



SPECIAL ISSUE

Peer reviewed

Vidyawarta®

MAH/MUL/03051/2012
ISSN-2319 9318

Peer Reviewed International Refereed Research Journal

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**Dr. Patangrao Kadam Mahavidyalaya,
Ramanandnagar (Burli)**

Tal: Palus, Dist.: Sangli, MH (India) 416 308

Reaccredited by NAAC 'A++' Grade with 3.53 CGPA

Affiliated to Shivaji University, Kolhapur

ICSSR, New Delhi Sponsored Two Day National Seminar On

**"Agricultural Transformation and Rural Development
in India: Issues, Challenges and Possibilities"**

Organized

Department of Economics & Internal Quality Assurance Cell (IQAC)



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improved and high-yielding oilseed varieties can significantly boost productivity and reduce dependency on imports.

2. Expansion of Irrigation Facilities:

Since oilseed crops are highly dependent on monsoon rainfall, improved irrigation systems such as drip and sprinkler irrigation should be promoted to ensure stable production.

3. Improved Agricultural Practices:

Providing farmers with training on modern agronomic techniques, including crop rotation, soil fertility management, and precision farming, can help increase yields and optimize resource use.

4. Government Policy Support:

Strengthening policies like Minimum Support Prices (MSP), subsidies for inputs like seeds and fertilizers, and financial assistance programs can encourage more farmers to cultivate oilseeds.

5. Research and Development (R&D):

Investing in R&D for developing climate-resilient and pest-resistant oilseed varieties can enhance productivity while reducing losses due to climate change and pest attacks.

6. Farmer Awareness and Education:

Conducting awareness programs, training sessions, and providing access to digital platforms for knowledge sharing can empower farmers with the latest information and best practices in oilseed farming.

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02

Agri Startups in India: A Catalyst for Agricultural Transformation

Amrut. M. Chavan

Senior Research Fellow (SRF) and Research Scholar, Department of Economics, Shivaji University, Kolhapur

Prof. Dr. P. B. Patil

Professor, Department of Economics, Dr. Patangrao Kadam Mahavidyalaya, Ramanandnagar

Abstract

Agriculture has long been the backbone of the Indian economy, but it has struggled with issues such as low productivity, supply chain inefficiencies, and climate change challenges.

The emergence of agri-startups in India has provided innovative solutions to these issues through technology, digital platforms, and sustainable farming practices. This research paper explores the role of agri-startups in transforming Indian agriculture, analyzing their impact, challenges, and future potential. It also provides policy suggestions to promote agri-entrepreneurship and support startups in scaling up their operations.

1. Introduction

The Indian agricultural sector, which employs nearly 50% of the country's workforce, has been facing persistent issues related to productivity, market linkages, and sustainability. In recent years, the rise of agri-startups has introduced novel solutions, leveraging digital technology, precision farming, and supply chain optimization. These startups are bridging gaps in the agricultural ecosystem and ensuring better profitability for farmers.

The traditional agricultural model in India has long been plagued by inefficiencies, including post-harvest losses, dependency on monsoons, and lack of access to real-time data. Agri-startups have emerged as key enablers in transforming agriculture from a labour-intensive industry to a technology-driven and data-informed sector. With the advent of artificial intelligence, big data, and IoT-based smart farming, startups are helping farmers make informed decisions about crop selection, pest control, and yield optimization.

Moreover, the increasing penetration of smartphones and the internet in rural India has provided a fertile ground for agri-startups to expand their reach. Digital platforms are enabling direct-to-consumer models, eliminating middlemen, and ensuring better price realization for farmers. Additionally, fintech solutions tailored for farmers are facilitating easy access to credit, insurance, and government subsidies, thereby reducing financial distress in the farming community.

As of 2023, India has over 2,500 agri-tech startups, with a market size projected to reach \$24 billion by 2025 (NASSCOM, 2023). Investment in agri-tech startups in India has surged, with funding exceeding \$1.5 billion in 2022 alone (Inc42, 2023). Startups such as DeHaat, WayCool, and Ninjacart have raised significant capital to scale their operations and improve supply chain efficiencies. However, despite these advancements, challenges persist, including lack of awareness, policy hurdles, and infrastructure constraints. This paper aims to explore the landscape of agri-startups in India, their impact, and the challenges they face in scaling up their solutions.

2. Literature Review

The role of technology-driven startups in agriculture has been widely studied in global and Indian contexts. Studies have shown that digital platforms, AI, IoT, and blockchain have played significant roles in optimizing farming

practices and ensuring transparency in supply chains. Research indicates that funding, regulatory bottlenecks, and farmer adoption are major challenges faced by agri-startups. Government schemes such as Agri Udaan, Startup India, and NABARD initiatives have been instrumental in supporting these ventures, but gaps remain in policy execution and financial accessibility.

3. Research Methodology

This study adopts a mixed-method approach, utilizing both qualitative and quantitative data. Secondary data is gathered from government reports, industry white papers, and academic publications. A comparative analysis of successful and failed agri-startups is conducted to understand key success factors.

4. Results and Discussion

4.1 Impact of Agri-Startups

- Increased productivity through precision agriculture and AI-driven insights.
- Improved market access via e-commerce platforms and direct-to-farmer models.
- Sustainable farming practices promoted by agritech companies focused on organic and regenerative agriculture.

