# Transforming Rural India Through Agricultural Innovations: Some Major Startups

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**Abstract**

Indian agriculture is at the crossroads. The erratic weather and lackluster prevailing policies have made dependence on agriculture a trailing proposition. A third of Indian farmers are rapid adopters of technology, another third of them are slow-going, and the rest are not likely to use modern technology at all. The NDA government has promised to put agriculture and rural development in spotlight, with various schemes and their upgradations, the government has announced some measures in order to revitalize this sector. In this research paper author have studied about some of these innovations with respect to productivity, risk management and security, and tried to explain the working of these innovations on grass route level and most importantly, would these innovations make agriculture sustainable and globally competitive?

Innovations like 'Barrix Agro Sciences' a Bangalore based startup to the 'CropIn technology solution' or India's largest weather monitoring and risk solution Company 'Skymet' providing offers services such as weather forecast and agriculture insurance have been studied, as well as the technical innovations made in agriculture insurance in the recently launched PMFBY have been analyzed in this paper. After the study we can conclude that 'Indian Agriculture requires innovation rather than subsidy'.

**Keywords**: Agriculture, Innovation, Technology, Insurance.

## Introduction

India's Department of Agriculture says the pace of farm mechanization has been poor, seeing only 2% annualized growth in the decade from 2001 to 2010. The need for greater mechanization and higher productivity is a sorely felt in the sector. Agriculture accounts for only 16% of India's GDP, even though it contributes nearly half of all jobs. When PM Narendra Modi recently attending an Agro based press conference seen as a relieved man, his happiness was on the account of positive signs from the IT sector development in agriculture. He said "I am not concerned at all about monsoon and hoping that improved policies, programs and innovative startups would aid the farm sector, which underpins the country's fast growing economy". Based on the analysis of conditions and policies he went on to predict a growth rate of 7.5 % to 8 %.

Despite the share of GDP decreasing over the time, agriculture still remains the backbone of the economy and without its growth the expectation for higher growth rate is impractical. In the physiocratic sense, agriculture is the producer of primary wealth. It brings together various cosmic forces accumulated over the millennia to produce seeds of various kinds. It is still the provider for wage goods like food, fiber and fuel, providing raw material for a large industrial sector. Nearly about 55% of population depends on agriculture and hence the country's fate depends

on it. If agriculture goes weak, nothing else would go stronger for the economy so this can't be ignored. The governments, both at the centre and the states, have learned the lessons the hard way by ignoring this vital sector.

Since independence, apart from the success of the Green Revolution, which made India self sustained in agriculture, most of the other programmes launched by various governments have fallen short of the expectations. Either they never got started due to bureaucratic tangle or got stuck in the pilot stage itself or if extended on a wider scale, the benefits never reached the people they were meant for. The government allocation to agriculture has never increased significantly, but subsidies and trade liberalization offset the decrease in government spending to some extent. Now the working of policies and programmes also focuses on the innovative ideas for the development of this sector. Coming to power with the backing of farming community, the BJP led NDA government swore to bring the smiles and prosperity back to rural India. Within a period of two years after the formation of government, there are a number of policies and programmes launched that focused on the innovative way of working by ideas or by innovative techniques. Here we are going to study some basic innovation regarding the upliftment of the agriculture sector prevailing currently. As we know innovation leads to change, and that change is highly required by current scenario of agriculture in India.

## Literature Review

**Sharad Joshi,** former Rajya Sabha member said, "Agriculture is the basic source of wealth and also the prime mover of the demand function. India being a developing economy, even the role of agriculture sector is more of importance as providing livelihood to nearly about 55 to 60 % of population, and in India it also provide a cushion for the ratio between the urban and the rural incomes".

**P.C. Kesavan,** Distinguished fellow at the MS Swaminathan Research Foundation says that, "Some of the programmes seems to be capable of bringing in structural changes of a more permanent nature and are conducive to boost the agricultural sector, provided these are implemented without distortions and dilutions. Sustainability in agriculture can't be achieved with only sustainable management of the natural resources and attractive policies".

## Objective of the study

The paper studies about the innovations by government or by private startups where they focused on increasing productivity, providing security, while being sustainable The states of India, its territories and the village areas have been targeted as the major elements under this. The projects under the agenda and their impact on the states, are key objectives of this study.

