence of any agri-tech support available for farmers today. It determines the actual money the farmer takes home for his produce. All these years, producers were always dependent on middlemen and mandi operators for selling their produce. Many times even money lenders, who lent money

Fintechs reach the marginal farmer with 1-acre land with the same enthusiasm with which they approach bigger farmers. Such inclusions encourage farmers to come up with innovative products and secure their future by boosting their earnings

About the AUTHOR

Mr Deepak Yadav is Founder,
GreenSat Innovation Labs Pvt
Ltd



Last-mile inclusion

This is the best part of the data revolution created by agritech. The last person on the farm gets included in the value chain. Fintechs reach the marginal farmer with 1-acre land with the same enthusiasm with which they approach a farmer holding 10-15 acres. Smaller FPOs also get the opportunity to connect with buyers internationally. Such inclusions encourage farmers to come up with innovative products and also allow them to secure their future by boosting their earnings.

The viewpoint of a farmer named Krishna Dhonnar hailing from Nagar district makes a good conclusion for the varied realistic benefits these agri-techs are offering at the grass-root level. He says, "Life has become simple. I have access to all the information promptly. I no longer have to run to banks or deal with pressing money lenders to generate funding. With the help of technology, I can protect my crops from many types of damages. I can even reach out to experts for support. This revolution has helped me improve my income and my family's condition. I am thankful for technology and its entry in the sphere of agriculture.



trade finance for FPOs who export and many more. Availability of such information enables farmers to do what they do best "Farming". Agri-techs with financial expertise are helping farmers get adequate financing even without stepping into a bank.

Battling with climate change

The world is racing against global warming and adapting net-zero models. Farmers are the worst affected as these frequent extreme weather changes and unseasonal weather conditions adversely affect the crops. This is where precision farming tools like satellite imagery and weather forecasting help by limiting the damage. They give farmers the chance to take preventive steps in advance, based on timely weather updates. In addition, they advise farmers on how to protect the crops in case anything goes wrong.

Creating value chains rather than supply chains

Looking at the recent agri-techs and the trends in the sector, it is safe to say that these companies are not simply building the supply chain. Rather, they are focusing on establishing robust value chains. They are doing so by providing farmers with improved techniques, better finance, market linkages, innovative solutions, and insurance support. With technologies like Radio Frequency Identification (RFID), agri-techs have driven home trackability and traceability. The journey of the produce from the farm to fork is now easily accessible by all parties involved - producer, seller and consumer.

for crop growing, predefined their rates. Such amounts used to be so low that they ultimately pushed farmers towards exploitation.

The agritech revolution is fast changing this scenario. Now using crop signatures and similar agritech techniques, both farmers and buyers can pre-decide the price even before the harvesting begins. These modern organisations also advise farmers. They help them with insights regarding what to produce, how much of it, where to sell and when to sell. Such information is generated after analysing the past market trends, current demands and future predictions. These initiatives have enabled farmers to get the right price for their produce.

Organised and need-based financing

Apart from crop loans, farmers need several other need-based financial supports. Many cultivators don't know when exactly they need the money.

Sometimes farmers borrow before sowing, and slowly the money gets spent on personal uses. Later when they require the sum, they have to borrow again at heavy interest cost. Wrong financial planning derails the entire crop cycle and puts farmers in a debt trap.

Agri-techs advise farmers on when to take the loan, how much, at what interest and how to ensure its faster execution. They even educate them about the various financial avenues present like equipment finance,

**fun
FACT**



I love playing with my pet dog Max. Any amount of stress – he takes it all away. Additionally I like to promote the use of recycled water in as many ways I can

DEVELOPMENT OF INDIAN AGRICULTURE, FARMERS' LIVELIHOOD

CRITICAL ROLE OF TECHNOLOGY

Indian agriculture drives the socio-economic growth of the country. Yet it faces numerous challenges. Among the most formidable challenges are lack of finance and lack of knowledge. Indian farmers strain hard to sustain farm productivity. The unforeseen changes in the climate also downgrade agricultural productivity in one way or another.

