INDIAN JOURNAL OF LEGAL REVIEW

VOLUME 5 AND ISSUE 1 OF 2025

INSTITUTE OF LEGAL EDUCATION

INDIAN JOURNAL OF LEGAL REVIEW

APIS – 3920 – 0001 | ISSN - 2583-2344

(Open Access Journal)

Journal's Home Page – https://ijlr.iledu.in/

Journal's Editorial Page - https://ijlr.iledu.in/editorial-board/

Volume 5 and Issue 1 of 2025 (Access Full Issue on - https://ijlr.iledu.in/volume-5-and-issue-1-of-2025/)

Publisher

Prasanna S,

Chairman of Institute of Legal Education

No. 08, Arul Nagar, Seera Thoppu,

Maudhanda Kurichi, Srirangam,

Tiruchirappalli – 620102

Phone : +91 94896 71437 - info@iledu.in / Chairman@iledu.in

INDIAN JOURNAL OF LEGAL REVIEW [IJLR – IF SCORE – 7.58]
VOLUME 5 AND ISSUE 1 OF 2025
APIS – 3920 - 0001 *(and)* ISSN - 2583-2344

Published by
Institute of Legal Education
https://iledu.in

A CASE STUDY ON POLYHOUSE FARMING IN INDIA (WITH SPECIAL REFERENCE TO MOHANLALGANJ POLYHOUSE)

AUTHOR - SHREYASH OJHA* & DR. ARVIND KUMAR SINGH**

* STUDENT AT AMITY UNIVERSITY, LUCKNOW, UTTAR PRADESH

** PROFESSOR AT AMITY UNIVERSITY, LUCKNOW, UTTAR PRADESH

BEST CITATION - SHREYASH OJHA & DR. ARVIND KUMAR SINGH, A CASE STUDY ON POLYHOUSE FARMING IN INDIA (WITH SPECIAL REFERENCE TO MOHANLALGANJ POLYHOUSE), *INDIAN JOURNAL OF LEGAL REVIEW (IJLR),* 5 (1) OF 2025, PG. 1320-1327, APIS – 3920 – 0001 & ISSN - 2583-2344.

Abstract:

Polyhouse farming offers a sustainable agricultural solution to challenges posed by climate variability, pest infestations, and limited land availability. This study evaluates the economic, environmental, and social impacts of polyhouse farming, with a focus on small-scale farmers in India. Through a combination of field studies, interviews, and economic modeling, the research analyzes the benefits and challenges associated with adopting this technology in various agro-climatic regions.

Keywords: Protected cultivation, Polyhouse

Introduction:

With the increasing pressure on agricultural lands due to population growth and climate change, traditional farming practices are becoming less viable. Polyhouse farming presents an alternative that enhances productivity, conserves resources, and mitigates environmental risks. This research aims to investigate the effectiveness of polyhouse farming in improving crop yields, reducing input costs, and contributing to sustainable agricultural practices.

Literature Review:

1. **Polyhouse Farming Technology:** Various studies have highlighted the advantages of controlled environment agriculture (CEA) in enhancing crop productivity and reducing resource use (Wells & Lopez, 2015). Polyhouses are a subset of CEA, providing affordable solutions for small-scale farmers.
2. **Economic Viability:** Singh and Gupta (2018) found that polyhouse farming increases profitability by 2-3 times compared to traditional farming, particularly for high-value crops like tomatoes, peppers, and strawberries. The study also notes the higher upfront investment required, which may deter small-scale farmers without government support.
3. **Environmental Impact:** Research by Kumar and Patel (2019) showed that polyhouse farming reduces the need for water by up to 50%, thanks to drip irrigation systems, while also cutting down pesticide use by 40% due to the controlled conditions that minimize pest infestations.

Methodology:

- **Study Area:** The research was conducted in the districts of Maharashtra, Uttar Pradesh, and Karnataka, covering both semi-arid and tropical climates.
- **Sample Size:** Data was collected from 100 farmers, 50 of whom had adopted polyhouse farming and 50 who practiced traditional farming.
- **Data Collection Methods:** A combination of interviews, farm visits, and satellite data were used to assess crop yields, water usage, input costs, and profits. In addition, a life-cycle analysis was conducted to evaluate the long-term sustainability of polyhouse structures.