## Research methodology

The research is descriptive and analytical in nature where facts and information already available are used. Which are analyzed to make a critical evaluation of the innovations.

## Innovations: That made the change

1. **Barrix Ago Sciences**

The Bangalore-based startup offers eco-friendly crop protection methods after much research on products that support organic farming to increase crop produce and quality with minimal expenditure. Instead of pesticides, it makes traps that use pheromones to attract crop-damaging pests and flies.

The Venus flytrap: Kundal Mallareddy, a farmer in Karnataka's Bidar district, uses 50% less pesticide than he did until three months ago, when he switched to pest-control traps produced by Barrix Agro Sciences.

A Fruit Fly Trap made by Barrix Agro: Vishak, another farmer based in Mulbagal district of Karnataka, says that using the fly traps has made it easier to ensure healthy crops during the monsoon. "During the rains the pesticides would get washed off and we would have to apply more and more pesticide. The fly traps work even then, which makes things easier," he says.

**Products:**

- Barrix Catch Fruit and Fly Lure + trap: Toxic pesticides contaminate water, soil and leave behind harmful residue, besides being expensive. Barrix's pheromone-based pest control traps have artificially synthesised smelling agents that attracts and traps pests. Instead of eating the crops, the pests are attracted to the pheromones in the traps.
- Fly pest sticky sheet: Barrix uses bright yellow and blue coloured recyclable sheets of wavelengths between 500 nm to 600 nm, proven to effectively attract and trap at least 19 high-risk pests from a long distance.

**2. Anulek Agrotech**

Sagar Bhansali, a Mumbai-based entrepreneur, set up Anulekh Agrotech, which sells a product called Biosat to farmers in Maharashtra and Gujarat in 50 kg bags. The product, is made using biochar, a soil additive, to improve fertility, thereby reducing reliance on chemical fertilizers. "The product itself is not an innovation. It's more of a discovery. The Amazonians used [this] technique that helped them get better crops," he says. Similar products were available elsewhere, "but we innovated on the side of supply chain and business model to make it more affordable for Indian farmers," he adds.

Laxman Rajve, a farmer from a village named Karanjgaon in Maharashtra has used the product for two years now. "I have two plots of five acres each on which I grow grapes. The grapes have been bigger and healthier since I started using the product," he says. This, he adds, has helped him get a better price on the grapes, pushing up his profits by ₹700 ($11) per quintal.

**Product:**

BIOSAT: BIOSAT (Biochar based organic Soil Amendment Technology), a soil additive, is made of biochar mixed with different organic nutrients. The product preserves soil fertility, traps carbon emissions, maintains the topsoil strength and increases crop production, thus reducing dependency on chemical fertilizers.

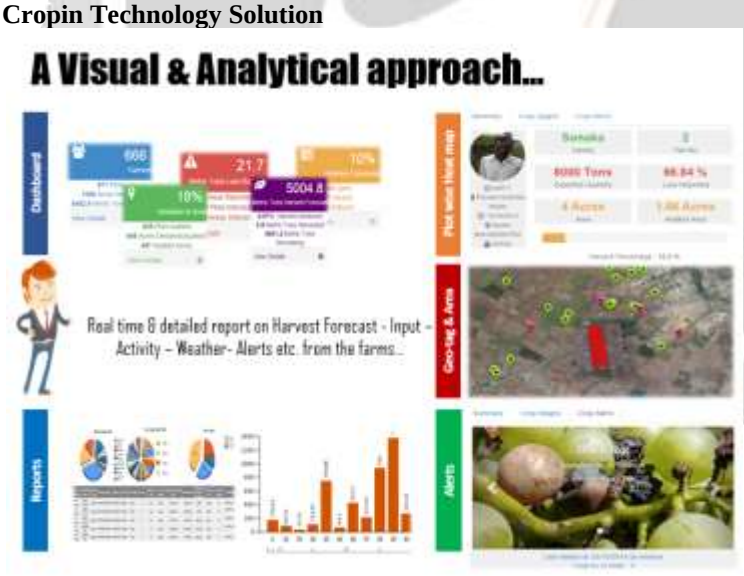
**3. MITRA**

A Nashik-based startup, MITRA (Machines, Information, Technology, Resources for Agriculture) aims to improve mechanization at horticulture farms with the use of R&D and high quality farm equipment. The company has developed sprayers for vineyards and for pomegranate farms. “Sprayers are used for adding hormones that help the growth of crops amongst other things,” says founder Devneet Bajaj, previously a principal at a private equity firm specia lizing in agribusiness. “Farmers would otherwise have to use a process of manual dipping that needs a lot of labor.”