Despite the technological advancements, Indian agriculture is still marked by traditional farming practices. These make it difficult for farmers to compete and grow monetarily as well as in terms of better yields.

Technological advancements in the agriculture sector are helping a large number of farmers to tackle climatic and knowledge-based challenges. Technology-driven agriculture which is focused on the below-mentioned key issues can immensely help the farmers to practice sustainable farming.

- **Advisory control** - Technology can help farmers to retrieve an accurate set of information that can reduce their reaction time towards any kind of farm issue. Technology provides high resolution data at relatively low cost. It can become a helpful tool for all sections of farmers including the smallholders to address their farming concerns with foolproof solutions.

- **Risk over technology adoption** - There is always a pattern of risks involved with a farmer's decision to let technology take over their traditional

Technology can help reduce chemical usage in agriculture. Making the farming practices as natural as possible is one of the core motives of technology-led sustainable agriculture

farming methods. Surprisingly, technology can not only help in adding quality to the cultivation practices but also to formulate a risk management plan. With these tools, the farmer can be assured of a good yield. With the assurance of a good yield, the farmer can safely practice the combination of technology and sustainable farming.

- **High-quality produce** - Agriculture must ensure ecological sustainability. Farmers also face the challenge of climate vulnerability. Food production

About the AUTHOR

Mr Anuj Kumbhat is Founder & CEO, WRMS



Technology has increased opportunities for farmers to make the best use of their land and skills. Technology-led accurate farming practices can help boost revenue and strengthen the country's economy



and good quality – both are important considerations. In such scenarios, technology can help reduce chemical usage in agriculture. Making the farming practices as natural as possible is one of the core motives of technology-led sustainable agriculture.

Most importantly, with the right technology in place, farmers can manage the water usage efficiently and provide water to the crops as per their specific requirements. Technology-oriented agriculture plans can help farmers to develop high quality plant protein, improve food traceability and adopt biological control measures.

● Supply chain management -

The biggest threat for the smallholders in agriculture is maintaining a resourceful supply chain. The prime issue that farmers face is the lack of yield holding capacity and hence the perishability of produce. Again, technology plays a stellar role in ensuring the minimum wastage of the produce and maximum aggregation, storage and transportation.

Supply chain management focuses on two major areas. These include localized access to advanced storage facilities and swifter access to the markets. This ensures that the produce does not go waste and reaches the end customer in the purest form.

In addition to the aforementioned key areas in agriculture that technology can improve, it can also help farmers in overcoming challenges related to soil, irrigation and even climate change. With



the assistance of technology, farmers who suffer due to sudden climate changes can correctly estimate the climate patterns. In this way, they can proactively adapt to the smart irrigation methods. This shall enable them to prevent any damage on both the yield as well as the income.

These days with the right technology, farmers can timely monitor their crops with an advanced application on their smartphones. More farmers in India are becoming aligned with the technology usage while understanding the basics of Automatic Intelligence that helps in ensuring the right price for their produce, and also higher quality of produce.

Smart and sustainable farming is

not possible without the technology and its correct implementation. The advanced farming practices governed by technology, stimulated by GPS, satellites and robotical analytics have completely changed the dynamics of agriculture in India. Technology has also increased opportunities for farmers to make the best use of their land and skills. Technology-led accurate farming practices lead to precise results. They enable the farmer to secure a higher yield and more value for his produce. In this way, technology can lead to significant saving. It can help boost revenue and strengthen the country's economy by strengthening our agriculture sector.

AGRI-STARTUP ECOSYSTEM

LOST CAUSE OR GOLDEN OPPORTUNITY



To bring a fundamental change in the agricultural ecosystem, we need an active intervention from third parties who are unprejudiced of all the pertaining issues, keep economic and societal growth at the core of their focus, and show exemplary dexterity in performing their tasks along with the deft to correctly navigate the resources. Here is where the role of Agri-tech start-ups come in the abstract picture. There can be no better opportunity than this to boost the potential of these start-ups and better fix the mixed economy system of India and stir it up.

