

# **Supply Chain Management and Indian Fresh Produce Supply Chain: Opportunities and Challenges**

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**Focus: Food Chain Approach  
For Presentation**

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## **Supply Chain Management and Indian Fresh Produce Supply Chain: Opportunities and Challenges**

Supply Chain Management (SCM) in general implies managing the relationship between businesses responsible for the efficient production and supply of agribusiness products from farm level to consumers, to reliably meet consumers' requirements in terms of quantity, quality, and price. In practice, this often includes the management of both horizontal and vertical alliances. In developing countries, the supply chain of agricultural products typically involves many players or agents with many farmers at one end and consumers at the other. These traditional supply chains are tightly linked with social structures (Lokollo, 2004). Generally, small farmers in developing countries are price – takers and their contact with “markets” is often limited to dealing with a produce collector or to sales at the local/ village market and district market.

### **Problem**

Indian agriculture is dominated by small holders, about 86% having land holdings of up to 2 ha. With an average, size of land holdings of 0.53 ha (Government of India, 2006). Questions have been raised as to the survivability of these small holders as their inability to access markets is one of the major limitations. Diversification of agriculture towards high value commodities have been suggested as plausible option for small holders. This option is being suggested because a shift is being seen in the food basket of Indian consumers toward more varied and nutritious diet of fruit, vegetables, milk, and meat. Sustained economic growth and a fast growing urban population are fueling rapid growth in demand for high value food products (Ravi and Roy, 2008). In addition, share of horticultural and animal food products in agricultural exports increased from 24 percent in 1981 percent to 35 percent in 2003. The producers' share in wholesale price is however, continues to be small (about 35 percent) with the major share going to market intermediaries as marketing cost, because of inefficient supply chains. Therefore, supply chain management may be a powerful tool in linking farmers to the markets for sustainable income generation.

### **Objective(s)**

Indian agric-produce supply chains are characterized by strict regulations and large number of intermediaries leading to number of inefficiencies, lower share for farmer in consumer rupee. Within this context, private players are entering for providing complete solutions to the farmers/ farming community under one roof. The overall purpose of the paper is to compare traditional supply chain with that being developed by the private sector under Public Private Partnership (PPP) mode. It reports results of a study undertaken to evaluate the fresh produce supply chains in India so as to highlight the issues of inefficiencies, stakeholders' expectations, reduction in post harvest losses, information flow and infrastructure development. A case of supply chain for apple has been chosen to reveal the critical success factors of supply chain development in case of fresh produce supply chains in India

### **Procedure**

The paper examines traditional fresh produce supply chains and problems associated with them. Marketing costs and margins are estimated and the paper further compares the traditional supply chain with that being developed by a private sector company under public-private-partnership model. A pilot project for apple was selected to critically examine factors for supply

chain development in case of fresh produce supply chains in India. The results of an exploratory study conducted to analyze the agri-produce supply chain in case of apples in the Western Himalayan region of India are presented and discussed which produces 99% of apples, is used here to highlight issues related with management of supply chains for fresh produce. Multistage sampling design was used for the selection of the sample from this region. Impact on marketing costs and margins in apples were estimated and compared with traditional marketing channels. The paper also reviews issues for the development of supply chains with special emphasis on apples outlining factors for success and risks in supply chain development.

## **Results**

### **Traditional Fresh Produce Supply Chains in India: A Case of Apples.**

The marketing chain is the sequence of stages involved in transferring produce from the farm to the consumer and contributes to the marketing costs. Traditional supply chain in India for fresh produce is generally too long and fragmented where intermediaries collect a sizeable share from the price of the produce paid by consumers. In Figure 1, traditional marketing channels for apples are shown. Mandi (market) system has number of inefficiencies like non-transparent price setting where seller and buyer are often cheated, high losses due to non-scientific handling and storage. There exists inadequate infrastructural support to government regulated supply chain leading to high losses as high as 40 percent in case of fruits and vegetables. Private participation is restricted by the Market Regulations (like APMC Act) by hindering the direct procurement from farmers outside the notified market yards. However, with the amendment of model APMC act, doors are being opened for private players to operate in the agri-produce supply chain.