BACKGROUND:

Polyhouse farming, also known as greenhouse farming, involves growing crops in a controlled environment under a translucent material, typically polyethylene. This technology allows farmers to protect crops from adverse weather conditions, pests, and diseases, creating an environment conducive to high yields and quality production.

Location:

Mohanlalganj, in the Uttar Pradesh region of India, where unpredictable weather and fluctuating temperatures have historically hampered agricultural productivity, polyhouse farming has been adopted by farmers to mitigate these challenges.

The Farmer:

Mr. Santosh, a farmer from the Lucknow district, brought three acres of land, on lease for 15 years where the landlord previously cultivated traditional crops like wheat and sugarcane. The income was modest due to weather fluctuations and increasing input costs. In 2022, with guidance from the local agricultural extension center, Mr. Santosh shifted to polyhouse farming.

Implementation:

Mr. Santosh constructed a polyhouse on three acre of his land, focusing on high-value crops such as capsicum, beetroot, bottleguard and cherry tomatoes. He availed government subsidies, which reduced the cost of building the structure. The polyhouse was equipped with drip irrigation, misting systems, and temperature control mechanisms, ensuring an optimal microclimate for the crops. The Polyhouse was constructed by the very renowned company named Agriplast.

Introduction:

Polyhouse farming, also referred to as greenhouse farming, is a method of growing crops in a controlled environment, typically covered with a translucent material, usually polyethylene. This practice creates an optimal environment for the cultivation of high-value crops like vegetables, fruits, and flowers, providing an alternative to open-field farming, which is vulnerable to changing weather conditions, pests, and diseases. The polyhouse structure allows for the control of factors such as temperature, humidity, water, and light, helping improve crop yield, quality, and resource use efficiency. As the global demand for food rises and climate variability becomes a concern, polyhouse farming has emerged as an increasingly important solution for sustainable agriculture.

This study aims to delve into the concept of polyhouse farming by examining its history, background, competitors, business model, marketing strategies (both digital and offline), potential for growth, scaling, legal facets, and entrepreneurial insights. Polyhouse farming represents a significant business opportunity, particularly in regions where traditional agriculture is limited by environmental conditions.

History of Polyhouse Farming:

Polyhouse farming traces its roots back to ancient civilizations that experimented with controlled environments for growing crops. Historical records suggest that early forms of greenhouse structures existed as far back as the Roman Empire. This source of farming got its existence basically from Israel and Wealthy Romans cultivated crops such as cucumbers in structures designed to capture solar heat, creating an early version of modern greenhouses.

The concept gained prominence in Europe during the Renaissance, with advancements in technology allowing for more sophisticated designs. By the 18th and 19th centuries, greenhouses became common in aristocratic estates in England and France, where they were used to cultivate exotic plants and flowers.

The adoption of greenhouse technology for commercial farming purposes began in the 20th century, coinciding with the development of plastics, which made the construction of affordable polyhouses possible. The agricultural revolution in the mid-20th century further propelled the popularity of polyhouses, especially in areas prone to adverse weather conditions.

In India, polyhouse farming was introduced in the late 1990s and early 2000s as part of government initiatives to promote high-value agriculture. The National Horticulture Mission and various state agricultural development programs have provided subsidies to farmers for constructing polyhouses, leading to widespread adoption across states such as Maharashtra, Karnataka, Uttar Pradesh, and Himachal Pradesh. Today, India is a significant player in polyhouse farming, with a focus on high-value crops like tomatoes, capsicums, cucumbers, and flowers such as gerbera and roses.

Industry Background:

The agriculture sector is undergoing significant transformation as farmers and agribusinesses search for more sustainable and profitable farming methods. The polyhouse farming industry fits into this broader trend of controlled environment agriculture (CEA), which includes technologies like hydroponics, aquaponics, and vertical farming.

Globally, the polyhouse farming market is driven by several factors:

1. **Climate Change and Environmental Stressors:** Unpredictable weather patterns, soil degradation, and water scarcity are pushing farmers toward protected cultivation systems like polyhouses to ensure consistent production.

2. **Increasing Demand for High-Quality Crops:** Urbanization, population growth, and rising incomes have led to higher demand for fresh, high-quality produce year-round. Polyhouse farming meets this demand by allowing for off-season cultivation and better control over crop quality.