Intending to strive for perfection, these start-ups amplify the standards of their products and services from the very foundation. The start-ups can help smash the traditional labour-intensive ways of farming activities and help the farmers be more self-sufficient and reliant on technology and data rather than going with the gut. Quite a few notable start-ups like DeHaat, AgNxt, Fasal, NinjaCart, CropIn etc., have raised funds from the

About the AUTHOR

Mr Gaurav Narang is a graduate of IIM Calcutta and a serial entrepreneur. In 2017, he co-founded CityGreens, a start-up offering smart farming solutions for controlled environment agriculture. Mr Narang has won various national and international honours like Aspiring Leaders 2019 by St. Gallens Symposium, Switzerland, Agri Startup runner up award 2021 by FICCI and grants totalling 3.5 Mn from GOI for innovative work by CityGreens





market to increase their reach and take their product to the next level.

Then there are start-ups working in the shadows, operating in a bootstrapped fashion to develop technologies and solutions that can bring ground-level changes in the Agri ecosystem. CityGreens, which I happen to co-found with Shweta and Rahul, is one such start-up that offers smart farming solutions for controlled environment agriculture.

Let me elaborate through an example. The graph below shows the yield comparison for tomatoes and capsicum, the two important horticulture cash crops grown by farmers at scale in India.

It is disheartening to note that we are at less than half of the world average. Moreover, when it comes to the highest producing nations, we are hardly at 20% of their levels. If we analyze these gaps, we will observe that these gaps are primarily due to a lower use of tech in Indian agriculture compared to the evolved nations. And why is the tech adoption so low? Because of high costs and low skill level of our agri workforce.

On the positive, this presents an immense opportunity for start-ups to bring in interventions to narrow the gap. For example, can you create technologies (or even adopt the ones already developed) for the Indian market that are easy to use for an average

The government should treat Agri Startups that are involved in the activity of farming as farmers

farmer, are available in vernacular languages, at a price point that the Indian farmer can afford to pay (out of the improved profits due to technology adoption)? If yes, you can build the next Unicorn, my friend.

Considerable Gap In Technology Adoption

Though it is evident that there is a considerable gap in technology adoption in agriculture, and thus an immense potential and opportunity for

Agri start-ups to fill that gap; yet, there are only a handful of Agri-startups that have scaled up nationally or raised a considerable sum of money. Coming from a nation of 20+ IITs and IIMs, we have less than 1,000 odd registered agricultural start-ups, a metric no Indian can be proud of. Moreover, the rate of failure of Agri start-ups is relatively high, and the gestation period for investors to see their returns is quite long. This dual-issue limits the potential to which Indian Agriculture can scale up.

For the Agri Start-ups to reach their potential and succeed both nationally and internationally, the ecosystem must start providing a helping hand. A few quick and easy interventions from the Govt. can be around offering tax holidays for the Agri Start-ups, treating them at par with the farmers when it comes to offering policy sops, sponsoring the R&D efforts financially and logistically, through tie-ups with various institutes having good infrastructural facilities or routing the companies CSR funds etc.

The government should treat Agri Startups that are involved in the activity of farming as farmers. It's ironic that even after 75 years of independence, even after leaving other profitable pursuits and dedicating their lives to agriculture, the new-age Agri start-ups and their founders are not treated as farmers in the Govt. rule book. Yours truly included.

fun FACT



I run half-marathons. Have completed 25+. I read books almost daily. I like teaching and am guest faculty at IIM Kashipur. I regularly teach and speak in other colleges on Entrepreneurship

RAY OF HOPE IN INDIAN AGRICULTURE

If a farmer is rich so is the nation. Agri Start-ups are disrupting the Indian agricultural ecosystem for the better.

The Indian agri-start-ups can be broadly divided into two categories. One follow the margin-based models where start-ups earn on the margins on the buy-sell model. The other is the subscription-based model where start-ups helps farmers boost production with a mix of hardware, software & services.

There is an increasing interest among investors and star-ups in the agriculture space that are solving the missing links in the agriculture value chain, bringing technological advancements and providing superior services for both the farmers and the end consumers. From weather forecasting, drone use, farm automation, smart

poultry to online food market, the new age start-ups are disrupting the space and redefining the rules of farming.

