International Journal of Advanced Research in Commerce, Management &Social Science (IJARCMSS)
ISSN :2581-7930, Impact Factor : 6.986, Volume 07, No. 03(I), July-September, 2024, pp 137-145

VIKSHIT BHARAT @ 2047: PATHWAY TO SUSTAINABLE AGRICULTURE DEVELOPMENT IN INDIA

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ABSTRACT

India's economic growth is projected to reach 8.2%in 2023-24(National Statistical Office).It is to be ranked fifth globally in terms of GDP and third in Purchasing Power Parity (PPP) in 2024. The IMF estimates that India's GDP will grow by 7% in 2024. As India approaches 2047, celebrating 100 years of independence, the vision of "Vikshit Bharat @2047" (Developed India) is emerging, aiming to move to a High-income status and surpass $30 trillion GDP. This study explores the role of sustainable agricultural development in achieving the vision of "Vikshi Baharat", focusing on incorporating advanced technologies into farming practices. The study explores the potential of innovations such as Precision Farming, Biotechnology, Machine Learning and Digital Agricultural, along with Sustainable Farming Practices, Water Resource Management, Soli Health Practices and Supporting Policy. Furthermore, the study highlights the importance of Agricultural Finance and Public-Private Partnership in economic development.

KEYWORDS*: Vikshit Bharat@2047, Sustainable Agriculture, Digital Agriculture, Agricultural Innovations, Vision for Developed India.*

Introduction

As India nears its commemoration of freedom in 2047, the vision of "Vikshit Bharat @ 2047" show up as a blueprint for the nation's advancement. This vision sets an ambitious goal of transforming India into a fully developed country, focusing on economic growth, social equity, technological advancement, environmental sustainability, and global leadership. The centenary of India's independence provides a symbolic target, driving the nation's aspirations for a prosperous and sustainable future(Jayasingh, Anand, & Sahoo, 2024).

At the heart of this vision lies the agricultural sector, a cornerstone of India's economy that supports the livelihoods of millions and ensures food security. Agriculture has been, and continues to be, the backbone of the Indian economy, contributing significantly to the national income and employing a large portion of the workforce. As India strives to become a developed nation, transforming its agricultural sector becomes essential. The shift towards sustainable agriculture is crucial not only for meeting the rising food demands of a growing population but also for ensuring environmental conservation and economic viability.

The importance of sustainable agriculture in achieving the vision of Vikshit Bharat@2047 cannot be overstated. With Indian's population projected to exceed 1.6 billion by 2047, the demand for food, feed,and raw materials is expected to rise significantly. At the same time, the agricultural sector faces numerous challenges, including climate change, resource constraints, and the need for technological advancements. Sustainable agriculture, which integrates environmental health, economic profitability, and social equity, offers a pathway to address these challenges while ensuring long-term food security and ecological balance.

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Now, the agriculture sector requiring a comprehensive transformation to meet future demands through integration of advanced technologies such as IoT, AI, and robotics into farming practices. By leveraging these technologies, India can enhance productivity and sustainability in its agricultural practices, aligning with the broader goals of national development.

The “Vikshit Bharat @2047” vision also underscores the need for a robust policy framework and strategic planning to navigate the complex challenges facing the agricultural sector. Effective governance, Public-Private Partnerships, and targeted investments in research and development are essential to drive innovation and support sustainable agricultural practices. Furthermore, the role of agricultural finance, including the involvement of financial institutions, microfinance, and cooperative societies, is critical in enabling farmers to adopt sustainable practices and access modern technologies.

Literature Review

Kumar et al. (2024) this study examine the significant role of agricultural biotechnology in India with focus on its effects on farming practices, productivity, and socio-economic development. Study highlight the key advancements such as genetically modified crops, gene editing technologies and biofertilizers for their contributions in sustainable agriculture development. Research emphasize on the success of GM crops, particularly BT cotton by the use of gene editing technologies like CRISPR. Researcher acknowledge the use of biofertilizers and biopesticides for enhancing soil hearth and reducing reliance on chemical inputs. It suggests, continued investment in biotechnology research and farmer training is essential of fully realize its benefits.

