

**CHALLENGES AND SOLUTION IN THE SUPPLY CHAIN OF INDIAN
VEGETABLE MARKET: A REVIEW****Bharati Pujari***

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Keywords: Supply Chain Management, Wastage, Infrastructure, Food Sector**Abstract**

India's population is very high. More than 120 crore people live in India. For that reason demand for vegetables is very high also. India is the second largest producer of vegetables in the world. But due to lack of proper supply chain management a lot of wastage is happening. As vegetables belong to perishable goods, within a short span of time these items will have no use. To reduce the wastage these items require proper storage, packaging, handling and transportation.

The main objective of the study is to find out the issues and challenges in the supply chain of vegetables and to find out the solution for the problem in supply chain. The present study undertakes a thorough review of basic and contemporary literature available. The study is based on secondary sources. The information has been collected from various published sources like journals, newspaper, articles, magazines etc and tries to explain the barriers in the supply chain of vegetables.

The study found that unavailability of cold chain, poor infrastructural facilities, high cost, wastage of fresh produce are the barriers which are affecting the vegetable sector. The problem of supply chain will be solved by development of cold chain infrastructure, proper connectivity, using modern technology, suitable packaging, awareness and knowledge level of farmers etc.

In an agrarian economy like India vegetable plays a very important role. So supply chain of vegetable plays a significant role in developing the food sector.

Introduction

India is the hub of different varieties of fresh vegetables. It is the second largest producer of vegetables in the world. It is the largest producer of okra and second largest producer of brinjal, cabbage, cauliflower, onion and potato in the world. Indian horticulture provides wide employment opportunity and provides a scope to raise the income of the rural people. During 2013-14, India's contribution in the world production of Vegetables was 14 % (NHB, 2014). China's share has been highest with 49.5% in world's vegetables production followed by India (14%). India produced around 162.187 MTs of vegetables which accounts for nearly 14.0% of country's share in the world production of vegetables. These also generate high income and employment, particularly for small farmers. But the country has no efficient supply chain for the distribution of vegetables. It plays an integral role in keeping business costs minimum and profitability as high as possible. The present challenge in supply chain management is to maintain all three flows (product flow, information flow & finance flow) in an efficient manner, resulting in optimal results for farmers, wholesalers and customers.

The world production and percent share of vegetables is shown in **Table 1**.

Table 1- World Production and percent share

VEGETABLES		
COUNTRY	PRODUCTION	SHARE(%)
China	573935000	49.5
India	162186567	14
USA	35947720	3.1
Turkey	27818918	2.4
Iran	23485675	2
Egypt	19825388	1.7
Russian Federation	16084372	1.4
Mexico	13599497	1.2



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Spain	12531000	1.1
Italy	12297645	1.1
Others	261467661	22.6

Source: Indian Horticulture Database, NHB, 2014

Table-2 Production Share of major vegetables in World

Commodities	
Vegetables	India share
Potato	28.0
Tomato	11.2
Onion	10.4
Brinjal	8.3
Cassava	8.0
Cabbage	5.3
Cauliflower	4.9
Tapioca	4.5
Okra	3.9
Peas	2.5
Sweet potato	0.7
Others	20.5

Source: Indian Horticulture Database, NHB, 2014

Table-3 Ranking of India in production of vegetables in World

Commodities	
Vegetables	India Ranks
Peas	1
Brinjal	2
Cabbage	2
Cauliflower	2
Onion	2
Pumpkin	2
Potato	3
Lettuce	5
Tomato	6
Beans	6
Cassava	8

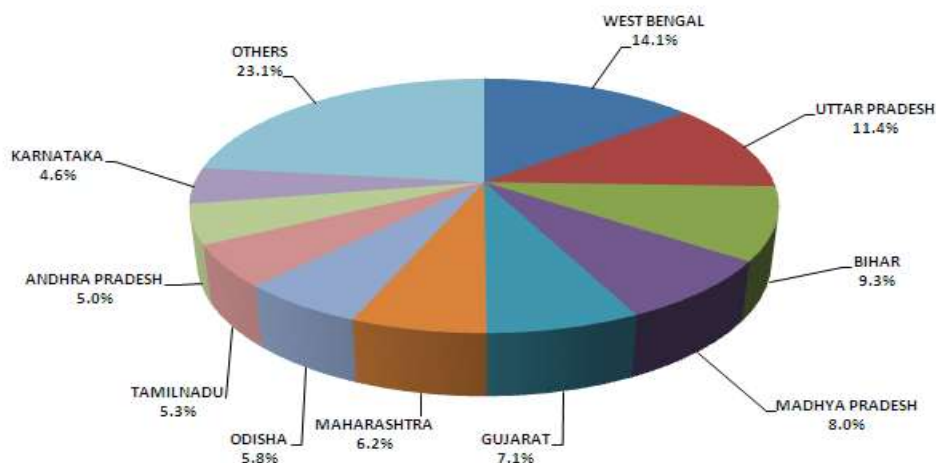
Source: Indian Horticulture Database, NHB, 2014

