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LINKING FARMERS TO MARKETS: A CASE OF INDIAN FRESH PRODUCE SUPPLY CHAINS+

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ABSTRACT

Modern retail in India has been characterized by a shift from traditional channels to new formats including departmental stores, hypermarkets, supermarkets and specialty stores across a range of categories. Food is the largest category of consumer spending basket, but Indian consumers are deprived of quality food products, variety and value-added services at the retail end largely because of the highly fragmented nature of food retailing. Organized retailing in India offers opportunities to fulfill the demand of quality and hygienic food, branded and unbranded produce which has risen due to increase in consumer incomes, more working women and consumers' concerns regarding health consciousness. This demand can be easily met by the increasing number of organized food retailers such as Subiksha, Food Bazaar, Food World, Reliance Fresh and other global players such as Wal-Mart. Though, the organized retailing in India is faced with many political and social challenges, the biggest challenge being faced are that of linking farmers to markets and protect the interests of farmers. The backward and forward linkages have to be strengthened to involve the already existing intermediaries and the new intermediaries which are evolving in the food supply chains such as service providers, commodity specific intermediaries who work on a larger scale than ever. Another challenge is the time factor, i.e. how quickly the fresh produce reaches in the hands of consumers. The role of Government in supply chains is very important as it tries to strengthen the supply chain by creating new formats like Safal wholesale markets, Agri-marts and terminal markets. The organized food retailers' approach is also to be reexamined in terms of various critical points of infrastructural investment, formats and mode of linking the farmers, intermediaries and Government.

Keeping in view the above said challenges, the present study aims to examine and evaluate the supply chains of fresh produce, compare the various evolving models, study the constraints and challenges, find out the various infrastructural gaps in the supply chains, mode of Public-Private Partnership i.e. where and how it is needed in global perspective. For the study, the two supply chains such as apple and mango have been selected as case studies.

Introduction

Green Revolution has helped India attain self-sufficiency in food and with the growth of the economy, a shift is also being seen in the food basket from consumption of cereals to a more varied and nutritious diet of fruit and vegetables, milk, fish, meat and poultry products. These changes along with the emerging food retail sector have brought in a lot of opportunities in the domestic sector. Market liberalization and increasing consumer demand has also offered attractive

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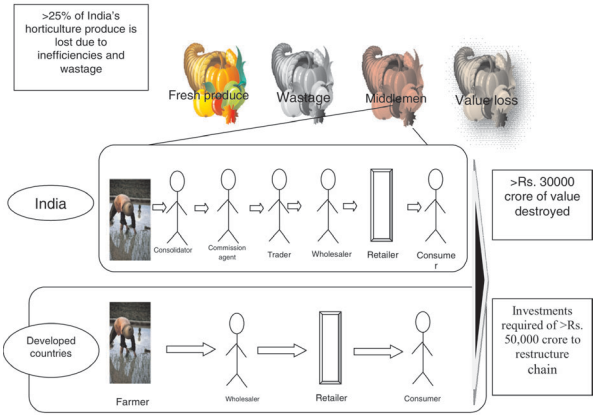
opportunities for agricultural exporters from developing countries. Global Trade in fishery products, exotics, pre-cut products, organic products and fresh fruits and vegetables extend altogether new options for businesses. Yet, the Indian exporters are not able to harness these opportunities due to stringent global market standards. Consumers in these countries and in urban areas of developing and transition economies demand safe and nutritional food, excellent quality and just-in-time delivery. This presents major challenges to produce from India where supply chains are inefficient to deliver the right kind of mix in the global market.

In India, the producers' share in consumer rupee is very less in case of perishable produce and the major share goes in the hands of market intermediaries due to inefficient supply chains **(Exhibit1).** Therefore, supply chain management may be a powerful tool in linking farmers to the markets to achieve better returns. Supply chain development not only benefits the private sector but also creates spin-offs that stimulate social, economical and environmental sustainable development in the region (employment generation, added value, decreases of product losses, etc.). Public support (e.g. development of the institutional infrastructure) plays an important role to create an enabling environment for supply chain development. Such support might take the form of a public private partnership in a supply chain to share experiences, risks and bottlenecks. In developing countries and emerging economies, however, supply chain development is often hampered due to lack of governmental support.