Challenges In The Indian Agri-Start-Up Space

Uncontrollable factors like weather, soil condition, market fluctuations and topographical conditions are the major challenges for farmers. Some of the challenges that the agri start-ups face are:

1. Unpredictable Climate change and availability of water
2. Lack of Technological Advancement and Innovation
3. Getting Funded:

There is also a lack of proper implementation of policy level incentive, support, rural incubation and expert guidance for budding start-

ups in the space.

4. Government Policies and Infrastructure

Impact and Key Trends of Agri Start-ups

A lot of interesting development and key trends can be observed in the space. Big Data Analytics, Internet of Things (IoT), AI and Agri Biotech are some of the key areas that are driving changes in the agri-start-up space. Other key trends in the area include: shift towards precision agriculture, controlled environment agriculture, drones and connective agriculture that are keeping the Indian agriculture ahead of the curve. Agri-start-ups in the coming years will help farmers to produce tastier, more nutritious and eco-friendly produce. There is a growing interest among investors for investment in dairy, poultry, aquaculture, horticulture and food processing too.



About the AUTHOR

Mr Abhishek Negi is the co-founder of Eggoz - the egg-focused consumer brand with high-quality, chemical & antibiotic-free farm-fresh eggs from local farmers straight to consumer tables. Within a short span of four years, Eggoz has emerged as a leading name in Delhi NCR and North India for top-quality egg distribution & supply



Opportunities And The Road Ahead

Indian agri start-up have a long way to go. Here are some of the opportunities and how it will impact farming in the coming decade:

Data Led Smart Farming: With the penetration of smart phone and internet in the rural market, farmers have access to a pool of information that they didn't have before. Start-ups in the space can now create smart apps that provide real time data of farming and farm land to farmers to help them yield more. Farming in general will be more digitized, connected and smart. Additionally, smart allied farming activities can now be developed and grown with the help of technology and internet connectivity.

Mitigate Climate Changes: Since agriculture in India's is vulnerable to climate change, agri start-ups can focus to solve the impact of changing weather and extreme climatic conditions. Agri start-ups can come up in the space and develop farming based on climate mitigation and build resilience within the Indian agriculture community.

Understanding Soil Science: Agriculture for the most part is highly dependent on the quality of soil. Technological innovation in the future can provide farmers the data about the quality of soil, on-site soil moisture, temperature & humidity. Agri start-ups in this area can also help farmers on genetics, soil fertility, climate conditions, harvest and yield.

Rise of Sustainable Food and Farming: There is a growing concern among consumer about chemically laden food and thus the demand for safer and hygienic food and raw materials are on the rise. Agri start-ups in the space have the opportunity to bridge the demand and supply gap of more fresh produce, harvested and delivered and on-demand products for customers. There will also be a shift towards organic based farming practice in the next decade.

EGGOZ
NUTRITION

Use of Alternative Energy: As India aims for net zero carbon emission by 2070, agriculture will play a crucial role in it. Start-ups in the space has a huge opportunity to harness renewable and alternative energy for farming. Sustainability, mitigation of natural factors, and reducing wastes will dominate the research and innovation space in agriculture in the coming decade.

The future will bring affordable, accessible and easy-to-use technologies and innovation in the agriculture space that will empower the farmers and provide better services to customers. Indian Agriculture Start-ups will usher in a new dawn for the agricultural industry and this is only the beginning.

The Indian agriculture is witnessing an unprecedented growth and evolution. The boom of new age agri start-ups and the technological advancements will pave the way for smart, AI and data led smart farming that will produce better yield and be both sustainable and hassle free.



I like to read books, play badminton, go swimming, or generally hang out with friends and family to bust stress

NATURAL ESSENTIAL OILS

HIDDEN TREASURE OF AGRICULTURE SECTOR

Essential oils production is highly promising for the farming community.