Indian scenario of vegetable production

In India the production of vegetables is very high but the per capita availability of vegetables is quite low because of post harvest losses which account for about 25% to 30% of production. Quality of a sizable quantity of produce also deteriorates by the time it reaches the consumer. Problem arises for marketing of vegetables due to their perishable nature. It is responsible for high marketing costs, price fluctuations and other similar problems. The chart below shows the total production of various fruits and vegetables in different states of India along with the area of production in the year 2013-14. This phenomenon is caused due to various factors in which economic and technological factors play the strong role. Farmers should get the knowledge of using the latest technology and they should get it through government and proper supply chain management should be there in the country so that it helps to increase their income.



Leading Vegetables Producing States in Terms of Production (2013-14)



Source: Indian Horticulture Database 2014

Supply chain management

Supply Chain Management is the management of the flow of goods and services. It is the oversight of materials, information and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. It involves coordinating & integrating these flows. It represents the management of the entire set of production, manufacturing/ transformations, distribution and marketing activities by which a consumer is supplied with a desired product. It integrates supply and demand management within and across companies. Hence, supply chain management is defined as the design and operation of physical, management information and financial systems needed to transfer goods and services from point of production to point of consumption in an efficient and effective manner.

Present scenario of supply chain in India

It has been found that 30 – 40 percent of fruits and vegetables are wasted due to post harvest losses. Table 4 shows the estimated waste percentage in each step of the food supply chain in India which is the cause of low availability of fruits and vegetables for consumers and the need for import of them in spite of India being second largest producer. There is lack of proper infrastructure like cold storages, refer vans etc. The planning commission has recently estimated the gap between agricultural warehousing supply and demand at 35 mn MT. Also there is lack of connectivity between producer and consumer. India’s current cold storage capacity at 25 MT is barely sufficient for 10% of fruit & vegetables produced in the country. There are too many intermediaries in this field and these intermediaries led to a cost inflation of ~ 250% over the cost of production.

Table-4 Estimated/ Assumed waste percentage in Indian food supply chain

Commodity	Agricultural	Postharvest	Processing & Packaging	Distribution	consumption
	Production		Handling and storage		
Fruits and Vegetables	15%	9%	25%	10%	7%

Source: Global Food Losses and Food Waste: Extent, Causes and Prevention, FAO,2011

Literature review

Agricultural Supply Chain are complex decision making systems (Bryceson and Smith, 2008) comprising network of organizations carrying processes and activities from production to distribution bringing agricultural / horticultural products from farm to the table (Aramyan et al., 2007).



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Hajjidiab and Taleb describe about the development of agile software to make supply chain more responsive and more traceable. Bechini et al. emphasize on using the IT tools and web services in collaborative practices to make the supply chain more traceable.

There is an absence of an integrated transportation and information infrastructure, demand forecasting, improper inventory management, improper product handling by farmers (Reddy et al., 2009), improper production planning, poor buyer- supplier relationship and e-commerce resulting in fragmented approach in supply chain (Jharkharia and Shukla, 2010).

The traditionally practiced supply chains lack in efficiency due to one or more reasons, out of which major issue is the existence of many intermediaries existing between the farmer and the rice processing company, and again between the processing company and the customer, resulting in greater complexity, lower efficiency, reduced margin and increased cost on the product (Kalidas et al., 2014).

Though India is the second highest fruit and vegetable producer in the world, cold storage facilities are available only for 10% of the produce. In spite of abundant agricultural produce, India ranks below 10 in the export of food products with processing levels in fruit and vegetable sectors at around 2% only (Viswanadham, 2007).

Supply chain development not only benefits the private sector but also creates spin-offs that stimulate social, economic and environmental sustainable development in the region (employment generation, added value, minimization of product losses etc.) (Naidu S, 2008).

Supply chain management of perishable food produce is complex as compared to other Supply chain managements due to the perishable nature of the produce, high fluctuation in demand and prices, increasing consumer concerns for food safety & quality (Vorst & Beulens, 2002), and dependence on climate conditions (Salin, 1998).