**Products:**

Air blast sprayers: Developed for fruits and vegetables in general, and grapes and pomegranates in particular, the sprayers, used to add hormones that help the growth of crops, reduce the expenditure on manual labour and are less time-consuming. The machines his company has developed are up to 30% cheaper than sprayers available in other parts of the world and take half an hour for an activity that would otherwise require 10 to 12 laborers for a whole day.

**4. Cropin Technology Solution**




In 2010, Bangalore software engineer Krishna Kumar set up a farming technology solutions startup called CropIn Technology Solutions. The technology is a cloud-based platform, integrated with a mobile app for Android, which allows large food companies to track the growth of crops on farms around the country. It provides agri businesses the technology and expertise to create a smarter and safer food supply for consumers around the world. The software tags what is grown in the fields and the conditions in which the crops are grown at the farm level and enables companies to remotely monitor farms, ensure the farmers adopt better agricultural practices and make every crop traceable.

**Product:**

CropIn offers information on a cloud-based platform, integrated with a mobile app for Android. Called Smart Farms, it allows large food companies to track the growth of crops on farms around the country with details about what the crop is and the conditions it is grown in to help companies remotely monitor farms, interact with farmers and make every crop transparents and traceable. It also aids farmers in adopting global agricultural practices and improves productivity by offering productivity insights and harvest forecasts.

5. **Eruvaka Technologies**

Eruvaka Technologies, based in the coastal Indian city of Vijayawada in Andhra Pradesh, has also developed technology to track farm conditions remotely, but specifically for aquaculture farmers. “The solution allows farmers to measure the water quality, the levels of dissolved oxygen and the PH level remotely on a Smartphone” explains Sreeram Raavi, founder of Eruvaka Technologies.

**Product:**

The device Eruvaka has developed, Floating Sensor Buoy, is placed in the farm and has sensors measuring the parameters that allow the maintenance of a healthy environment for growing fish and shrimp. The device has a battery and solar panel, as well as wireless connectivity through a SIM Card mounted on the buoy, and can alert the farmer of a drop in any parameter through a text or phone call. Raavi’s technology also ropes in cloud computing and data analytics to help study the changes in water quality in detail to be able to predict an oncoming problem. The collected information is uploaded on the cloud and transmitted to individual customers through an Android app, SMS, voice call or the internet. Farmers can also remotely control automated equipment such as aerators and feeders.

6. **Skymet**

Skymet is India’s largest weather monitoring and agri-risk solutions company. According to their website, they are the experts in measuring, predicting, and limiting climate risk to agriculture, thus reducing losses incurred due to bad weather conditions.

**Product:**

Launched to aid farmers, Skymet’s weather website offers services such as weather forecast, crop insurance and agri-risk management. Prediction of weather conditions can help prepare a farmers for a drought or heavy unseasonal rainfall and help them take appropriate preventive measures, they say and claim to accurately measure and predict yield at the village level for any crop.

7. **Ekgaon**

A Gujarat-based venture, Ekgaon Technologies is an IT based network integrator that provides a technology platform and offers a range of services to farmers in rural areas including financial, agricultural inputs and government assistance.

**Products:**

- Financial: A mobile phone enabled financial services delivery platform, it provides information on microfinance institutions and banks for delivery of door-step services such as credit, savings, remittance, insurance, investment and mortgage.
- Agricultural: Offered in Hindi, Gujarati and Tamil languages, the system uses mobile, voice recognition, interactive voice response system (IVRS) and web technologies to provide information on weather, commodity market prices, soil nutrient management and crop management.
- Citizen: The web and mobile applications help citizens monitor the delivery of government programmes and services entitled to them.

**8. Digital Green**

Digital Green is a not-for-profit international development organisation that focuses on training farmers to make and show short videos where they record their problems, share solutions and highlight success stories as community engagement to improve lives of rural communities across South Asia and Sub-Saharan Africa.