Exhibit 1: Inefficient Agri - Supply Chain in India Functional Cost in Chain



Methodological Framework

Indian agri-produce supply chains are characterized by strict regulations and large number of intermediaries leading to number of inefficiencies, lower share of farmer in consumer rupee. Considering the above barriers and plight of the Indian farmers due to them, private players for providing complete solutions to the farmers/farming community under one roof have entered into this field. Taking a deep look at the above concept of Complete Solution Provider (CSP) for the farmers as well as consumers, a study was 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. This paper aims to compare the traditional supply chain with that being developed by the private sector under Public –Private-Partnership (PPP) mode. This paper also describes the benefits offered by the new supply chains One case of supply chain pilot project of apple has been chosen which reveals the critical success factors for supply chain development in case of fresh produce supply chains in India. Role of public-private partnerships has also been highlighted in these

areas. An exploratory study has also been conducted to analyze the agri-produce supply chain in case of apples in the Western Himalayan Regions of India, which produces 99 percent of apples in the country. The sample consisted of farmers from the region. Multistage sampling design was used for the selection of the sample. Finally, it is attempted to explore setting–up of a common market for farmers by leveraging AGMARKNET(http://agmarknet.nic.in) initiative of Government of India.

Fresh Produce Supply Chains in India: A Case of Apples

Agriculture is vital to India and contributes about 20 per cent of GDP, feeds a billion people, and employs 66 percent of the workforce. India with arable land of 184 million hectares, produces annually 91 million tonnes of milk (highest in the world), 150 million of fruits and vegetables (second largest), 483 million livestock (largest), 210 million tonnes food grain (third largest), 6.2 million tonnes fish (7th largest) and is the fifth largest in egg production

Fresh produce supply chains are complex and evolve over time. The opportunities in retail sector in fruits and vegetables have given new dimensions to supply chain management. Number of innovative models have emerged to safe guard the interest of both producers and consumers. 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. Indian fresh produce supply chains can be used to harness the opportunities both for domestic and international markets, but there are a lot many challenges to meet **(Exhibit 2).** Agricultural Supply Chains In India are governed by State Marketing Board under Agriculture Produce Market Committee (APMC) Act, which defines the frontiers of agri-marketing structure in particular state.

Exhibit 2: Existing Problems in Fresh Produce Supply Chains

- Reduction in product losses during transportation and storage
- Dissemination of technologies, advanced techniques, capital and knowledge among partners
- Better information about the flow of products and markets
- Transparency in the supply chain
- Tracking and traceability
- Better 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
- Farmers awareness and knowledge
- Lack of storage and other post harvest facilities

Agricultural Markets

Agricultural markets in India can be classified into following types:

- Village Markets: A market which is located in a small village, where major transactions take place among the buyer and sellers of a village.
- Primary Markets: These markets are located in big towns near the centre of production of agricultural commodities. In these markets, a major part of the produce is brought for sale by the producer-farmers themselves. Transactions in these markets usually take place between the farmers and traders.

- Secondary Wholesale Markets: These markets are located generally at district headquarters or important trade centers or near railway junctions. The major transactions in commodities take place between the village traders and wholesaler. The bulk of arrivals in these markets are from other markets.
- Terminal Markets: A terminal market is one where the produce is either finally disposed of to the consumer or processors, or assembled for export.

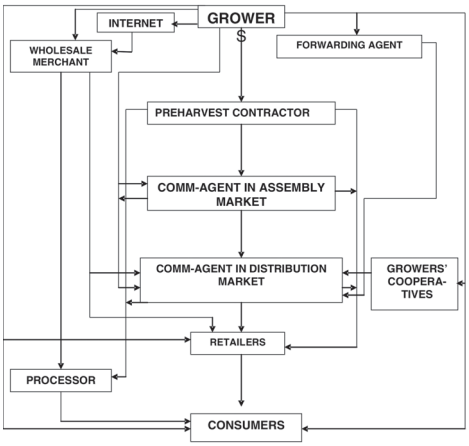
Sale in the Regulated Markets

In India the produce is sold in the regulated market only through open auction under the supervision of the market official as per regulation. But the sale is also done through negotiations or under cover system (see picture). In this system no one knows the price at which the sale is actually undertaken as the price is agreed under the cloth through certain codes which are known to the trader and the buyer. This type of sale is not allowed in the market but in practice is common.

Under Cover Selling at Azadpur Fruit and Vegetable Market, Delhi

Supply chain is too long and fragmented where intermediaries collect a sizeable share from the price of the produce. 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. But with the model APMC act being proposed by the central government and Food Safety and Standards Bill-2005, it has been expected that regulations will be simplified and doors are being opened for private players to operate in the agri-produce supply chain. There are several functionaries involved in marketing of apples which perform different functions (Exhibit 3). These are: Commission Agent,Wholesaler,Wholesaler-cum-Commission Agent,Retailer, Mashakhor and Forwarding Agents.