Jayasingh et al. (2024) researcher conduct a study on sustainable agriculture development with the vision of developed nation by 2047. Study explore the challenge of rising India’s per capita income while ensuring inclusive growth. It highlight the role of key sectors such as entrepreneurship, e-commerce, innovative technologies, value chains and climate-smart practices in driving sustainable agricultural development. The findings suggest that coordinated efforts from policymakers, businesses, and communities are essential for equitable agriculture growth and strengthen India‘s global position in innovation and sustainability. The paper suggest a visionary plan for agriculture’s role in India’s future.

Ashoor et al. (2024) this paper carefully examines the role of AI and IoT intransforming modern agriculture. During the study, researchers explore the technologies advancements by which data-driven farming become a reality and focus on use of technologies such as drones, robotics and smart irrigation systems. These innovation enhance agricultural efficiency through precise crop management and efficient utilization of resources. They found that high speed 5G networks are essential in enabling the connectivity needed for these advancements, especially in rural areas. The paper provides an in-depth analysis of Smart Decision Support Systems (SDSS) and their role in real-time soli analysis and decision-making for farmers.

Sharma et al. (2024) examine the historical and contemporary significance of organic farming in India and underscoring its role in sustainable agricultural practices. Researchers explain that organic farming in Indian relies on traditional practices, focusing on chemical-free cultivation without GMOs or artificial growth stimulants. They found that organic farming is crucial for developing nations for enhancing food security, supporting small-scale farmers, and mitigating climate change risks. The study highlights the importance and challenges of organic agriculture, suggesting that with policy support, it can positively impact India’s farming sector.

Acharya et al. (2023) conducted a study on the impact of Blockchain technology on agriculture and food supply chains. The study explore how blockchain technology can enhance transparency, traceability and security. During the study researcher found that Blockchain can significantly transform agricultural supply chains by increasing transparency, reducing fraud and enhancing consumer trust. The study provides a deep analysis of Blockchain’s potential in transforming agricultural supply chain and highlight the significant technical and regulatory challenges that must be overcome. Its focus on practical implication of Blockchain technology with identification of current obstacles and suggest the areas for future research and policy intervention.

Lee et al. (2023) the research explore the role of agricultural extension professionals promoting precision farming technologies by using the UTAUT model. Research highlights precision farming as a promising solution for boosting agricultural productivity and identifies a key issue that many extension professionals have lack competence and motivation that is needed to effectively promote it. The research finds that factors like Gender, Age and Years of service do not influence their intention to promote precision farming. Study proposes that proficient advancement programs can be more comprehensive with focusing on a wide demographic.

Rimpika et al. (2023) examine the benefits of precision farming. They compare precision farming with traditional farming, particularly in small and scattered landholdings. The study explores whether precision agriculture can increase crop production, decrease inefficiencies, and offer benefits for the environment and economy through optimizing resources such as seeds, water and agrochemicals. Researchers highlight the use of GIS, GPS, and Data-Driven technology to manage variability in farming and acknowledge that small-scale farmers may struggle to adopt it due to finance. The study's main focus is on the challenges of implementing precision farming in India, where 58% of farmland is under 1 hectare per owner, making the investment in advanced technology difficult.

Dr. Manoj kumar (2023) explores the role of biopesticides in Indian agriculture as sustainable alternatives to synthetic chemical. Kumar highlight the necessity of transitioning towards eco-friendly pest control methods as Neem-based products. The study discusses the current limited use of biopesticides, while emphasizing the potential for their expanded adoption. Biodiversity is considered essential for creating new biopesticides that can fulfil the increasing need for organic and residue-free crops. The study explore the India's traditional knowledge systems and explore the challenges associated with scaling the production and need for supportive policy frameworks to accelerate adoption.

