



Supply Chain Management, Post-Harvest Handling and Export Potential of Indian Ornamental Horticulture

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INTRODUCTION

Supply chain refers to the network of activities involved in producing, handling, and delivering products from suppliers to consumers. In India, ornamental horticulture has grown rapidly due to urbanization and rising demand for flowers for decoration, festivals, and events. However, the sector faces challenges such as poor cold chain infrastructure, weak logistics, and fragmented markets, leading to high post-harvest losses. Therefore, efficient supply chain management, improved post-harvest practices, and strong market linkages are essential for enhancing competitiveness and ensuring sustainable growth.

Concept of Supply Chain

A supply chain refers to the integrated network of activities, stakeholders, and resources involved in the production, handling, and delivery of products from input suppliers to final consumers. In ornamental horticulture, it is highly time-sensitive and quality-driven due to the perishable and fragile nature of flowers and plants (Food and Agriculture Organization [FAO], 2022), involving both the physical flow of goods and the flow of information such as demand, prices, and logistics coordination. An efficient supply chain ensures timely delivery of fresh products, reduces post-harvest losses, improves price realization for producers, and enhances overall customer satisfaction.

Key Components of the Supply Chain of Ornamental horticulture products

The ornamental horticulture supply chain consists of multiple interlinked stages as mentioned below and overall, effective coordination among these components is essential to minimize losses, maintain quality, and improve profitability.

1. Input Supply- Input supply in ornamental horticulture includes seeds, bulbs, planting materials, fertilizers, pesticides, pots, and growing media, with the quality of these inputs directly influencing yield, product quality, and market value.

There is also an increasing use of hybrid seeds and tissue culture plants to enhance productivity and ensure better-quality output.

2. Production- Cultivation in ornamental horticulture is carried out under open-field or protected conditions such as greenhouses and polyhouses, requiring skilled labor, precise irrigation, and effective climate control. The adoption of modern techniques like drip irrigation, fertigation, and precision farming helps improve productivity, resource efficiency, and overall crop quality.

3. Harvesting and Post-Harvest Handling- Harvesting at the appropriate maturity stage is essential to maintain the quality of ornamental products, followed by activities such as sorting and grading, cleaning and trimming, and bundling with initial packaging. Improper handling at this stage can result in significant quality losses and reduced market value.

4. Storage- Cold storage plays a vital role in maintaining the freshness and extending the shelf life of ornamental products, with proper control of temperature and humidity being essential to preserve their quality and market value.

5. Transportation- Transportation of ornamental products requires fast and efficient logistics, often involving refrigerated transport to maintain freshness, minimize spoilage, and ensure timely delivery to markets. It also constitutes a significant component of the total marketing cost.

6. Distribution- Distribution involves the movement of ornamental products to wholesalers, retailers, florists, and exporters, ensuring their availability across different market channels. Efficient distribution systems help maintain steady supply, improve market access, and contribute to price stability.

Supply Chain Models in Ornamental horticulture products

Modern supply chains significantly improve competitiveness, reduce losses, and enhance export potential (FAO, 2022). The different supply chain models operate in ornamental horticulture:

1. Traditional Supply Chain- It involves multiple intermediaries such as agents, wholesalers, and retailers, and is often characterized by inefficiencies, delays, and higher post-harvest losses, along with limited transparency and a lower share of profits for farmers.

2. Modern Integrated Supply Chain- The modern supply chain includes cold chain systems, direct market linkages, and organized retail networks, which help reduce wastage, maintain product quality, and enhance traceability and overall market efficiency.

3. Contract Farming Model- Contract farming involves agreements between growers and companies or exporters, ensuring an assured market, price stability, and access to technical support, while also reducing marketing risks for farmers.

4. Cluster-Based Approach- Cluster-based production involves the concentration of floriculture activities in specific regions or hubs, which facilitates better infrastructure, efficient logistics, and economies of scale. This approach helps reduce transportation costs and improves overall production and marketing efficiency.

Post-Harvest Management in Ornamental horticulture products

Post-harvest management is critical for maintaining the quality and marketability of ornamental products. Improper post-harvest handling can lead to significant losses in both quantity and quality, affecting profitability.

1. Pre-cooling: Pre-cooling involves the rapid removal of field heat immediately after harvest, which helps slow down respiration and significantly extends the shelf life of ornamental products.

2. Grading and Standardization: This process includes classification of products based on size, color, and overall quality, ensuring uniformity and helping producers obtain better prices in the market.

3. Use of Preservatives: Chemical solutions are used to enhance the vase life of flowers, making them especially important for export markets and long-distance transportation.

4. Packaging: Proper packaging using sleeves, corrugated boxes, and protective materials helps prevent mechanical damage and maintain product quality during handling and transport.

5. Cold Storage: Cold storage facilities maintain optimal temperature and humidity conditions, reducing spoilage and extending the overall life of ornamental products.

Export Marketing of Ornamental horticulture products

Export marketing involves international trade of high-value ornamental products such as roses, carnations, orchids, and foliage plants. India exports these products to major markets including Europe, the Middle East, and Japan due to high global demand. Export-oriented floriculture requires advanced infrastructure such as cold chain systems, efficient logistics, and strict compliance with global standards.