### **Existing Problems in Indian Fresh Produce Supply Chains:**

- Losses during transportation and storage
- Lack of appropriate technologies, advanced techniques, capital and knowledge among partners
- Lack of information about the flow of products and markets
- Lack of transparency in the supply chain
- Tracking and traceability
- Lesser control of product safety and quality across the supply chain
- Large investments and risks are shared among partners in the chain
- Poor shelf life of products
- Lack of farmers awareness and knowledge
- Lack of storage and other post harvest facilities

### **Market Costs and Margins**

Apples reach the consumer through different intermediaries who exploit farmers largely. The cost incurred by each is included in the ultimate price, which also varies considerably. Therefore, the share of the producer in price paid by consumer depends on the channel followed by the producer in marketing his produce (Figure 1). It has been observed that in most of the channels, the numbers of intermediaries are many and charges of different intermediaries are not in accordance to the Market Acts adversely affecting the producers and the consumers. For working out marketing cost and margins, the wholesale prices of Azadpur Fruit & Vegetable Market, Delhi, were used as an example. This market is considered as the largest market of apples in India where more than 70 per cent of apples arrive mainly from three states: Himachal Pradesh (HP), Jammu & Kashmir (J&K), and Uttarakhand (UK). The estimated marketing costs and marketing margins varied widely in Delhi market from the three selected states. The net price (percentage of

wholesalers price) received by producers from HP was the highest 69.5 percent followed by UK 57.3 percent to a low of 54.7 percent for producers from J&K (Table 1). It may be observed that marketing costs in case of J & K apple growers was highest followed closely by HP growers. The marketing costs for growers in J&K and UK was higher compared to HP growers mainly because of higher costs of packing material, freight, and costs associated with transportation.

### **Supply Chain Development for Apples- Farm Gate to Market Place: Entry of Adani Fresh**

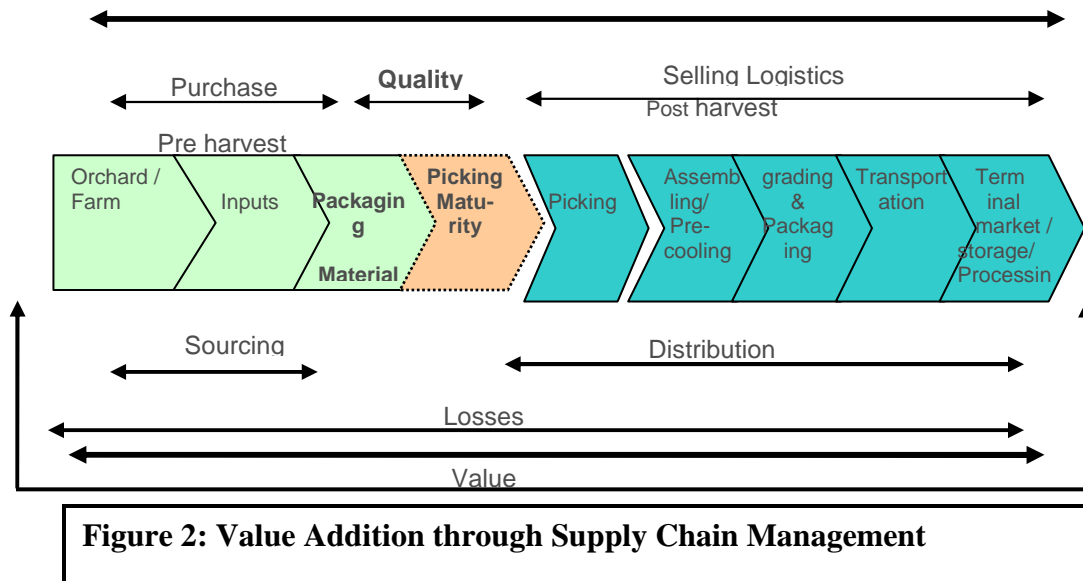
Adani Group of Enterprises (a private sector company) has been trading in agriculture commodities for over a decade. The company has now entered into horticulture sector with focus on tapping domestic as well as international markets for major fruits and vegetables in Middle East and European Union. Adani enterprise however, realized that with the existing kind of marketing set-up, facilities, and infrastructure it was difficult for the company to harness these opportunities at competitive prices while maintaining the quality throughout the supply chain. Hence, infrastructure was set up at three places in HP for strong backward integration for product availability to meet the international standards. In the supply chain of apples, the biggest hurdle before the company was to procure right quantities of commodities at the right price and quality. For procurement of apples, the company identified many constraints and in order to strengthen its position aimed at the following aspects:

- Development of innovative technology including cool chain, handling, transportation, storage etc. to minimize post harvest losses in food products.
- Formulation of conditions for development of markets and marketing infrastructure including e- marketing and assessment of trading performance.
- Application of International codes and standards (CODEX, HACCP, and EU standards) for food safety and quality assurance.
- Started developing strong relationships with farmers and government
- Training the teams
- Developing better understanding of produce and the market.