1. Essential oils are produced from non-conventional crops such as Lemongrass, Davana, Palmarosa, Basil (Tulasi) etc.

2. The shelf life of the essential oil is three years under proper storage conditions which prevents distress sale.

3. Also the essential oils are produced by processing the harvested crop at the farm level itself. Hence value addition is done at the farm level fetching good price for farmers.

Essential oils are active ingredients to many major industries such as Pharmaceutical, Cosmeceutical, Nutraceutical, Flavor & Fragrance industry, Aromatherapy, and FMCG. In flavor industry, they are majorly used in toothpaste, beverages and confectionery. In fragrance industry, they are used in cosmetics, perfumes, agarbattis, room fresheners, floor cleaners etc. In health and wellness, they are used for Cold, Cough, Headache, Skin care, Hair Care etc.

Most of the current market for this product is export driven. USA, Western Europe and Japan are the major Consumers. Global essential oil market is expected to grow by CAGR 9.57 % during 2021-2028 period (Fortune Business Insights). Domestic consumption is less, nevertheless it is increasing.

Global Essential Oil Market

World wide, approximately 300 important natural fragrant raw materials are in use. Out of them, 50 % are cultivated. Rest are obtained from wild or as by product of other industries. Out of the cultivated raw material, only 110 essential oils comprise 95% of global consumption in fragrance and flavor industry. Out of this, there are 31 crops for which India is well known. Nearly 21 crops which are grown in India but not at

a level of global significance. India has made global impact with essential oils of Menthol mint, Sandalwood, Jasmine, Tuberose and Spices.

Potential of Essential Oil Industry

India has scope to make global impact in other essential oils which are less cultivated such as Vetiver, Patchouli etc. Growing Innovations in food industry using spice oils and growing demand for natural products in place of synthetic products in personal care and wellness are boosting the essential oil industry. India can bank on its varied climatic and soil conditions to grow the essential oils which are on demand in the market.

Benefits in Essential Oil Production

1. Most of the essential oil crops like Lemongrass, Palmarosa, Holy Basil, Citronella are perennial crops. Once cultivated, a farmer can reap the harvest for every 3 to 4 months for about 4 years of the crop. Farmer will have steady income through out the year.

2. Farmer would have the initial cost of land preparation and seeds only once for 3 to 4 years.

3. Most of the essential oil crops are drought resistant and require minimal irrigation.

4. Essential oil crops are flood resistant.

5. Most essential oil crops are pest resistant.

6. All of the essential oils have a



About the AUTHOR

Dr Siva Mahesh Tangutooru, a first generation entrepreneur, is Co-Founder and CEO, TurfPearl Agritech, the natural plant extracts company. Dr Vishwa Priya Podduturi is Co-Founder, TurfPearl





Along with the essential oils, the market for medicinal crops and herbal products is unfolding at a fast pace and holds great potential for future

shelf life of upto 3 years under proper storage conditions. Hence they prevent distress sale.

Challenges in Essential Oil Production

1. At farm post harvest processing unit should be available for the farmer. It costs minimum 3 lakhs for setting up the unit.

2. It is not viable for farmers with small land holdings of less than 5 acres.

3. Essential oils are not traded in regular farmer markets. Farmer himself has to reach out to the buyer. As there are few players in this field, farmer often finds it difficult to sell his products unless he finds a trusted buyer.

4. As essential oils are raw materials for industry, their quality plays a major role in the market. Farmer has to be aware of the desired industrial quality of his product and the optimal parameters required for cultivation and harvesting to get the desired quality product.



successfully reached out to more than 5000 farmers across India.

1. We market more than 200 MT of farmers essential oils which is produced from 15,000 acres produce every year.

2. We have driven the farmers towards cultivation of new crops in this field which are in demand such as holy basil (tulasi) and guide them from seed

sowing to final product selling.

3. We played an advisory role to all our farmer suppliers by consistently updating about market requirements.

4. Encouraging farmer clusters with one farm processing unit for a group of farmers to make essential oil production viable for them.

5. Continuously matching the farmer product with the industry needs.

Hurdles in the Journey

1. Gaining farmers trust: We as a team organized many farmer meetings at village level and did model farming and setup the processing unit to help understand the financial dynamics of these crops.