**Products:**

- It uses technology-enabled behaviour change communication that is cost-effective, scalable and brings together researchers, development practitioners, and rural communities to produce and share locally relevant information through videos.
- Two social online games Wonder Village and Farmer Book: In the games, players simulate a village economy and relate with actual farmers that Digital Green works with, on the field. The players are placed in a resource-constrained setting in which they have to complete quests such as set up paddy and maize farms and supply raw materials to the farmers' markets.

**9. Frontal Rain Technologies**

The Bangalore-based agri-tech startup seeks to deliver affordable advanced technology solutions for emerging companies and take technology to remote corners of the country.

**Product:**

- The company's offering Rain+, according to their website, is a comprehensive suite of products on the cloud for food and agribusinesses. Rain+ can help companies at every stage of the value chain starting from growing, processing, logistics, wholesale trade, retail trade and exports. This technology, accessible through desktop, tablet and mobile devices, is used by companies dealing with commodities like spices, herbs, basmati rice, seeds, animal feed, sea food, dairy and edible oil.

**10. Agrostar**

A Pune-based 'direct to farmer' m-commerce platform, Agrostar strives to provide quality agro inputs at the farmers' doorstep.

**Product:**

AgroStar enables farmers to procure a range of agricultural goods such as seeds, crop nutrition, crop protection and agri-hardware products by simply giving a missed call on the company's 1800 number or through their mobile app to eliminate unavailability of products, substandard products, duplication and adulteration.

**Suggestions as to retain youth in farming**

For retaining the youth in farming, the government should provide some alternate means of livelihood, as dependence on farming alone is highly risk prone. This is possible by establishing some agro processing industries in the villages and allowing the farmers to work in rotation according to their convenience without clashing with their farming operations. Farmers can be made as share holders in this type of enterprises and the profit can be distributed among the shareholders as per their contribution. This is expected by forming some farmers' associations in the similar lines to that of Maharashtra where they have crop associations and they are running even agribusiness centers. This needs initiatives from farmers themselves and the local government should also help them to forge ahead by providing some initial help.

In all above, gender mainstreaming and development, and use of modern ICTs (Information and Communication Technologies) for effective transfer of technology also contribute to enhance the food production and thereby food security of the country..

**Future Innovations Required in Research, Policy and Institutional Dynamics for Agriculture in India**

Once again, if we have to see a significant growth in agriculture, we need to put together the united efforts of all the stakeholders with innovations in research, policy and institutional dynamics. Scientists and agriculturalists strongly believe that with the right technology, public policy and institutional initiatives, India has the potential to be the leading producer and exporter of food produces in the world rather than struggling to feed its own population. The experience from the Green Revolution has also shown that besides technological advancements, supporting institutions like credit, land reforms etc., as well as incentives like prices, are of great importance for technology led growth in agriculture. Now, the agriculture sector calls for major reforms, from marketing to investment, institutional change, especially new technologies in water management, land markets and creation of efficient value chains. For achieving sustainable security in food production we need to give more emphasis on two major cereals, rice and wheat. In addition to this, we also need to make use of the frontier technologies viz., biotechnology, nanotechnology, remote sensing, GIS, genome sequencing, marker assisted technology, weather modeling etc to come out with solutions for ever increasing demands in food production.

**Conclusion**

Agriculture is the back bone of Indian economy as it supplies raw material for many of the industries and it is the source of livelihood for majority of the rural population in India. There had been innumerable transformations in cultivation practices of crops to suit the demands of the populace. Parallel to that number of innovations were also part of these modifications which were successful in changing the face of Indian agriculture from mere 'Sip to Mouth' position to the present proud position of 'self sufficiency' and earning a sizeable amount of foreign exchange from agricultural exports. However, we cannot be complacent with these achievements as the demand for food is ever mounting due to persistent increase in human and animal population in the country. Hence, it is very much essential to take the stock of the situation and search for new innovations which can enhance the productivity without causing much damage to the environment. Greater scope for further improvement in yields of food grains in India is the strength for Indian agricultural science. Future research needs to concentrate more on climate resilient agriculture safeguarding the natural resource base in order to make our future generations thrive on this living planet

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