### **Issues of Concern for Supply Chain Development in Apples**

- Good agricultural practices for production of high quality produce
- Safe, damage free harvest, transport and handling practices devices
- Maintenance of high quality during CA storage
- Processes, equipment, and pilot plants for commercial exploitation and manufacturing of high quality innovative food and fiber products.
- Packaging having international safety mounts
- Private investment in processing, market infrastructure, market developments and contract farming
- Minimum risk to the farmers

Adani Group made an investment of over \$280 million (Rs.11 billion) in the hill state for setting up controlled atmosphere packaging and storage units. The company also has plans to invest over \$408 million (Rs.16 billion) to set up its own cold chain of refrigerated vehicles for transporting apples, kiwi, almonds, and peaches. Figure 2, shows the broad components for forward and backward linkages being followed by the company.



**Figure 2: Value Addition through Supply Chain Management**

### Producers' and Company Linkages: Impact

The Adani Enterprises started its operations in September 2006, by contacting farmers for procuring the produce (apple) at an announced price and with certain specifications. They collected the produce from the farmers at the orchard site. The farmers were not to bear any marketing cost such as cost of box, transportation to the markets, commission, and market fees etc. There was no risk involved for farmers during transportation as well as price risk. The company provided the plastic crates to the farmers and trained them about the maturity of the apples, as it is the critical factor for post harvest management. At the pack house apples are cleaned, washed, sorted, and graded for both quality and color by sensors. Finally, the apples are put under CA storage for better shelf life. In Table 2, the impact of new (Adani) supply chain over traditional marketing is shown in the state of Uttarakhand (UK). It may be seen that the farmers' share has increased by about 41 percent apart from the risk. On the other hand, there were significant improvements in:

- Remarkable reduction in post harvest losses
- Surplus produce brought into food chain
- Improved quality of produce
- Better price realization by farmers and minimum risk
- Export promotion
- Employment generation
- Socio-economic development of State
- Benefit to all stakeholders in value chain

### Important Measures Required To Redesign Supply Chain for Improving Competitiveness of Fresh Produce in India

The model adapted by Adani enterprise in designing the supply chain to improve competitiveness highlights the role of different players in the supply chain to bridge the gap existing in the traditional agri- supply chains. The training, capacity building component assumes

significant importance for all the stakeholders in the value chain. Some of the measures required to re-design the supply chain for improving the competitiveness of the fresh produce are as follows:

- Integrate supply chain for fresh market, processing and export
- Sorting, grading and packaging to be done closer to production areas
- Setting up of a network of 'Collection Centers' / 'Value Added Centers' with basic post-harvest facilities
- Introduce Returnable Packaging for fresh produce to avoid multiple handling and minimize wastages
- Establish common cold chain facilities for marketing perishable products
- Encourage Contract Farming- provide direct linkages with farmers [market by-pass]

### **Conclusion**

The opportunities in retail sector in fruits and vegetables have given new dimensions to supply chain management. These Innovative supply chains are focusing at bi-directional information flow among all stakeholders, reduction of post harvest losses, strengthening market infrastructure to bring a win-win situation or both farmers and consumers. The study suggests that public private collaboration through contract/corporate farming would help understand functioning of domestic and global market and their implications. The private players can provide both backward and forward integration to the farmers as well as in building the capacities of all the stakeholders. With the creation of specialized market infrastructure, post harvest losses can be minimized if quality aspects are properly managed and would result in higher returns to the farmers and the consumers will get better returns. Horticulture at national and international level would meet the long felt need of planners and private sector for better management, and safeguarding against supply shocks and price risk.

### **References**

1. Lokollo, Erna M. "Linking farmers with Markets: Ways to Reduce Poverty through Supply Chain Management" UNESCAP-CAPSA, Vol.2, No. 9, September 2004.
2. Government of India. 2006 Level and pattern of Consumer Expenditure 2005-05. Report No. 508(61/1.0/1), National Sample Survey Organization, Ministry of Statistics and Program Implementation, Government of India, New Delhi.
3. Ravi, C. and D. Roy. 2006. "Consumption Patterns and Food Demand Projections : A Regional Analysis" Paper presented at the workshop Plate to Plough: Agricultural Diversification and Its Implications for the Small holders organized by IFPRI, Asia Office, New Delhi and the Institute of Economic Growth , New Delhi at New Delhi, September 20-21.