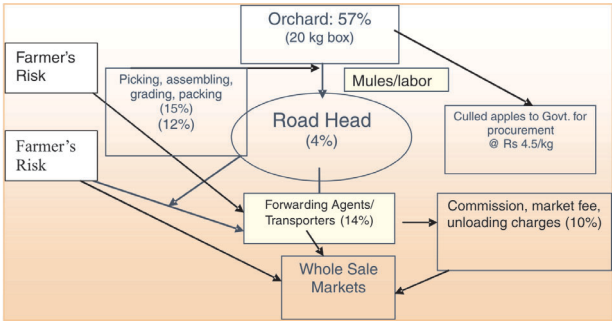
Exhibit 3: Marketing Channels for Apples



Marketing Infrastructure

The marketing infrastructures of the regulated markets also play a pivotal role in fostering and sustaining the tempo of agricultural development. The availability of right infrastructure ensures income distribution in favor of small and marginal farmers by raising their access to the market. Requirement of marketing infrastructure is undergoing a radical change in globalize environment. The present marketing infrastructure in Indian agricultural markets is inadequate as a result of which most of the fresh produce either gets perished or is not able to get the right price in markets. The small and marginal farmers are also not having specialized infrastructure such as cleaning, grading, and packaging and standardization machinery

Exhibit 4: Price Spread: Logistics in Apple Supply Chain



Market Costs and Margins

As explained earlier, the apples reach the consumer through different intermediaries who exploit the farmers to a great extent. The cost incurred by each is included in the ultimate price, which also varies considerably. Therefore, the share of the producer in consumer rupee depends on the channel followed by the producer in marketing his produce **(Exhibit 4).** It has been observed that in most of the channels, the numbers of intermediaries are more and charges of different intermediaries are not in accordance to the Market Acts and this adversely affects the producers and the consumers. For working out marketing cost and margins, the wholesale prices of Azadpur Fruit and Vegetable Market, Delhi, considered being the largest market of India where more than 70 per cent of apples arrive, have been taken into consideration. This

market is supplied apples mainly from three states Jammu&Kashmir (J&K), Himachal Pradesh (HP) and Uttarakhand (UK). It may be observed that marketing costs in case of J & K apple growers is higher as compared to that of HP mainly because of high cost of packing material, transportation charges etc. During the visit to Harshil area of Uttarakhand (UK), the farmers reported that the traders in Delhi market are charging taxes of HP as well as Sales Tax (which are not applicable). The farmers' knowledge with regard to market transactions and documentation is very poor as far as UK is concerned. All these factors along with multiplicity of charges in the market have increased the marketing cost and control over the trade, resulting into lesser returns. The HP grower gets about 70 per cent share of the wholesale price whereas in the case of UK and J & K it was 57 and 55 per cent respectively **(Exhibit 5)**

Exhibit 5: Marketing Costs and Margins of Apples in Delhi Market
(Percentage of Wholesalers Price)

S. No.	Particulars	HP	UK	J & K
1.	Net price received by orchardist	69.5	57.3	54.7
2.	Expenses incurred by orchardist on:			
	i. Packing, grading and assembling	3.3	4.3	4.1
	ii. Packing material	9.8	15.1	13.3
	iii. Carriage up to road-head	1.1	4.1	3.4
	iv. Freight up to market	7.0	9.5	12.3
	v. Loading unloading charges, State tax, octroi, postal charge etc., commission of Commission Agents and market fee	9.3	9.7	12.2
	Sub Total	30.5	42.7	45.3
3.	Wholesale price at Delhi	100.0	100.0	100.0

Redefining Distribution of Apples: A Case of Adani Enterprieses

The Adani Group is having its turnover of about Rs. 20,000 crores. The main activities of the group are trading- infrastructure – port (Mundra), rail, gas, mining – iron ore, coal, Adani Willmar – "fortune" edible oil, B2C India Limited, i-call etc. Presently the main focus is on logistics and agri fresh, power and ship building. Adani Enterprise is the flagship company of Adani Group and has been conferred the prestigious status of "Five Star Trading House" (highest status conferred by Government of India).The company trades over 55 commodities across four continents. The business includes agri. commodities (Wheat, Rice, Pulses, Sugar), Power Trading, POL, Chemicals, Minerals, Coal and Coke, Textiles, Precious Metals etc. The group is exploiting the opportunities in retailing Sector with l46 Outlets and 5 warehouses in Gujarat

Group's Agribusiness Avenues

Group is trading in agriculture commodities for over 1ast ten years which include wheat, pulses etc. and edible oil. The biggest project was established for bulk handling, storage and transportation facilities for Food Corporation of India in Punjab and Haryana. The company has now entered into horticulture sector with main focus on tapping domestic as well as international markets for fruits such as Mango, Litchi, Pomegranate, Grapes and Papayas and vegetables – lady finger, bitter gourd, brinjal, chillies, green onions for Middle East and EU. The company also plans to export Organic products for niche market.