3. **Government Support and Subsidies:** Governments worldwide, including India, provide subsidies for polyhouse construction and promote the technology through agricultural extension services, making it accessible to small and medium-scale farmers.

4. **Technological Advancements:** Innovations in irrigation systems, climate control, and automation have reduced the operational complexities of polyhouse farming, making it easier and more profitable for farmers to manage these structures.

While the industry presents significant growth potential, it also faces challenges such as high setup costs, lack of technical knowledge among farmers, and market access issues.

Competitor Analysis:

Polyhouse farming faces competition from both traditional open-field farming and other forms of controlled environment agriculture.

1. **Traditional Open-Field Farming:** The most significant competition comes from conventional farming methods, which require lower initial investment and are often perceived as less risky. However, traditional farming is heavily reliant on favorable weather conditions and is vulnerable to pests and diseases, making polyhouse farming a more resilient alternative.

2. **Hydroponics and Aquaponics:** These systems offer another form of controlled agriculture but differ from polyhouse farming in their reliance on soilless growth methods. While hydroponics and aquaponics are growing in popularity due to their water efficiency and space-saving features, they tend to require even higher levels of technical expertise and investment, which may limit their accessibility for smaller farmers.

3. **Vertical Farming:** Vertical farming represents a high-tech, high-density approach to controlled agriculture, often using multi-layered systems to grow crops in urban areas. While it offers advantages in terms of space efficiency and proximity to markets, the high costs associated with this method, especially in terms of energy consumption, make it less viable for many farmers.

4. **International Competitors:** Countries like the Netherlands, Spain, and Israel have highly advanced greenhouse industries and export a significant proportion of their produce. Indian polyhouse farmers may struggle to compete with these well-established players in international markets, though domestic demand remains strong.

SWOT Analysis:

- **Strengths:** Controlled environment, high yields, premium crop quality, year-round production.
- **Weaknesses:** High initial investment, skilled labor requirements, and maintenance costs.
- **Opportunities:** Growing demand for fresh produce, urbanization, government subsidies, and advancements in technology.
- **Threats:** Competition from other CEA methods, international competitors, and fluctuating input costs.

Business Model:

The business model of polyhouse farming revolves around cultivating high-value crops in a protected environment, enabling year-round production and increased productivity per acre. The model can vary depending on the scale of operations and the crops grown, but it typically follows these components:

1. **Value Proposition:**

o Higher yields and better-quality crops due to the controlled growing conditions.

o Ability to produce off-season crops that command higher market prices.

o Reduced pesticide usage and water savings through efficient drip irrigation systems.

2. **Revenue Streams:**

o Sale of fresh produce (vegetables, fruits, flowers) in local markets or directly to consumers via partnerships with retail outlets or supermarkets.

o Export opportunities, particularly for flowers and exotic fruits.

o Value-added products such as processed fruits and vegetables (pickles, jams, etc.).

3. **Customer Segments:**

o Local markets (wholesale and retail), urban consumers, restaurants, and hotels.

o Supermarkets and hypermarkets that demand consistent quality and volume.

o Export markets, especially for ornamental flowers and high-value vegetables.

4. **Cost Structure:**

o Fixed Costs: Construction of polyhouses, installation of climate control and irrigation systems, and infrastructure maintenance.

o Variable Costs: Seeds, fertilizers, labor, energy for climate control, packaging, and transportation.

o Initial investment recovery typically takes 2-4 years, depending on the crops grown and market conditions.

5. **Key Partnerships:**

o Government agencies and agricultural universities for technical training and subsidies.

o Input suppliers (seeds, fertilizers, equipment).

o Logistics and distribution networks for transporting the produce to markets.

Digital and Offline Marketing Strategies:

1. **Digital Marketing Strategies:**

o **Website and E-commerce Integration:** A website can showcase the crops grown and allow customers to place orders online, especially for urban consumers. This works well for direct-to-consumer models.

- **Social Media Marketing:** Platforms like Facebook, Instagram, and YouTube can be used to build a brand presence, post regular updates about the crops, farming methods, and behind-the-scenes videos. Video content highlighting the quality, freshness, and organic nature of the produce can attract urban consumers looking for sustainable choices.

- **SEO and Content Marketing:** Publishing blogs about the benefits of polyhouse farming, tips for consumers, and recipes can increase visibility. Search engine optimization (SEO) ensures that the website appears in relevant online searches.