Bordoloi (2023) the research examines the role of biofertilizers and organic nutrient management impact on soil health in North East India, specifically in the Ri-Bhoi district. The research highlight the comparative analysis of biofertilizer- enhanced organic farming method (T1) with traditional farmer method (T2) and clearly demonstrate the advantages. The research also highlighted enhanced soil quality, showing considerably higher levels of Organic Carbon, Nitrogen, Phosphorus, and Potassium in the plots treated with biofertilizer. The results indicate that utilizing biofertilizer can enhance sustainable agriculture through increasing crop productivity and enhancing soil quality.

Shahane and Shivay (2022) the paper highlights the importance of soil health in organic farming and discusses various practices to enhance it. The introduction of Conservation agriculture, focusing on minimal soil disturbance and crop rotation, is gaining traction globally. The study discusses various forms of soil degradation, including desertification and pollution, is negatively impacting agricultural productivity. Study mention that effective soil health management involve organic inputs such as manures, microbial inoculants, biodynamic formulation and practices like crop rotation and agroforestry. Study conclude that government schemes like Soil Health Cardspromote balanced fertilization but organic farming may face challenges like lower yields premium prices for organic product and soil health management costs.

Smith et al. (2019) this research paper explores the evolution of agricultural biodiversity in India after the Green Revolution. It examines the relationship between agricultural intensification and crop diversity. The study found that while crop diversity decreased in key regions like the Indo-Gangetic Plains due to specialization in crops, but overall national crop diversity increased. The paper uses historical time series analysis of crop distribution at national and district levels to trace these changes. It realize the importance of balancing specialization with diversity to enhance food security. The study underscores the need for policymakers to consider the interaction between regional specialization and national biodiversity with the complexities of modern agriculture.

Research Gap

While extensive research has been conducted on sustainable agricultural practices, a significant gap stillexists in the literature, particularly regarding the long-term vision for sustainable agriculture within thecontext of "Vikshit Bharat @2047." Much of the existing research focuses on sustainable development patterns but fails to integrate these with the rapid technological advancements driving India's digital revolution. By exploring advancement in technology and policy in study aim to provide a comprehensive framework for guiding India's agricultural sector towards a sustainable and prosperous future.

Objectives of Study

The objective of research is to identify key pathways for sustainable agriculture development with modern technologies and amenities for enhancing sustainable practices in India.

Research Methodology

The research methodology for this study incorporates qualitative techniques to gain a comprehensive understanding of sustainable agriculture development within the framework of Vikshit Bharat @2047. Researcher conducted an extensive search using Google Scholar and other electronic databases. Keywords used in the search included terms like "Vikshit Bharat", "Sustainable Agriculture

Development”, “Machine Learning”, and “Agriculture Finance”. Additionally, researcher explore secondary data from reports and publications from various reputable organizations and previous studies. This approach allows us to analyze patterns, trends and advancements in sustainable agriculture development with Indian’s long-term goals for 2047.

Significance of Research

This research is significant for sustainable agriculture development as a critical element for India’s future, particularly within the vision of Vikshit Bharat @2047. Sustainable agriculture is essential for ensuring long term food security, maintaining ecological balance, and fostering economic and social equity. More than 50% of India’s population relies on agriculture for their livelihoods (Kumar et al., 2024). At present, India’s agricultural sector faces numerous challenges, including the impact of climate change, soil degradation, insufficient irrigation infrastructure, and the overuse of chemical fertilizers and pesticides. This research explore pathways to overcome these challenges and aims to contribute to creating sustainable agricultural systems that can meet the needs of both current and future generations.

Key Pathway and Modern Technologies for Sustainable Agriculture Practices in India

Combining advanced technologies with sustainable practices is crucial for achieving the vision of Vikshit Bharat by 2047, and its’ ensure sustainable agriculture development and building an efficient and resilient agricultural system. Important components consist of incorporating agricultural technologies like precision farming, biotechnology, and digital agriculture, which make use of IoT, AI, and robotics to enhance productivity and efficiency. Eco-friendly farming methods such as organic farming, IPM, and crop diversification play a role in preserving environmental well-being. Efficient irrigation and rainwater are essential for effective water resource management. Improving soil quality and productivity is achieved by implementing specific techniques and conducting soil analyses. Regulatory and supportive policies, along with PPP, are essential, with agricultural finance provided by financial institution to promote the adoption of sustainable practices. Furthermore, AI, machine learning, and supply chain management advancements are transforming agriculture by enhancing effectiveness and efficiency. By adopting these elements, India can develop a stable agricultural sector, which will support in achieving nation vision and empowering farming communities.

