



AGRI-TECH SUPPLY CHAIN BUSINESS OPPORTUNITIES & CHALLENGES IN RURAL (HILL AREA) INDIA

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Introduction:

The agricultural industry is crucial to India's economy since it employs a large percentage of the people and ensures the country's food supply. However, agricultural production, infrastructure, and supply chain management all present special difficulties in rural locations, especially hill regions. The rise of Agri-tech solutions in recent years has brought up possibilities and difficulties for dealing with these problems. This introductory section discusses the commercial potential and constraints presented by interventions in the Agri-tech supply chain in rural hill regions of India.

The agricultural productivity and profitability of local farmers in India's rural hill regions is sometimes hampered by factors such as geographical limits, restricted access to markets, and poor infrastructure Singh, N. (2020). Fragmented land ownership, insufficient irrigation infrastructure, and inefficient supply chain processes all add to these difficulties. New technologies and the ongoing digital revolution, however, may help farmers in these areas overcome these obstacles and usher in a new era of agricultural prosperity.

The term "Agri-tech" refers to a broad category of technology interventions that aim to improve the effectiveness, openness, and long-term viability of food systems. In order to enhance the procurement, transportation, storage, and distribution stages of the supply chain, these interventions make use of digital platforms, data analytics, and the internet of things (IoT), among other developing technologies. Viswanadham, N. (2007). Gaining better access to markets, increasing productivity, and decreasing post-harvest losses are all possible outcomes of incorporating technology into the Agri-supply chain.

Better access to markets is a major benefit of Agri-tech for farmers in remote hill locations. In the past, farmers in these areas typically faced unfair pricing since they had to rely on middlemen to sell their goods. By removing intermediaries and improving price discovery, Agri-tech solutions let farmers sell their products directly to consumers via digital channels (Mittal et al., 2018). Farmers benefit from this direct market relationship because it gives them more control, more customers, and the opportunity to develop into other markets.

In addition, Agri-tech interventions may assist farmers in rural hill regions deal with the logistical difficulties they confront. Optimization of transportation routes, decrease in post-harvest losses, and increased supply chain efficiency are all possible with the use of Internet of Things (IoT) sensors, smart storage facilities, and data analytics Negi, S., & Anand, N. (2015) . The quality and



freshness of agricultural goods is maintained and increased by real-time monitoring of transportation variables such as temperature and humidity.

The possibility for traceability and quality assurance is another major advantage of agri-tech in remote highland locations. People now care a lot about where their food comes from and how it was produced. Thanks to advances in agriculture technology, customers can now follow their food from the field to the table in real time. RFID tags and QR codes are only two examples of the kinds of technologies that make it possible to track the origin and methods of manufacturing, fostering confidence and guaranteeing quality Singh, N. (2020).

The potential for this supply chain use of agri-tech solutions to drastically alter India's rural hill regions is enormous. Market access, efficiency, traceability, and information provision are all areas where these initiatives may help farmers. The full promise of agri-tech cannot be realised unless a number of obstacles, including as the digital divide, contextual adaption, cost, and skill development, are overcome Qu, Y., Pokhrel, S. R., Garg, S., Gao, L., Xiang, Y., Somashekhar IC, J.K.Raju, & HemaPatil. (2021). India may get access to agri-advantages tech's and create conditions for long-term agricultural expansion and rural revitalization if the country's policies, infrastructure, and human resources are strengthened to address these obstacles.

Review of Literature:

The purpose of this literature analysis is to analyse the current state of knowledge about interventions in the Agri-tech supply chain in India's rural hill districts. It investigates the benefits and drawbacks of different approaches and pinpoints areas where further study is needed.

Research on Agri-Tech Supply Chain in Rural Hill Areas:

Several studies have looked at the potential of Agri-tech solutions for the issues faced by farmers in rural hill areas of India. Mittal, Sarangi, and Srivastava analysed the research published in 2018 on the topic of Agri-tech in logistics. According to the findings, supply chain modernization increased output, decreased expenses, and reached a larger audience. The review, however, paid little attention to the unique challenges encountered by hill communities.