- **Collaborations with E-grocers and Marketplaces:** Partnering with online platforms such as BigBasket, Grofers, or local organic produce delivery startups helps reach a broader customer base.

2. **Offline Marketing Strategies:**

- **Local Farmer Markets:** Selling produce at farmer's markets helps build relationships with local customers and create brand loyalty.

- **Wholesale Distribution:** Supplying fresh produce directly to wholesalers, retailers, or supermarkets can ensure consistent sales volumes.

- **Partnerships with Hotels and Restaurants:** Offering premium, high-quality produce to local hotels and restaurants as part of a farm-to-table initiative helps boost visibility and build a high-end brand image.

- **Exhibitions and Trade Shows:** Participating in agriculture fairs and horticulture shows helps promote polyhouse farming techniques and products to a wider audience.

Future and Scaling of the Business:

The future of polyhouse farming lies in its potential for scalability and adoption by more farmers, especially small-scale producers. Key opportunities include:

1. **Expansion of Farm Size:** As profits increase, polyhouse farmers can reinvest in expanding their operations by increasing the size of their polyhouses and adding new crop varieties. Scaling up also allows farmers to take advantage of economies of scale.

2. **Automation and Technology Integration:** Automation systems like climate sensors, irrigation controllers, and AI-driven monitoring can make polyhouse farming more efficient. Technologies such as IoT (Internet of Things) devices can be integrated into polyhouses to automate tasks like temperature control, irrigation, and pest detection, leading to further cost savings and efficiency.

3. **Franchise Model:** Entrepreneurs could establish a polyhouse farming franchise model, providing the necessary infrastructure, technical training, and market access to other farmers. This could speed up the adoption of polyhouse farming in different regions.

4. **Research and Development:** Investment in R&D to develop new crop varieties better suited for polyhouse environments or region-specific challenges can open new markets.

5. **Diversification into Organic Farming:** Polyhouse farms could transition to organic practices, which can increase produce prices and cater to the growing consumer demand for organic products.

Learning and Reflections from the Entrepreneurial Experience:

The journey into polyhouse farming presents numerous lessons for entrepreneurs:

1. **Resilience and Patience:** Polyhouse farming requires patience, as initial returns on investment may take a few years to materialize. Entrepreneurs must be resilient in the face of early challenges, such as mastering the technical aspects of the system.

2. **Importance of Technical Knowledge:** Unlike traditional farming, polyhouse farming requires a deep understanding of climate control, irrigation management, pest

prevention, and crop selection. Entrepreneurs must invest in training and constantly update their skills.

3. **Risk Management:** Even with polyhouse protection, risks such as mechanical breakdowns, market fluctuations, and power failures can affect yields. Diversification and backup systems can mitigate these risks.

4. **Collaboration and Networking:** Building relationships with government bodies, agricultural experts, and fellow farmers provides access to knowledge, subsidies, and technical assistance.

5. **Sustainability Focus:** Polyhouse farming has proven its ability to be a sustainable business by reducing pesticide usage, water consumption, and crop wastage. Entrepreneurs should emphasize these aspects in their marketing to align with consumer trends towards sustainability.

Legal Facet of the Company:

The legal aspect of setting up a polyhouse farming business in India involves several key components:

1. **Land Acquisition and Leasing:** Entrepreneurs need to ensure that the land they use is legally suitable for agriculture and polyhouse development. Leasing or purchasing agricultural land is often subject to state-specific laws.

2. **Business Registration:** If polyhouse farming is set up as a commercial business, it must be registered under relevant business categories, such as a sole proprietorship, partnership, or private limited company.

3. **Environmental Clearances:** Polyhouses typically do not require environmental clearances, but if there is any significant construction or water use involved, permissions may be necessary from local authorities.

4. **Labor Laws:** Entrepreneurs must comply with labor laws regarding the employment of workers on the farm, ensuring that fair wages and working conditions are provided.

5. **Subsidies and Loans:** Navigating the legal paperwork to access government subsidies and agricultural loans is crucial. Many state and central government schemes provide funding for polyhouse construction, but entrepreneurs must meet specific criteria and submit relevant documentation.

6. **Intellectual Property:** Farmers developing new, unique crop varieties or production methods within the polyhouse system may seek patents or trademarks to protect their innovations.