Precision Farming

Precision farming, represents a significant advancement in modern farming practices by leveraging data and technology to optimize agricultural productivity while minimizing resource consumption and environmental impact. This approach utilizes advanced tools such as GPS, GIS, remote sensing, IoT sensors, drones, and machine learning algorithms to monitor and manages crops and livestock with precision. Key components include Variable Rate Technology (VRT), which allows for the precise application of water, fertilizers and pesticides based on specific field conditions (Lee, Strong, Briers, Murphrey, & Rajan, 2023). Soil sampling and analysis determine nutrient levels and other soil characteristics, enabling tailored fertilization. Yield monitoring sensors on harvesters provide real-time data on crop performance, allowing farmers to identify areas for improvement. The data collected through these technologies is analyzed to inform decisions on planting, irrigation, fertilization, and pest management. Precision agriculture provides many advantages such as improved efficiency, reduced expenses, environmental friendliness, and better crop quality (Rimpika, et al., 2024).

Gross Capital Formation (GCF)

Gross Capital Formation (GCF) measure overall investment in tangible assets such as agriculture equipment, structure, and land improvements. Its’ reflect the commitment to modernizing agriculture. GCF investment is crucial for strengthening productivity and sustainability, which include post-harvest facilities that reduce waste and preserve product quality by which farmers’ income would lead. The constant progress of GCF in the agriculture industry is supported by increasing public investment. The use of modern machinery, ranging from basic tools to advanced equipment, is crucial for enhancing productivity in agriculture. This is achieved through custom hiring and training support, highlighting the significant contribution of GCF.

Biotechnology

Biotechnology, particularly through genetically modified (GMO) crops, plays a significant role in advancing sustainable agriculture. Biotechnology in agriculture refers to the use of scientific techniques and tools to modify plants to improve their utility for agriculture purposes. This includes genetic modification, tissue culture, molecular markers, and other advanced methods. Biotechnology provide many benefits like increased Crop Yields, Reduced Chemical Use through GMOs and bio pesticides, Enhanced Nutritional value, Resource Efficiency, Conservation of Biotechnology, leading to decreased environmental and health impacts and Economic Benefits to lead to cost savings for farmers and increase profitability. Biotechnology offers promising tools and techniques to address to challenges of sustainable agriculture development.

Digital Agriculture

Digital agriculture is offering innovative solution to address longstanding challenges in agriculture sector. Digital ecosystem provide real-time information and efficient supply chains to improve agricultural productivity and sustainability. Mobile application and digital platforms become vital tools in this transformation (Issa, Majed, Ameer, & Al-Jawahry, 2023). Apps like E-Kisan portal providing comprehensive information to farmers about to market price, weather condition, and innovative agriculture technique and government schemes. Due to this farmers can make informed decisions and can improve their yield and livelihoods. Additionally, mobile apps provides advisory services on crop management, pest control and soil health, which are particularly beneficial for farmers in remote and underserved areas.

The adoption of internet of things (IoT) devices is another key aspect of digital agriculture. IoT technology enables the collection and analysis of data from various sources, such as soil sensors, weather stations, and drones, allowing for precise monitoring of crop conditions and resource usage. This technology supports cooperative farming by facilitating data sharing and collaboration among farmers, enhancing their ability to manage resource efficiently and improve crop yields. Drones, equipped with advanced imaging and sensing technologies, are being increasingly used for task such as crop monitoring, pest detection, precision spraying. These Unmanned Aerial Vehicles (UAVs) help farmers manage large field more effectively, reducing the need for manual labor and minimizing the use of pesticides and fertilizers. The digital agriculture technology enhancing farmer incomes, and ensuring food security for the nation.