Opportunities in Agri-Tech Supply Chain:

Several studies have identified the opportunities presented by agri-tech interventions in rural hill areas. Singh (2017) discussed the geographical constraints and inadequate infrastructure faced by farmers in hill regions. The study emphasized the potential of agri-tech to improve market access for farmers, enabling direct linkages with buyers and reducing dependence on intermediaries. It also highlighted the role of digital platforms and mobile applications in expanding market reach.

Challenges in Agri-Tech Supply Chain:



Researchers have shown that there are obstacles to implementing agri-tech solutions notwithstanding the advantages. Qu, Y., Pokhrel, S. R., Garg, S., Gao, L., Xiang, Y., Somashekhar IC, J.K.Raju, & HemaPatil. (2021) argued that agri-tech solutions in remote hill communities need local customization. They stressed the need of taking into account things like the specific geography, agricultural trends, and cultural norms of a region. However, the research did not dive into particular concerns like the digital divide or skill development, although acknowledging the value of technology in improving logistics and guaranteeing quality assurance.

Research Gap:

While there have been several studies on agri-tech supply chain interventions, little is known about the unique problems that plague India's rural hill districts. While there is recognition of overarching difficulties with market access, efficiency, and quality assurance, there is a dearth of research that tackles the region-specific concerns. Implementing agri-tech solutions in rural hill regions is difficult because of the digital gap, inadequate infrastructure, and low levels of digital literacy. In addition, the effective adoption of agri-tech interventions requires skill development programmes adapted to the requirements of farmers and other stakeholders in these areas.

Discussion:

This research paper's discussion part will go into the main findings and implications of the literature studied on the subject of the possibilities and problems faced by businesses operating along the agri-tech supply chain in India's rural hill districts. In doing so, it will emphasise the importance of the literature's findings on the possibilities and difficulties presented by the distinct agricultural landscapes of these areas.

Several promising avenues for agri-tech supply chain interventions in rural hill regions are highlighted by the examined research. Increased access to markets through the internet and mobile apps presents a promising new avenue for farmers to bypass middlemen and get higher prices for their goods. With this newfound confidence and access to a wider client base, farmers may branch out into markets farther afield. Agri-tech solutions may also improve supply chain operations by optimising transportation routes and decreasing post-harvest losses. They may also ensure the safety and provenance of agricultural goods by facilitating traceability and quality assurance via the use of technology like RFID tags and QR codes.

While the research highlights the potential benefits of agri-tech interventions in rural hill regions, it also highlights the obstacles that must be overcome before these interventions can be fully implemented. The digital divide is a major hindrance since these areas often have poor internet access and low levels of digital knowledge. Investments in digital infrastructure and activities for digital literacy training are crucial to bridging this difference and ensuring efficient use of agri-tech solutions. The need for contextual adaptation is also stressed, since the specific topography, agricultural patterns, and cultural norms of rural hill communities make generic solutions ineffective.



Conclusion:

The literature reviewed on agri-tech supply chain business opportunities and challenges in rural hill areas of India underscores the immense potential of technology in transforming the agricultural landscape of these regions. The opportunities offered by agri-tech interventions, such as improved market access, enhanced efficiency, and traceability, can greatly benefit farmers and contribute to their economic growth. However, several challenges need to be overcome for successful implementation. Addressing the digital divide, adapting technology to the specific context of hill regions, ensuring affordability, and providing skill development programs are essential to harness the full potential of agri-tech in these areas.

By bridging these gaps, India can unlock the benefits of agri-tech and pave the way for sustainable agricultural growth, economic development, and improved livelihoods for farmers in rural hill areas. Public-private partnerships, policy support, and community engagement are crucial in addressing these challenges and creating an enabling environment for the adoption and utilization of agri-tech solutions. Further research is needed to delve deeper into the context-specific challenges and opportunities in these regions, as well as to explore innovative strategies for overcoming the identified barriers. With a comprehensive understanding and targeted efforts, agri-tech can be effectively harnessed to revolutionize the supply chain in rural hill areas, ultimately contributing to the overall agricultural development of the country.

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