



Agricultural Supply Chain Management in India: Challenges and Future Prospects

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INTRODUCTION

Agriculture remains one of the most important sectors of the Indian economy, providing livelihood to millions of farmers and contributing significantly to food security. However, agricultural development does not depend only on production; efficient movement of produce from farms to consumers is equally important. This process is facilitated through Agricultural Supply Chain Management (SCM), which integrates production, storage, transportation, processing, marketing and distribution activities.

A supply chain is a network of people, organizations, resources and activities involved in delivering a product from its origin to the final consumer. In agriculture, it represents the journey of agricultural produce from “farm to fork”. Effective supply chain management ensures timely delivery, reduces losses, improves quality and creates value for all stakeholders involved in the system.

Understanding Agricultural Supply Chain Management

Agricultural Supply Chain Management refers to the systematic coordination of activities involved in the production, handling, storage, transportation, processing and distribution of agricultural commodities. It aims to ensure that products reach consumers in the right quantity, quality, place and time while minimizing costs and losses.

An agricultural supply chain generally consists of three major components:

- **Upstream Supply Chain:** Input procurement such as seeds, fertilizers, machinery and other resources.
- **Internal Supply Chain:** Production, harvesting, grading, processing and storage activities.
- **Downstream Supply Chain:** Transportation, marketing, distribution and delivery to consumers.

Efficient coordination among all stakeholders including farmers, processors, wholesalers, retailers and consumers is essential for a successful supply chain system.

Importance of Supply Chain Management in Agriculture

Agricultural supply chains play a vital role in ensuring food availability and improving market efficiency. A well-functioning supply chain helps reduce post-harvest losses, improve farmer income and strengthen food security.

Major benefits of agricultural supply chain management include:

- Reduction in post-harvest losses.
- Better market access for farmers.
- Improved price realization.
- Promotion of value addition and processing.
- Enhanced food quality and safety.
- Increased export competitiveness.
- Generation of employment opportunities in rural areas.

- Improved consumer satisfaction through timely availability of quality products.

Present Status of Agricultural Supply Chains in India

India is one of the largest agricultural producers in the world and supports nearly 18 per cent of the global population. Despite significant achievements in agricultural production, the country continues to face serious supply chain inefficiencies.

According to recent estimates, India loses nearly 40 per cent of its fresh produce annually because of inadequate storage, poor transportation facilities and inefficient supply chain systems. The economic value of food loss is estimated at approximately ₹1.52 lakh crore annually, representing a substantial burden on the agricultural economy. Food losses and wastage not only reduce farmer income but also threaten national food security.

Table 1: Estimated Post-Harvest Losses in Major Commodities in India

Commodity	Loss (%)
Cereals	3.89–5.92
Pulses	5.65–6.74
Oilseeds	2.87–7.51
Fruits	6.02–15.05
Vegetables	4.87–11.61
Fisheries (Marine)	8.76
Poultry	5.63

Source: Ministry of Food Processing Industries (2022).

India's food and grocery market continues to expand rapidly due to urbanization, changing food habits and the growth of digital commerce. Online grocery platforms, organized retail chains and quick-commerce services are transforming agricultural marketing and creating new opportunities for supply chain modernization.

Major Challenges in Agricultural Supply Chains

Despite considerable progress, agricultural supply chains in India continue to face several challenges.

Fragmented Farming System

Small and fragmented landholdings limit production volumes and reduce farmers' bargaining power in the market. This makes aggregation and efficient marketing difficult.

Inadequate Infrastructure

Insufficient cold storage facilities, warehouses, pack houses and rural roads contribute significantly to post-harvest losses and quality deterioration.

Excessive Intermediaries

The presence of multiple intermediaries often reduces the share of farmers in the consumer's rupee and increases marketing costs.

Weak Market Linkages

Many farmers have limited access to distant markets, organized retailers and digital trading platforms, resulting in price exploitation.

Limited Use of Technology

Poor adoption of information technology, digital traceability systems and market intelligence restricts effective supply chain planning and coordination.