Organic Farming

Organic farming has gained significant momentum globally, and India is poised to be a leader in this domain. This shift towards organic farming in India not only promises to improve soil health but also offers farmers the opportunity to tap into premium markets, thereby increasing their income. The Indian government has been actively promoting organic farming through dedicated schemes such as the Paramparagat Krishi Vikas Yojana (PKVY) and The Mission Organic Value Chain Development for North Eastern Region (MOVCDNER). The benefits of organic farming are numerous, including the production of chemical-free food grains and crop, improved soil health, and reduced environmental pollution (Sharma & Nagar, 2024). Additionally, organic farming helps in preserving biodiversity and promotes the sustainable use of resources. The future of organic product in India looks bright. Continued government support, combined with increased consumer demand for organic products, is likely to drive further growth in this sector.

Agroforestry

Agroforestry, the integration of trees and crops, plays a crucial role in achieving ecological balance while providing economic and environmental benefits. Agroforestry systems enhance biodiversity, improve soil health, and bolster climate resilience. At present, agroforestry is recognized globally for its ability to combine agriculture and forestry to address environmental challenges such as soil degradation and loss of biodiversity. By diversifying crops and incorporating trees, agroforestry reduces the dependency on monoculture and agrochemicals, ensuring long-term ecological benefits. With proper policy support and scaling of successful models, agroforestry can significantly contribute to sustainable agriculture development with soil regeneration and climate adoption.

Integrated Pest Management

Integrated Pest Management (IPM) represent a sustainable approach to managing pests by combining various techniques such as biological control, crop rotation, and mechanical control, significantly reducing the dependency on chemical pesticides. This method leverages natural predators, diversified cropping systems, and physical barriers to control pest populations, ensuring healthier ecosystems and reduced environmental harm. Now, IPM taking as a critical tool in curbing the excessive use of chemical pesticides. The rise in chemical fertilizer and pesticide use has led to imbalances in soil health and environmental degradation (kumar, 2023). Effective use of IPM is reducing chemical inputs, thereby promoting a healthier balance of essential nutrients in the soil and minimizing ecological damage. This aligns with recent governmental interventions, such as the PM-PRANAM initiative, which incentivizes states to cut down on chemical fertilizers by promoting alternatives like Nano Urea, Nano DAP, and organic fertilizers. The soil health card scheme and the introduction of “Urea Gold” have further supported the movement toward balanced fertilizer usage and enhanced soil fertility. IPM in India will enhanced with policy support, technological interventions, and an increased focus on farmer training.

Crop Diversification

Crop diversification is a pivotal strategy in sustainable agriculture that promotes economic stability, improve soil health and enhances resilience to market fluctuations. By shifting focus from traditional monocultures like rice and wheat to alternate crops such as pulses, oilseeds and millets, farmers can achieve more balanced and profitable farming systems (Smith, Ghosh, & Hijmans, 2019). This approach not only reduces the risks associated with market volatility but also enhances ecological sustainability. Diverse cropping systems enrich soil fertility, particularly through the cultivation of legumes, which improve nitrogen levels in the soil, thereby reducing the dependence on chemical fertilizers. The government has implemented Crop Diversification Program (CDP), under the Rashhtriya Krishi Vikas Yojana (RKVY). Additionally, the National Food Security Mission (NFSM) focuses on increasing the productivity of food grains and commercial crops through improved production techniques, access to high-yielding varieties, and integrated pest management. Economic incentives, such as the Minimum Support Price (MSP) policy, further encourage diversification.

Water Resource Management

Efficient water resource management emerges as a critical pillar because growth and development of agriculture sector depend on availability and distribution of water. The sustainable water resource management involves optimizing water use in irrigation, enhancing rain water harvesting, and ensuring equitable distribution across regions. With increasing stress on water due to climate change, population growth, and industrial demands, a comprehensive and forward-looking strategy is essential. Efficient irrigation techniques, such as drip and sprinkler systems, are integral to sustainable agriculture. These systems are designed to reduce water wastage by delivering water direct to the plant roots or evenly distributing it across fields, thereby minimizing evaporation and runoff. Similarly, sprinkler systems offer flexibility in water application catering to different crop types and soil conditions.