Exhibit 6 :Crucial Problems Identified in Apple Marketing

- Picking, assembling and maintenance of freshness
- Standardization and grading
- Packing
- Handling and transportation
- Wholesale marketing
- Pricing
- Utilization of culled / value addition
- Regulation of supply and storage
- Market information
- Infrastructure in PPP Mode
- Price Support System
- Government Interventions

Supply Chain Development for Apples

To harness this potential, it realized that with the existing kind of marketing set-up and infrastructure and other facilities, it was really difficult for the company to harness these opportunities at competitive prices while maintaining the quality throughout the supply chain. Hence, a need was felt for strong backward integration for product availability, developing procedures and systems in both infrastructure and manpower to meet the world standards. While studying the supply chain of apples, the biggest hurdle **Exhibit 6** before the company was to procure the commodities at the right price and quality. For procurement of apples, the company identified many constraints and in order to strengthen its position aimed **Exhibit 7** at following objectives:

- 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.

Exhibit 7: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.
- Natural food colorants from plant and microbial sources
- Cost effective utilization of processing waste and by-products for bio-fuels
- Packaging having international safety mounts
- Private investment in processing, market infrastructure, market developments and contract farming
- Policy and regulatory framework for processing, safety, quality, traceability, public-private-partnership and amendment of APMC Act
- Minimum risk to the farmers

Building Marketing Infrastructure

Adani Agri Fresh launched operations in Himachal Pradesh in 2006, when it procured a major chunk of apples from the hill state. In the entire apple producing areas of the country the post harvest infrastructure is almost absent and the produce is marketed as such which leads to very high post harvest losses and hence high marketing cost.

Adani Group wanted to grab the opportunities and started looking for sites in Himachal Pradesh in September2005 and the following sites were selected:

Site No. 1 – RAMPUR Sub Division

Site No. 2 – THEOG Sub Division

Site No. 3 – ROHRU Sub Division

The orchardist in the largest apple growing state in the country got a much better price from the agri-major and they were also spared the hassle of packaging their produce and transporting it to big markets in Delhi, Mumbai, Ahmedabad and Kolkata. Adani made an investment of over $280 mn (Rs11bn) in the hill state for setting up controlled atmosphere packaging and storage units. The company also has plans to invest over $408 mn (Rs16bn) to set up its own cold chain of refrigerated vehicles for transporting apples, kiwi, almonds and peaches. The **Exhibit 8** shows the broad components for forward and backward linkages being followed by the company.

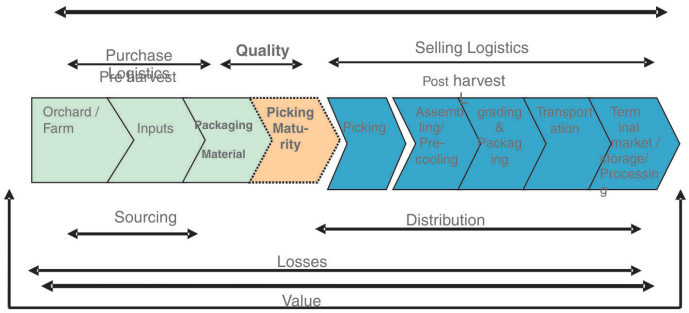


Exhibit 8: Value Addition through Supply Chain Management

Planning for Operations

For developing the infrastructure such as grading and packing houses, controlled atmospheric stores (CA), refer vans, the following operations were aimed at:

- Started developing strong relationship with farmers and government
- Training the teams
- Understanding the produce
- Understanding the market
- Setting systems
- Farm visits

Producers' and Company Linkages

Finally their operations started during September 2006, where they tied up with farmers for procuring the produce. They started with announcing the prices of apples (Rs. 30-32 per kg.)

with certain specification and 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. and their was no risk involved 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 the critical factor for post harvest management. At the pack house the clean, wash and sort the produce and grading is done for both quality and color by sensors. Finally the apples are put under CA storage for better shelf life.