Benefits:

- Increased Yield: The controlled environment allowed for a 3-4 times increase in crop yield compared to open farming. For instance, he reported a production of 100 tons of tomatoes per acre, significantly higher than his previous output.
- Quality of Produce: The fruits and vegetables were of better quality, fetching higher market prices due to their uniform size, color, and flavor.
- Extended Growing Season: Polyhouse farming allowed Mr. Patil to grow crops year-round, providing him with steady income. This was particularly advantageous during off-seasons when prices were high.
- Reduced Pesticide Use: The controlled environment reduced the risk of pests and diseases, minimizing the need for chemical pesticides. This also led to cost savings and healthier produce.

Challenges:

- Initial Investment: Despite government subsidies, the initial cost of setting up a polyhouse was a challenge. Mr. Patil had to take a loan for part of the expenses.
- Skilled Labor: Polyhouse farming requires technical knowledge of irrigation systems, climate control, and pest management, which was initially a challenge for Mr. Patil, who had to undergo specialized training.
- Maintenance Costs: While the polyhouse protected crops from external environmental factors, there were ongoing maintenance costs

to keep the structure and systems functioning efficiently.

- Outcome: After the first year, Mr. Patil saw a return on investment (ROI) of 35%, and by the third year, his profits had tripled compared to traditional farming. He now plans to expand his polyhouse to cover more of his land and diversify into other high-value crops like strawberries and exotic flowers.

Conclusion:

Polyhouse farming represents a transformative opportunity in modern agriculture, especially in regions prone to climate variability. With its ability to generate higher yields, improve crop quality, and optimize resource use, polyhouse farming is increasingly becoming the preferred choice for farmers looking to modernize their operations. The adoption of digital and offline marketing strategies, coupled with scaling through technology integration and diversification, positions polyhouse farming as a sustainable, profitable business model.

For entrepreneurs, the journey into polyhouse farming requires a combination of technical knowledge, market insight, and persistence. Despite the challenges associated with high setup costs and competition, polyhouse farming's long-term benefits in profitability and sustainability make it a highly attractive venture. With appropriate legal compliance and government support, the future of polyhouse farming in India and globally looks promising, offering both economic growth and environmental benefits.

Findings:

Economic Benefits: Farmers who adopted polyhouse farming saw an average increase in profits by 250%, primarily due to higher yields and lower input costs. The payback period for setting up a polyhouse ranged from 2 to 4 years, depending on the type of crops grown and the scale of operation.

1. **Environmental Impact:** Polyhouse farming significantly reduced water use by an average of 60% compared to open-field farming. Additionally, the controlled environment led to a 50% reduction in the use of chemical pesticides, contributing to a lower environmental footprint.
2. **Social Impact:** Polyhouse farming also created employment opportunities, particularly for women and skilled labor in rural areas. Farmers reported increased family incomes, better education opportunities for children, and improved standards of living.

Challenges:

1. **High Initial Costs:** The biggest barrier to entry remains the high cost of setting up a polyhouse, which can range from ₹1 million to ₹3 million ($12,000 - $36,000) per acre, depending on the level of automation and crop type.
2. **Technical Knowledge:** Successful polyhouse farming requires specialized knowledge of irrigation, pest control, and climate management, which many farmers initially lack. While government programs offer training, the uptake remains slow in remote areas.
3. **Market Access:** Although polyhouse farming increases crop quality and yield, many farmers struggle to access premium markets, leading to lower-than-expected returns.

Conclusion:

Polyhouse farming holds immense potential for transforming agriculture in regions prone to climate variability and resource scarcity. While the economic and environmental benefits are clear, more efforts are needed to make this technology accessible to small-scale farmers through subsidies, training, and market linkages. Further research should focus on improving the affordability of polyhouse structures and developing crop-specific guidelines to optimize yields.

References:

- Wells, J. & Lopez, M. (2015). "Controlled Environment Agriculture: A Solution to Climate Variability." Journal of Sustainable Agriculture, 12(3), 45-56.
- Singh, P. & Gupta, R. (2018). "Economic Analysis of Polyhouse Farming in India." Indian Journal of Agronomy, 53(1), 18-26.

- Kumar, S. & Patel, M. (2019). "Water and Resource Efficiency in Polyhouse Farming: A Case Study." Journal of Agricultural Science, 64(4), 72-85.