2. Consistently matching the quality of the product to the industry requirements was a challenge as the quality is very much dependent upon the seed, the climatic conditions and also the harvesting time period.

Future Prospects

The essential oil market is continuously increasing and hence there is great scope in this field. Along with the essential oils, medicinal crops and herbal products such as Aswagandha, Bacopa, Senna, Garcenia etc whose market is unfolding at a greater pace of CAGR 18.9% through 2030 (InsightSlice) holds a great potential for future.

TurfPearl

We have started our journey with agriculture and essential oils in 2018 by incorporating TurfPearl Agritech Pvt Ltd. Though from a non-agriculture background with education and working experience in biomedical engineering field, the essential oil products and its promising future has driven us into this field. Since our incorporation, we have

fun FACT

Dr Tangutooru loves to play with children, watch cricket and holiday in crowd- free destinations

VALUE CREATION

AGTECH START-UPS

POWERING NEW WAVE OF ECONOMIC GROWTH

\$ 370 billion sector could well transform on the back of significant technology and regulatory changes, along with the emergence of several start-ups. According to a PwC report, India is in third position after the US and China in terms of AgTech funding. According to industry estimates and the PwC report, start-ups in Indian AgTech are likely to receive a record \$1 billion this fiscal, taking total investments to \$2.5 billion since 2012 with a further \$10 billion expected in the next decade.

With India's digital ecosystem witnessing healthy tailwinds through affordability and availability of high-speed internet and maturing digital content, it presents exciting opportunities for innovation in agriculture which leverages next generation technologies such as AI, ML, IoT and Software as a Service (SaaS). The Government is also using this window of opportunity



About the AUTHOR

Mr Ramesh Ramachandran is Senior Vice President (Strategy & Farming as a Service) Mahindra & Mahindra Ltd. He is also on the board of three agri-tech start ups - one each in India, Switzerland and Canada.



as evidenced by its proactive initiatives on conceptualizing a national agri stack and developing a regulatory framework for the use of drones in agriculture.

The AgTech sector is abuzz with the increasing flow of growth capital into start-ups that play across the value chain from market linkage to financing to precision farming to mechanization services. This fast-growing start-up ecosystem is bringing new business models that seek to address several legacy challenges in the industry. But what will it take for start-ups to translate buzz and big valuations into meaningful on-ground impact that materially contribute to doubling farmer income?

Here are 5 pointers based on Mahindra and Mahindra's experience with Krish-e, an in-house AgTech vertical focused on Farming as a Service.

Show me the money

All roads lead to value creation for

farmers. Unless technology based solutions can deliver incremental value add for farmers they will neither adopt nor stick with those solutions. While acceptability of digital solutions will no doubt be aided by the rapid increase in rural smart phone usage and the increased comfort level of using digital devices, the truth is adoption requires a clear demonstration of incremental value. At Krish-e we focus relentlessly to ensure farmers and other adopters in the ecosystem see a positive impact on their income per acre and a rapid payback on their initial investment.



Phygitize the model

Agriculture is intrinsically a physical activity and despite the pandemic triggered spur to move digital, most farmers still require physical validation and presence. To trigger changes in farmer behaviour, on-ground solutions and activities have to come together with digital ones. On-ground advisory and rental solutions deployed on Krish-e Takneek plots (demonstration plots) create empirical evidence for farmers, build trust and local relationships and make physical transactions easier. Krish-e's digital solutions meanwhile bring a unique set of insights and use cases for farmers and other stakeholders. For instance, an AI powered advisory app (Krish-e Nidaan) enables farmers to diagnose pests and disease in real time and get a remedial measure. An IoT solution for rental entrepreneurs (Krish-e smart kit) enables them to remotely monitor their machine activities through an app, in real time.

