

# Supply Chain Management of Vegetables- Perishables

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**Abstract**—Supply chain management of food commodities plays a vital role in adding value for the final customers as well as the producers. The main purpose behind the study is, though the producers are selling the products at a low cost, the commodities reach the customers at a higher price. There are a large number of intermediaries present in the chain between producers, farmer and ultimate consumer. The profit is tapped by most of these intermediaries.

Initially, the study would be mapping the supply chain for the chosen agricultural perishables. Analyzing the supply chain would be next stage, where the value added in the stage is assessed in terms of the value of the final product. Making appropriate suggestions based on the analysis, with the objective of maximizing the value for the final customer. The study would be conducted based on observations and field visits done at Ooty, Mettupalayam and Coimbatore.

## 1. INTRODUCTION

In India, agriculture contributes to be one of the main sectors which contribute to the GDP and to the labor force. The agricultural commodities that are being produced at one location are made available to the final customers through retail stores. This is made available at the desired location with the help of different stakeholders in the supply chain between the farmers and the customer. The stakeholders involved in the supply chain are farmers, agents, distributors, retailers and others related to it. There has to be efficient coordination between these stakeholders for transfer of commodities from the producer to the consumer.

Considering the supply chain management of agricultural perishables, managing the freshness as well as profitability of these plays a more difficult task. The SCM of agricultural perishables plays a more important role since the perishables have to be consumed within limited time after its produce. The area of interest would be Ooty, Mettupalayam and Coimbatore, as most of the vegetables coming from Ooty on reaching Coimbatore, the final value is very large comparing to the initial price at which the farmers sell the items at a lower price. This is because the people are willing to buy these at any price the market is offering them.

The specific objective of the investigation involves studying the comparative roles played by the intermediaries in the traditional and modern supply chains in vegetable marketing. The effectiveness of supply chain can be studied by comparing these factors. The primary data collection is from interview with the farmers and the intermediaries by visiting them, i.e., through observations and also secondary data from website. Analyzing these factors, one can understand the challenges faced in the supply chain of perishables and this can be used as a point of reference for further research in this industry.

## 2. LITERATURE REVIEW

### 2.1 Supply Chain Management

Supply chain deals with all the activities/ functions involved from the transfer of products/ commodities from the initial producer to the final customer. Supply chain management is the effective coordination between the functions in the supply chain for getting more profit for the organization or improving the performance for them. These functions include all the activities from procurement of goods, exchange of information, logistics, to the final delivery of the product to the final customer. This helps in producing better value for the end user or the customer.

Supply chain management is a set of functions which is used together to bring together manufacturers, suppliers, warehouses and stores efficiently in order to distribute the products/ commodities to the current location at the right time in right quantities (Simchi-Levi *et al.*, 2008). This helps in reducing the overall costs while satisfying all the service requirements. Supply chain is a two direction flow of information, materials and services in addition to the managerial and operational activities. It also allows in gaining a competitive advantage along with giving customers more value along with resource allocation (Cooper *et al.*, 1997).

The firms will attain more competitive advantage by enhancement of productivity and value. Productivity improves when the amount of resources used are reduced when compared to others. By providing the customers with

customized products and services, the final value gets emanated. This helps in requires improving the reliability and responsiveness which requires innovation and resources (Christopher, 1998). Effective communication between the partners in the supply chain and also sharing information with each other helps in better coordination and integration in the supply chain (Ellram & Krause, 1994).

## 2.2 Supply chain of perishables- vegetables

The SCM definitions are remaining the same over the years with a little or some modifications. The SCM of agricultural perishables were given less importance in the earlier days. The SCM of F& V is very complex and has to be considered as a separate field of study for better efficiency. This is due to their nature of perishability and also their demand and prices are highly fluctuating on daily basis and it is very hard to predict this. The customers are also becoming more conscious about the quality of the food they are having and its safety (Vorst & Beulens, 2002).

The supply chain on the vegetables involves many intermediaries as its stakeholders (Shown in the fig). They tap most of the value in between the producer and the final consumers. About 75 per cent of the net total margin is being derived by these parties (Modi *et al.*, 2009). After they vegetables are being produced by the farmers, they are being passed on to these intermediaries. These intermediaries are responsible for a number of functions being carried on the vegetables before they reach the final customers. These functions will include the transfer of ownership from the producer to the final consumer, transportation of these vegetables, its maintenance and preservation, timely delivery to the buyers, payments to the farmers, etc. (Halder & Pati, 2011). The traders and commission agents act as aggregators between the producers and the buyers. Small farmers can sell their vegetables to them and they will collect these and sell to large traders. Mandis (market place) is where most of the transactions take place. The problems involved with most of the local mandis are that the buyers/ sellers can be easily cheated because the setting of the prices will not be transparent and there will be losses and damages in the products due to inefficient handling by the people. Under the current scenario, farmers find it easier to sell to the agents rather than going to the mandi for selling it. More than 90 % of the agriculture produce is actually moving through distributors and agents rather than directly selling it to the retailers or customers (Sidhu *et al.*, 2010). The F& V supply chain sector in India consists of all the stakeholders from the initial producer of the commodities till they reach the final consumer.