4.2 Case Studies related in Agri-Startups in India

A. Ninjacart

A B2B agri-tech startup optimizing supply chain management. Ninjacart is one of India's largest agri-tech startups, revolutionizing fresh produce supply chains by connecting farmers directly with retailers, restaurants, and food businesses. Founded in 2015, Ninjacart uses data-driven solutions to eliminate inefficiencies in agricultural distribution. The company has established a robust logistics network that ensures farm-to-market delivery within 12 hours, significantly reducing food wastage. By leveraging artificial intelligence and machine learning, Ninjacart predicts demand patterns, helping farmers make informed cultivation decisions. As of 2023, Ninjacart operates in over

100 cities and has improved farmer incomes by reducing dependency on middlemen.

B. DeHaat:

A digital platform providing farmers with advisory services, inputs, and market linkages. DeHaat is a full-stack agri-tech platform offering comprehensive solutions to smallholder farmers. Established in 2012, the startup provides farmers with high-quality seeds, fertilizers, pest management solutions, and AI-based crop advisory services. Through its digital platform, DeHaat connects farmers with institutional buyers, enabling better price realization. The company has built a strong rural network, currently serving over 1.5 million farmers across India. In 2022, DeHaat raised \$115 million in funding to scale operations and expand technological innovations. The startup's success is attributed to its farmer-centric approach, seamless logistics, and AI-powered agronomic recommendations.

C. Crop In:

A data-driven agritech startup enabling precision farming. CropIn specializes in farm management and precision agriculture by leveraging satellite imagery, big data analytics, and machine learning. Founded in 2010, the company provides real-time farm monitoring and predictive analytics to agribusinesses, governments, and farmers. CropIn's SmartFarm platform enables farmers to improve productivity, optimize input usage, and mitigate risks associated with climate change. The company operates in over 50 countries, supporting sustainable agriculture practices. CropIn's ability to integrate AI and IoT into farming operations has positioned it as a global leader in precision agriculture solutions.

Beyond individual case studies, agri-startups collectively contribute to improving supply chain efficiency, ensuring better price realization for farmers, and reducing post-harvest losses. Studies show that digital platforms and logistics optimization have helped

decrease post-harvest losses by nearly 25% in key agricultural regions. Moreover, the proliferation of fintech services tailored to farmers, such as digital lending and insurance, has increased credit accessibility by over 40% in rural areas. Agri-startups focusing on climate-resilient farming practices are also gaining traction, particularly as erratic weather patterns become a growing concern. Precision agriculture solutions are leading to an estimated 15-20% increase in yield productivity across various crops. While the sector continues to expand, collaboration between startups, government agencies, and agribusiness corporations will be crucial in ensuring long-term sustainability and scalability of agri-tech interventions.

4.3 Challenges Faced

- Limited access to venture capital and credit facilities.
- Farmer resistance to adopting new technologies due to low digital literacy.
- Inadequate infrastructure, particularly in rural areas, affecting logistics and supply chain efficiency.

5. Conclusions and Policy Suggestions

Agri-startups have significantly contributed to improving efficiency, sustainability, and farmer incomes. However, their growth is hindered by financial constraints, regulatory complexities, and adoption barriers. To foster a thriving agri-startup ecosystem, the following policy suggestions are recommended:

- **Enhanced Funding Mechanisms:** Strengthening venture capital support and offering low-interest loans.
- **Regulatory Ease:** Simplifying policies related to agri-tech, land leasing, and contract farming.
- **Farmer Digital Literacy Programs:** Educating farmers on the benefits of technology adoption.
- **Infrastructure Development:** Investing in rural connectivity and logistics to support agri-startup scalability.

In conclusion, agri-startups have immense potential to revolutionize Indian agriculture. With appropriate policy interventions and ecosystem support, they can drive sustainable agricultural transformation and contribute significantly to India's economic growth.

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03

STUDY OF RECENT POLICIES AND TRENDS OF AGRICULTURAL EXPORT PROMOTION IN INDIA

Mahesh S. Vandkar

Assistant Professor,
Department of Economics,
Dr. Ghali College, Gadhinglaj

1. Introduction & Background

India's economy depends heavily on agriculture, which raises GDP and creates jobs. For economic expansion, farm income stability, and the enhancement of rural livelihoods, agricultural exports are essential. Being one of the biggest exporters of a range of agricultural products, India occupies a significant place in the world's agribusiness.

India's economy depends heavily on agricultural exports because they boost farmers' earnings, increase GDP, and fortify foreign exchange reserves. India, which is mostly an agrarian nation, benefits from a diversity of climates that enable it to grow a broad range of export-ready crops. Among the main benefits of agricultural exports are:

- **Employment Generation:** Since a sizable section of India's population is employed in agriculture, exports generate additional job opportunities in farming, processing, packaging, and logistics;
- **Foreign Exchange Earnings:** Agricultural exports significantly contribute to India's trade balance, reducing dependency on other sectors;
- **Global Food Security:** India plays a key role in supplying staple foods and other agricultural commodities to various countries, especially in Asia, Africa, and the Middle East;
- **Economic Growth:** Agriculture accounts



Publisher & Owner

Archana Rajendra Ghodke

Harshwardhan Publication Pvt.Ltd.

At.Post.Limbaganesh, Tq.Dist.Beed-431 126

(Maharashtra) Mob.09850203295

E-mail: vidyawarta@gmail.com

www.vidyawarta.com



ISSN 2319 9318