Table 1: Marketing Costs & Margins for Apples in Delhi Traditional Market

Particulars	(Percentage of Wholesalers Price)		
	HP	UK	J & K
Net Price received by orchardist	69.5	57.3	54.7
<b>Expenses incurred by orchardist on:</b>			
1. Packaging, grading, & assembling	3.3	4.3	4.1
2. Packing material	9.8	15.1	13.3
3. Carriage up to road-head	1.1	4.1	3.4
4. Freight up to Market	7.0	9.5	12.3
5. Loading unloading charges, State Tax, Octroi, Postal charge etc., commission of Commission Agents & Market Fee	9.3	9.7	12.2
<b>Sub Total</b>	30.5	42.7	45.3
<b>Wholesale Price at Delhi Market</b>	<b>100.00</b>	<b>100.00</b>	<b>100.0</b>

States: Himanchal Pradesh (HP); Uttarakhand (UK); Jammu & Kashmir (J&K)

Table 2: Impact on Marketing Costs and Margins in Apples  
(Producer's Share in Wholesale Price in Adana's Supply Chain and Traditional Marketing)

Particulars	Adani's Supply Chain	Traditional Marketing
Net Price received by orchardist	97.8	57.4
<b>Expenses incurred by orchardist on:</b>		
2. Packaging, grading, & assembling	1.7	4.3
6. Packing material	-	14.0
7. Carriage up to road-head	0.5	4.1
8. Freight up to Market	NIL	10.5
9. Loading unloading charges, State Tax, Octroi, Postal charge etc., commission of Commission Agents & Market Fee	NIL	9.7
<b>Sub Total</b>	2.2	42.6
<b>Wholesale Price at Delhi Market</b>	<b>100.00</b>	<b>100.00</b>

### Marketing Channels for Apples

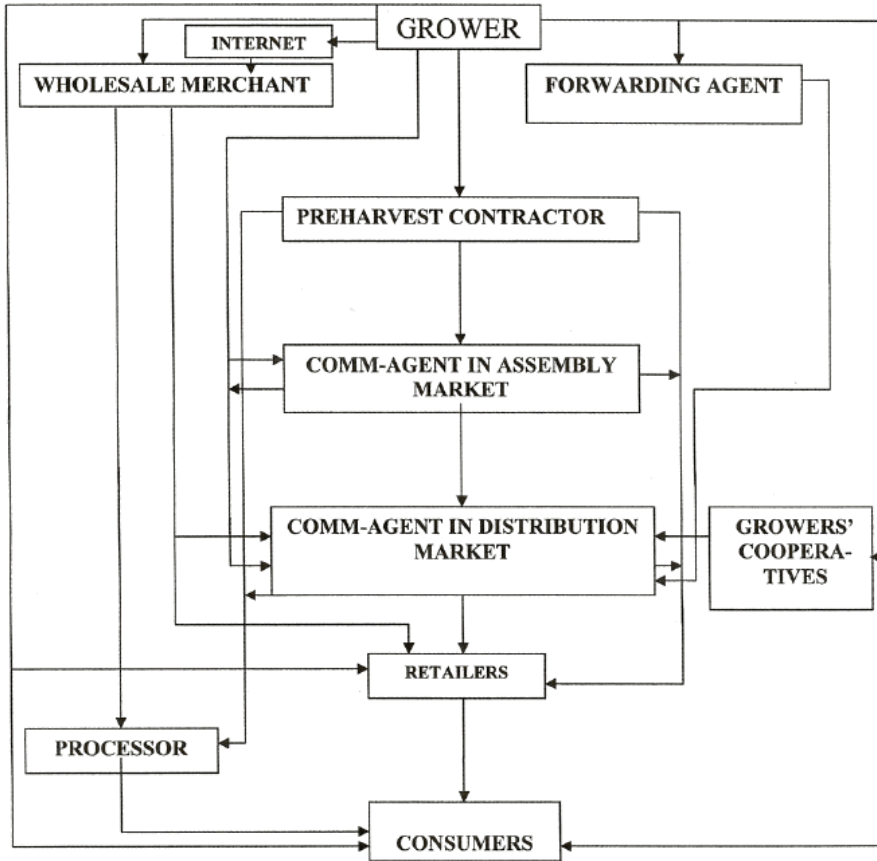


Figure 1. Traditional Marketing Channels for Apples