Export Requirements of Ornamental horticulture products

These are the major requirements for exporting of ornamental products:

1. Quality standards: Products must meet international norms for size, color, freshness, and uniformity to suit premium market demands.

2. Phytosanitary certification: Certification is required to ensure products are free from pests and diseases as per importing country regulations.

3. Grading, packaging, and labeling: Proper grading based on quality, use of protective packaging materials, and accurate labeling with product details are essential.

4. Regulations and documentation: Exporters must comply with international trade rules and maintain necessary documents such as invoices, certificates, and permits.

Advantages of Export marketing of Ornamental horticulture products

1. High income potential: Export markets offer better prices, increasing earnings for growers and exporters.

2. Foreign exchange earnings: Contributes to the country's economy by generating valuable foreign exchange.

3. Market diversification: Reduces dependence on domestic markets by accessing international buyers.

4. Technological advancement: Promotes adoption of modern technologies, improved practices, and quality standards.

Role of Institutions and Policies for promoting Ornamental horticulture products

Government and institutional support crucial for sector development:

Government Support and Policy Framework:

The Government of India promotes ornamental horticulture through various policies, schemes, and financial assistance aimed at increasing production, improving quality, and enhancing export potential, while encouraging technology adoption and private investment.

1. Role of National Horticulture Board (NHB): NHB provides financial assistance, subsidies for greenhouse cultivation and cold storage, and supports data collection and market development in the floriculture sector.

2. Role of Mission for Integrated Development of Horticulture (MIDH): MIDH focuses on infrastructure development and promotes adoption of modern technologies to improve productivity and efficiency in horticulture.

3. Role of Indian Council of Agricultural Research (ICAR): ICAR contributes through research on improved flower varieties, advanced production technologies, and pest and disease management practices.

4. Role of Agricultural and Processed Food Products Export Development Authority (APEDA): APEDA promotes export of floriculture products by providing certification support, training, market intelligence, and facilitating participation in international trade fairs.

5. Financial Assistance and Subsidies:

Government schemes provide subsidies for greenhouse structures, cold storage, irrigation systems, and planting materials, encouraging farmers to adopt modern practices.

6. Infrastructure Development: Development of cold chain systems, pack houses, and floriculture clusters improves logistics, reduces post-harvest losses, and enhances overall efficiency.

7. Training and Capacity Building: Training programs and extension services help farmers and stakeholders improve skills in cultivation, post-harvest management, and marketing.

8. Quality Regulation and Certification: Policies ensure adherence to quality standards, grading systems, and phytosanitary requirements, which are essential for export competitiveness.

9. Public-Private Partnerships (PPP):

Collaboration between government and private sector promotes investment, technology transfer, and better market linkages.

Challenges in Supply Chain of Ornamental horticulture products

These constraints significantly impact profitability and efficiency (Kumar & Singh, 2020) of Ornamental horticulture products:

1. Price Volatility: Prices of ornamental products fluctuate frequently due to imbalances between demand and supply, especially during seasonal peaks and off-seasons, making income unpredictable for farmers.

2. Lack of Organized Markets: The dominance of the unorganized sector, including local mandis and informal traders, reduces efficiency, limits transparency, and restricts access to better market opportunities.

3. Poor Cold Chain Infrastructure: Inadequate availability of cold storage, pre-cooling units, and refrigerated transport leads to

rapid deterioration of perishable products, affecting quality and shelf life.

4. High Post-Harvest Losses: Improper harvesting, handling, packaging, and storage practices result in significant losses, reducing the quantity and quality of marketable produce.

5. Dependence on Intermediaries: The presence of multiple intermediaries such as commission agents and wholesalers reduce the share of farmers in the final consumer price and limits their bargaining power.

6. Limited Market Information: Lack of timely and accurate information on market prices, demand trends, and consumer preferences affects decision-making, planning, and profitability for growers.

Strategies for Building an Effective Supply Chain of Ornamental Horticulture Products

An effective supply chain is essential to maintain quality, reduce losses, and improve profitability in ornamental horticulture. Key strategies include:

1. Strengthening Cold Chain Infrastructure: Develop pre-cooling units, cold storage, and refrigerated transport to preserve freshness and extend shelf life.

2. Improving Post-Harvest Management: Adopt proper harvesting, grading, packaging, and storage practices to reduce quality deterioration and losses.

3. Promoting Organized Markets: Establish organized floriculture markets and auction platforms to improve transparency and price realization.

4. Enhancing Market Linkages: Strengthen direct linkages between growers, retailers, exporters, and consumers to reduce intermediary dependence.

5. Adopting Modern Technologies: Use greenhouse cultivation, precision farming, digital tracking, and supply chain management tools to improve efficiency.

6. Encouraging Digital Marketing and E-commerce: Online platforms can expand market access and enable direct sales to consumers.

7. Capacity Building and Training: Train growers and stakeholders in supply chain management, quality standards, and export requirements.

8. Policy and Institutional Support: Government support through subsidies, infrastructure development, and research can strengthen the supply chain.

CONCLUSION

Supply chain management, post-harvest handling, and export marketing are essential for improving efficiency and profitability in ornamental horticulture. Efficient logistics, cold chain infrastructure, and proper handling help maintain quality and reduce losses. Despite challenges like price volatility and weak infrastructure, the sector has strong growth potential. Better market linkages, modern technologies, and institutional support can ensure sustainable growth in India.