Case Example 1: Amul Cooperative Supply Chain Model

One of the most successful examples of agricultural supply chain management in India is the Amul cooperative model. Amul has developed an integrated supply chain that

directly connects dairy farmers with consumers through village-level collection centres, district unions and state-level marketing federations.

The Amul model ensures that nearly 82 per cent of the consumer's expenditure on milk reaches dairy farmers. The cooperative network supports more than 36 lakh farmers and generated revenue exceeding ₹61,000 crore during 2022. By reducing intermediaries and strengthening producer participation, Amul has become a benchmark for inclusive and efficient supply chain management in India.

Case Example 2: Value Addition through Rose-Based Supply Chains

Value addition is an important component of agricultural supply chain management. A study conducted in Pushkar, Rajasthan demonstrated that processing rose flowers into value-added products significantly enhanced profitability compared to selling raw flowers.

Table 2: Economic Returns from Value-Added Rose Products

Product	Net Returns (₹)
Loose Rose Flower (per qtl.)	2,814.16
Gulkand (per qtl.)	9,999.97
Rose Syrup (per 100 litres)	6,785.36
Rose Water (per 100 litres)	11,111.40

Source: Rawat (2024).

The results indicate that value addition through processing substantially increases returns to producers. Development of efficient supply chains for processing, packaging and marketing can therefore play an important role in improving farmer income and reducing post-harvest losses.

Government Initiatives for Strengthening Agricultural Supply Chains

Recognizing the importance of efficient supply chains, the Government of India has launched several programmes and schemes to improve agricultural marketing, logistics and infrastructure.

Major initiatives include:

- e-NAM (National Agriculture Market): Facilitates transparent and integrated agricultural marketing across states.
- Formation and Promotion of Farmer Producer Organizations (FPOs): Strengthens collective marketing and bargaining power of farmers.
- Agriculture Infrastructure Fund (AIF): Provides financial support for warehouses, cold storages and logistics infrastructure.
- PM SAMPADA Yojana: Promotes food processing, value addition and cold chain development.

- Mission for Integrated Development of Horticulture (MIDH): Supports post-harvest management and horticultural infrastructure.
- Operation Greens: Helps stabilize prices of perishable commodities and supports storage and transportation facilities.
- Kisan Rail Scheme: Facilitates low-cost and rapid transportation of perishable agricultural commodities.
- APEDA Export Promotion Programmes: Strengthen export-oriented agricultural supply chains through quality improvement and infrastructure development.

Future Prospects of Agricultural Supply Chain Management

The future of agricultural supply chain management in India is closely linked with technological advancement, digitalization and infrastructure development. Emerging technologies such as blockchain, artificial intelligence, Internet of Things (IoT), digital marketplaces and real-time tracking systems are transforming agricultural supply chains and improving transparency.

The rapid growth of e-commerce platforms and online grocery services is creating new marketing opportunities for farmers and agribusiness firms. Expansion of cold chain infrastructure, warehouse networks and food processing industries is expected to further reduce losses and improve efficiency.

Strengthening Farmer Producer Organizations (FPOs), promoting value addition, enhancing market intelligence and encouraging public-private partnerships will be critical for building resilient and inclusive agricultural supply chains in the future.

CONCLUSION

Agricultural Supply Chain Management is a critical component of modern agricultural development and food security. Efficient supply chains ensure smooth movement of agricultural commodities from farms to

consumers while reducing losses, improving quality and enhancing farmer income. Although India has made considerable progress through various policy initiatives and technological interventions, significant challenges such as inadequate infrastructure, fragmented farming systems and weak market linkages continue to affect supply chain efficiency.

Successful examples such as the Amul cooperative model and value-added agricultural enterprises demonstrate the potential of well-organized supply chains in creating value for producers and consumers alike. Strengthening logistics infrastructure, promoting digital technologies, expanding cold chain networks and enhancing farmer participation through FPOs will be essential for building sustainable and resilient agricultural supply chains in India. A strong agricultural supply chain is not merely a marketing mechanism; it is a lifeline connecting farmers, consumers and the broader economy.

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