Exhibit 9: Impact on Marketing Costs and Margins in Apples
(Producers Share in Wholesale Price – Modern and Traditional Marketing)
(Percentage of Wholesalers Price)

Sr. No.	Particulars	Modern Marketing	Traditional Marketing
1.	Net price received by orchardist	97.8	57.4
2.	Expenses incurred by orchardist on:		
	i. Packing, grading and assembling	1.7	4.3
	ii. Packing material	-	14.0
	iii. Carriage up to road-head	0.5	4.1
	iv. Freight up to market	Nil	10.5
	v. Loading unloading charges, State tax, octroi, postal charge etc., commission of Commission Agents and market fee	Nil	9.7
	Sub Total	2.2	42.6
3.	Wholesale price	100.0	100.0

Contract farming or marketing is an arrangement between the farmers-produces and the agri-business firms to produce certain pre-agreed quantity and quality of the produce at a particular price and time. It can only be a pure procurement transaction or can entrer to the supply of input or beyond. **Exhibit 9** reveals the impact of modern supply chain over traditional. It may be seen that the farmers' share has increased by about 41 percent apart from the risk. On the other hand there is a significant improvement in the quality as well as post harvest losses **Exhibit 10.**

Exhibit 10: Benefits offered by Adani's Supply Chain

- Remarkable reduction in post harvest losses
- Surplus produce brought into food chain
- Improved quality of produce
- Better price realization by farmers and minimum risk
- Nutritional security to large section of masses
- Export promotion
- Employment generation
- Foreign exchange earning
- Socio-economic development of State
- Benefit to all stakeholder in value chain

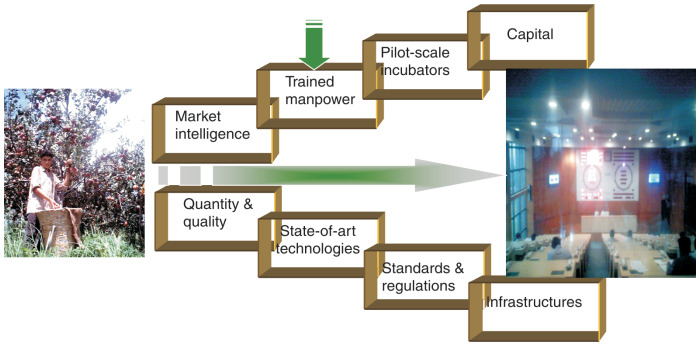
Suggestive Model for Redesigning the Agri -Supply Chain

A model has been suggested in the **Exhibit 11** which highlights the role of different players to abridge the gap existing in the traditional agri supply chains. The training/capacity building component assumes significant importance of 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 Centres' / 'Value Added Centres' 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]

Exhibit 11: Farm Gate to Marketplace – Value Addition through Supply Chain Management: A Suggestive Model



Creating an ICT based Common Market for Farmers

Directorate of Marketing and Inspection (DMI) , Ministry of Agriculture has embarked upon an ICT Project : NICNET based Agricultural Marketing Information System Network (AGMARKNET: http://agmarknet.nic.in) as part of the Central Sector Scheme : "Marketing Research and Information Network" for progressively linking all important agricultural produce wholesale markets in the country. The project, initiated in March, 2000, is being implemented on turn-key basis by the National Informatics Centre.

AGMARKNET initiative has so far achieved:

- A national database comprising daily market information in respect of about 300 commodities, 2000 varieties and 2937 markets to facilitate agricultural marketing research and planning. 2800+ Markets have been networked so far.
- A unique single Window Service to access information needs of multiple stakeholders in respect of various markets spread across the country.

AGMARKNET can facilitate commodity trade flows across the country and serve as ICT based platform for establishing a common virtual market. Introduction of on-line trading over AGMARKNET would, however, require:

- Legal acceptance of online trading of agricultural/horticulture produce across the country
- Adequate facilities for Grading, Quality Certification and standardization of commodities near the production areas

- Customized services related to storage, transportation, logistics handling and shipment
- Implementation of National Warehousing Receipt System
- Accessibility of farmers to Internet based on-line trading through facilitators
- Enhancing awareness level of farmers

Conclusion

The study has suggested that public private collaboration through contract/corporate farming would help understand functioning of domestic and global market for various agricultural commodities and their implications. The private players can provide both backward and forward integration to the farming community as well as in building the capacities of all the stake holders. With the creation of specialized market infrastructure, post harvest losses can be minimized if quality aspects are properly managed in the entire value chain and would result in higher returns to the farmers and the consumers will get better returns. Agriculture including food processing at national and international level would meet the long felt need of planners and private sector for planning commodity management, and safeguarding against supply shocks and price risk.

[+]Views expressed are personal

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