Rainwater harvesting is also a vital strategy for ensuring water availability during dry periods, particularly in regions prone to water scarcity. Tradition and modern method of rainwater harvesting, such as ponds, tanks and recharge wells, can play a transformation role in augmenting water reserves. Ponds and tanks act as surface storage systems that capture runoff during the monsoon season, providing a critical reserve for irrigation during dry spells. On the other hand, recharge well helps to increase groundwater levels by channeling excess rainwater into underground aquifers. These method aids to conserve water and reduce dependency on external water sources and have manifold benefits, including increased water use efficiency, enhanced crop productivity, and reduced pressure on water resources.

Soil Health and Fertility

Soil health is crucial for sustainable agriculture as it serves as a living ecosystem that supports plant growth and nutrient cycling. However, Indian agriculture faces challenges such as soil degradation, nutrient depletion, and erosion due to excessive use of chemical fertilizer. To address these issues, practices like enhancing soil organic carbon, proper nutrient management, and reducing soil erosion are essential. Key practices for improving soil health include crop rotation, organic amendments, and minimal tillage. Crop rotation diversifies nutrients in the soil, reduces pests, and improves, soil structure. Organic amendments like compost enrich soil with nutrients and organic matter, while minimal tillage help preserve soil structure and prevent erosion. Soil testing and nutrient management are crucial for optimal crop growth. Farmer can tailor nutrient application based on their soil’ s nutrient content and pH levels to avoid overuse of chemicals and minimize environment impact. Advances in technology, such as user-friendly soil testing kits and mobile labs, have made soil testing more accessible and accurate. By combining traditional knowledge with technological innovations, India can develop a resilient agricultural systems that supports long-term food security and sustainability.

Policy and Governance

Effective government policies are crucial for sustainable farming regulations for promoting environment and food security. Such initiative consists Pradhan Mantri Fasal Bima Yojan (PMFBY) to provide insurance against crop loss due to natural disasters or diseases and Pradhan Mantri Kisan SAMPADA Yojana (PMKSY) to support supply chain management for reduce wastage and extend food shelf life. Furthermore, it provides subsidies and financial incentive for buying modern farming tools, premium seeds and fertilizers.

Public-Private Partnership (PPPs) play a crucial role in addressing agricultural challenges by combining the strengths of both sectors. They facilitate knowledge sharing, technology transfer, and capital mobilization, leading to innovative solutions and improved resources utilization PPPs also help in research and development, adoption of advanced farming techniques, enhancing market access and strengthening the supply chain. Ultimately, effective government policies and Public-Private Partnership offers a comprehensive framework for sustainable agricultural development in India.

Agriculture Finance

Agriculture finance plays a key role in providing financial services tailored to farmers' needs. Access to affordable finance is crucial for adopting modern technologies and sustainable practices to increase agriculture productivity. Innovative financial models like microfinance and digital platforms are transforming this sector by offering more inclusive solutions for smallholder farmers. Financial institutions like commercial banks, RRBs, and cooperative banks are instrumental in providing targeted credit schemes and insurance solutions to support farmers. Microfinance and SHG groups are also empowering small and marginal farmers. The Kisan Credit Card (KCC) scheme has further revolutionized access to agricultural credit. As of march 2023, banks have issued 7.35 crore KCCs with a credit limit of 8.86 lakh crore (Hamid, Singh, & Rehaman, 2024)

Artificial Intelligence and Machine Learning

Artificial Intelligence (AI) and Machine Learning (ML) are transforming the agricultural landscape by enabling predictive analysis and automation techniques. AI- driven predictive models analyze extensive database, such as historical weather date, soil conditions, and crop productivity, to forecast crop yields and weather patterns accurately (Issa, Majed, Ameer, & Al-Jawahry, 2023). These insights enables farmers to optimize planting schedules, resource allocation, and pest management strategies, reducing crop failure risk and improving productivity. AI's ability to predict climate anomalies and provide early warnings also empowers farmers to adapt to climate change, enhancing the resilience of agriculture.