In India, more than 90 percent of the produce dispose through commission agents/wholesalers and a small proportion sell through retailers and directly to consumers (Sidhu et al., 2010).supply chain which connects the farmers to both the organized, as well as the unorganized

retail is highly inefficient with several intermediaries and manual handling. It results a lot of wastage as much as nearly 30% and also less remuneration for the farmers.

Objective of the study

1. To identify the factors affecting supply chain of Fruits & Vegetables sector in India.
2. To find out the solution for solving problem regarding supply chain management in India.

Methodology

Descriptive research has been used for this study. The present study undertakes a thorough review of basic and contemporary literature available and identified the issues which are affecting the supply chain of agricultural products, especially Vegetables.

Challenges in the supply chain of vegetable in India

There are a lot of factors which are treated as hurdle or the obstacle for the effective supply chain management in vegetable sector.

Inadequate cold chain system

There are various problems related to cold chain in India, such as lack of cold chain facilities, inadequate capacity of cold chain, lack of cold chain network. For this reason it is difficult for farmers and businessmen to do their business effectively and get proper remuneration for their produce.

Presence of multiple Intermediaries

There are large number of local traders and intermediaries in supply chain who take all the share of farmer's income. The whole supply chain in India is dominated by local traders and commission agents. Due to the presence of intermediaries, farmers get very minimal share of his production.

Lack of connectivity

There is lack of connectivity or linkage between farmers with other partners. There is no direct contact between farmer and customer. There is poor linkage between the marketing channels, from the farming place to mandi.

Lack of technical application

Inefficient technology, obsolete techniques, and old machineries are used in supply chain in vegetables in India. Due to these things farmers and agri businessman are deprived of using appropriate technologies and techniques to reduce the post-harvest losses and time in operational activities.

Lack of infrastructure



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There are a lot of factors responsible for poor infrastructure like lack of storage facility, lack of processing facility, improper handling and packaging, poor road connectivity. All the things are responsible for ineffective supply chain in vegetable sector in India

Lack of knowledge and awareness level of farmers

Farmers are the real players in agricultural production. Indian farmers have very poor knowledge regarding the use of modern technologies, techniques etc. to work effective and efficient. They have very less knowledge regarding the management of post-harvest produce, quality of seed etc. Without proper knowledge and awareness level of the farmer the supply chain of F&V cannot be efficient.

Lack of transportation facility

Transportation related challenges are very high in India because of unavailability of well transportation mode, high cost of transportation, lack of temperature controlled vehicle for the movement of goods etc.

Improper information

In India, farmers have lack of information regarding the prices in the market, demand, food processing units etc. for this high amount of loss occurs, late delivery of goods happen.

Lack of standard in quality

Quality has a strong impact on the supply chain, so it leads to efficiency and less rejection by the customer. In India, there is a lack of quality standards to meet international quality for export, Poor hygiene and safety standards, high quality degradation etc.

Solution

Cold storage facilities should be provided by the cooperative societies. Cold chain infrastructure should be developed in major production area. Capacity of cold chain should be increased.

Government should act as the facilitator to create infrastructure facilities for marketing of vegetables. They should provide such facility where farmers can sell their vegetables directly. Cooperative marketing societies may be created by the farmers.

Coordination of farmers through cooperatives, contract farming and retail chains would facilitate better delivery of output, reduce market risks, provide better infrastructure, attract more public interest, acquire better extension services, and create awareness regarding the prevailing and new technologies.

Information system for better coordination among different stakeholders from farmers to consumers is the need of the hour. The internet and mobile communication can also be used to enable information and financial transfer between the stakeholders.

Small sized food park can be developed with the facility of packaging, semi processing, grading, better loading and unloading.

Seminars, meeting may be organized to give technical and marketing knowledge to the farmers. Exhibition and fair should be organized for recent developed technology.

Refrigerated vans can be initiated by public private partnership basis.

Demand forecasting knowledge must be there. Government website can be developed showing daily prices of vegetables. In television also it should be shown.

Conclusion

Vegetable sector is a very growing sector and gives a huge opportunity for the agribusiness and the development of the rural areas through a well-established supply chain. Given the characteristics of vegetables such as seasonality, perishableness, inadequate storage and transport facilities etc, the supply chain can be made efficient by reducing the length of the chain improving cold chain facilities. The supply chain management in vegetables has to be improved in all the stages of the supply by adopting global best practices in storage, packaging, handling, transportation, value added service etc. modern supply chain with a view to benefit both farmers as well as ultimate consumers. No doubt that by improving supply chain system we can improve our Indian economy universally and particularly to the horticultural economy.

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