Growth is good but beware of growth hacks

As start-ups it is easy to fall into the trap of short-cut and often unsustainable solutions to drive growth in key metrics. Start-ups need to ask themselves whether they are growing by creating long term value for users or by enticing farmers and users with unsustainable offers. A good way to create a business for the long term is to ensure that all

All roads lead to value creation for farmers. Unless technology based solutions can deliver incremental value add for farmers, they will neither adopt nor stick with those solutions

key activities genuinely address the big problems in Indian agriculture. At Krish-e we anchor our efforts around delivering higher income for farmers and ecosystem players through better agronomy, better mechanization and better use of new advanced technologies. Hyper scaling is still possible through creative on and off-line operating models. For instance, Krish-e started with 10 Takneek plots

a little over 2 years ago and today that has grown to 4000 live plots.

Spin a partnership web

From our Krish-e experience it is best to work with and in a web of partnerships. We work closely with technology partners who bring expertise in remote sensing, imagery analytics, IOT and AI. Working closely with them we translate cutting edge technologies into farmer solutions quickly and frugally and to enable this we have in fact invested in 3 such start-ups, though we work with several more. We also work with a network of on-ground service providers who collaborate with us to educate and influence farmers, deliver on ground services, and improve farmer practices. We consider them technology partners too from a go-to-market perspective.

Offer integrated solutions

For start-ups like Krish-e, focused on helping farmers and B2B customers cultivate better and get more from an acre, it is vital to offer integrated solutions. To deliver tangible on-farm outcomes Krish-e integrates agronomy, equipment rental, apps and precision farming. Creating an integrated but simple farmer experience is a rewarding and ultimately winning strategy as it creates loyal farmers and a more productive agriculture sector. It is our belief that start-ups who excel in delivering superior per acre outcomes for farmers will be better placed to attract partners from other players in the Agri value chain.

AgTech start-ups are here to stay. With their innovative approaches there is no doubt that the agriculture sector will transform in the years to come. The speed of transformation is difficult to predict but the die is certainly cast, and new manufacturing and service opportunities are already emerging. It is energizing to think that the growth of AgTech start-ups can power a new wave of economic growth – driving India to its goal of becoming a \$5 trillion economy by FY25.



fun FACT

Mr Ramachandran likes long distance running and playing Indian percussion instruments. He finds sports and literature sources of enduring inspiration

DAIRY STARTUPS

CHALLENGES,

OPPORTUNITIES

There are immense opportunities and also challenges for start-ups in the dairy sector.

The Indian dairy sector has huge potential for our youth. There is a big margin between demand and supply of milk in India. Demand is almost four times of the supply. This difference is what creates huge opportunities in this sector.

Startups in dairy sectors have three scenarios.

- 1) Milk production through natural resources
- 2) Milk collection
- 3) Branding and breeding



All these are inter-connected. A startup can begin with milk collection and branding. Youth from the rural areas can also opt for milk production and breeding.

Milk production from natural resources which include dairy animals may be a big investment. One needs training and experience to handle it well.

Milk collection and branding is comparatively easier. It includes the collection of milk from rural areas and converting it into a value addition product. Branding is the easiest part as everyone needs fresh and pure milk. If one maintains quality and freshness, one can benefit from word of mouth publicity.

Value addition of milk is necessary for higher profitability for the investor and also for the farmer.

For example a start-up has a tie-up with some farmers of a village. It purchases full cream raw milk at Rs 36 per litre from a farmer as per fat content. Now the start-up will sell milk with different fat variants. If we talk about pasteurized full cream milk, it is available in the market at Rs 58 per litre which includes all operating, processing and handling expenses. This way, value addition of milk will work better.

One can earn even more by converting the milk into products like Curd, Paneer, Khoya, Lassi. Now the profits will increase by 30% to 50%. The start-up will be able to pay farmers more, so that they benefit and stay associated with him.

Startups in dairy sectors can play a vital role to boost the economy. Successful start-ups improve job creation, increase farmers' income, generate employment and ensure a healthy society.

The dairy sector has huge potential for our youth. There is a big margin between demand and supply of milk in India. Demand is almost four times of the supply. This difference is what creates huge opportunities in this sector



About the **AUTHOR**

Mr Mohit Bajaj is a dairy entrepreneur based at Bareilly in Uttar Pradesh





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