AI-powered automation is transforming farming practices. Smart machinery, such as robots and autonomous vehicles, is being used to perform labor-intensive tasks such as planting, irrigation, harvesting, and crop monitoring. These automated systems, integrated with computer vision and IoT technologies are capable of identifying crop maturity, detecting diseases, and even managing weeds, significantly reducing the need for manual labor and chemical interventions. For instance, autonomous drones equipped with AI are used for targeted spraying of pesticides and fertilizers, minimizing waste and ensuring eco-friendly farming practices.

Blockchain

Blockchain technology is emerging as a transformative tool in agriculture, particularly for ensuring transparency and traceability in supply chain. By creating a secure and distributed ledger, it enables every stakeholder to record and verify data at each stage. It ensures that information such as planting, inputs, harvesting details, and transportation is transparently record and accessible. It improved traceability and enabled consumers to follow the journey of the produce "From Farm to Fork" (Acharya, Shrivastava, & Padhi, 2023).

Blockchain plays a significant role in Smart contracts that facilitate secure and timely transactions between farmers and buyers. By promoting accountability, it create more equitable and transparent agricultural marketplace. Blockchain empowers small scale farmers through digital platforms and e-market places by which farmers can sell their product directly to purchaser. Moreover, blockchain technology can help streamline logistics and reduce inefficiencies within the agricultural supply chain by improving data sharing and coordination among stakeholders.

Supply Chain Management

Effective supply chain management is important to reduce post-harvest losses and improve market access for farmers. Innovative storage technique ensure the freshness of produce for a longer period. Modern cold storage facility aid to preserve perishable goods from spoilage and waste. Improved logistics enhance the overall effectiveness of the supply chain. Efficient transportation on time ensure that produce arrives at the market in optimal condition. E-commerce platforms, such as e-NAM (National Agriculture Market), are transformative for farmers. It reduce the gap between farmers and buyers, facilitate better price discovery and minimize reliance on intermediaries. Advancements in cold storage and logistic, combined with digital market linkages, contribute significantly to improve economic outcomes for farmers.

Challenges and Opportunities

In its quest for a sustainable agricultural future, India faces a complex array of opportunities and challenges. As the country strives to increase agricultural productivity and ensure food security, it must tackle critical constraints, including climate change, soil degradation and inadequate irrigation infrastructure. These challenges are further compounded by issues such as fragmented supply chains, limited market access, and financial constraints, which undermine the potential for sustainable development. However, the landscape is not devoid of promise. Advances in technology, the rise of e-commerce and digital platform and growing investment in cold storage and logistics offer transformational opportunities to improve efficiency and reduce post-harvest losses. Additionally, supportive policy reforms, Public-Private Partnerships, and capacity-building initiatives can spur innovation and enhance resilience in the agriculture sector. By addressing these challenges and harnessing emerging opportunities, India can pave the way for a thriving sustainable agricultural system.

Conclusion

The vision of Vikshit Bharat @2047 offers a transformational path for India’s agriculture sector, envisioning a future characterized by sustainability, innovation and resilience. To realise this vision, it is imperative to adopt and integrate sustainable agricultural practices that address current challenges while leveraging emerging technologies and solutions. Achieving this ambitious vision requires a concerted effort from all stakeholders - government bodies, farmers, researchers and civil society. Collaboration and active participation across these groups is essential to drive the necessary transformation and innovations in agriculture. By fostering a culture of continuous learning, adaptation and community engagement, India can build a resilient agriculture sector that not only ensures food security and improves rural livelihoods but also contributes significantly to the nation’ overall growth and prosperity. The journey towards Development India by 2047 will be marked by strategic investments in technology, infrastructure and human capital with strong policy support and stakeholder collaboration.

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