## 2.3. Challenges in managing vegetables Supply chain

Agriculture sector in India remains the dominant sector in our economy. With the increase in the production of agricultural products year by year, it is becoming more difficult to handle

the supply chain of these commodities. Some of the difficulties in managing the supply chain are:

- There are a lot of intermediaries present in the supply chain of agricultural perishables. There is not effective communication between each of these intermediaries in most of the cases.
- Farmers are not well aware of the market demand conditions. They produce according to the season and try to sell everything in the market.
- Involvement of technology is limited in the traditional supply chain. Though new technological advancements for example: cold chain, gps, etc could be used for time saving and also bringing more productivity and efficiency in the supply chain, traditional supply chain management does not explore more into these functions.
- Another important factor to be considered in the supply chain is the freshness of the agricultural perishables. The products that are produced in one area/ state is usually transmitted to other places/ states. So, the freshness of these commodities is degrading when these are sold to the final customers in the second or third day.
- There are a lot of unorganized retailers present in the current scenario. The inefficient practices followed by them decreases the efficiency of the supply chain. The farmers are linked with these intermediaries and they are reluctant to change from the current practice to some extent.

## 3. RESEARCH QUESTION

Could the existing supply chain for the select vegetables (perishables) be improved for enhancing the value for the customers and the producers?

The specific objectives of the investigation are:

1) To study the comparative roles played by the intermediaries in the traditional and modern supply chains in vegetable marketing.

2) To compare the factors influencing the effectiveness of supply chain in the existing supply chain.

Then comparing these factors with the modern retailing will show that the effectiveness of the supply chain can be improved by using an organized format and with the help of technological advancements. This will prove that the value for the farmers and the final customers will be improved by using modern retailing in comparison to the traditional one.

## 4. METHODOLOGY

The primary source of data collection is from farmers, intermediaries and retailers.

Initially, field visit was done to Ooty to understand the current situation of supply chain management of agricultural perishables and also to identify the challenges faced by the farmers in the cycle. This was done by doing interviews with some of the farmers around Ooty. The farmers are responsible

for the transportation of agricultural perishables till they reach the agents. They also have to make sure that they reach the mandi market before 1 pm, otherwise they will not get the market price for that day and will be given a reduced rate for the commodities.

In the second phase, visits with some of the agents in Mettupalayam provided insights into the roles played by them in the supply chain. They are the sources of contact for the farmers to sell their agricultural commodities to the retailers. They decide the price which the farmers get daily for the goods they sell based on the current market conditions.

In the third phase, field visits with many of the retailers in Coimbatore were done to understand the final operations in the supply chain. Some of the Managers of the retail stores helped in gaining insights into the details about the pros and cons about the traditional supply chain.

Also, the discussions with the employees of LEAF organization helped in understanding the advantages of modern retailing when compared with traditional retailing.

**5. THE STUDY**

**5.1. Traditional Retailing in Ooty**

Ooty is mainly known for its tourism sector. Another source of income for the local people in ooty is from agriculture. Many of the farmers are solely dependent on the income from this sector. One of the main challenges that the farmers face after cultivating their crops is selling it to the distributors.

One of the main markets for them is the Mettupalayam Mandi (market). After the production of the crop, the farmer is responsible for its cleaning, packing and transportation of the commodities till it reaches the market. They have to bear the cost for the entire process.

When they reach the market, they are paid by the agents (1<sup>st</sup> intermediaries) after deducting the transportation and unloading costs. In Mettupalayam, there is almost 100 stores who are registered agents for distribution of agricultural commodities. The vegetables will be graded as 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> quality. The vegetables of second and third quality will have a lesser price.

After the farmers are paid their full amount, the agents will sell the products to distributors (2<sup>nd</sup> intermediaries) at a margin of around 10%.

The distributors will sell the goods to the retails stores and other local markets on the same day itself. They will have a margin of around 15% on the goods sold. These goods will be sold to the customers on the consecutive days. So, the vegetables plucked today will be sold in the market during the second and the third day. The retailers will sell the vegetables to the customers at a greater margin.

This has been the form of traditional retailing and has been followed by the farmers for a long time.



**Fig. 1: Traditional retailing**

**Table 1: Factors affecting SCM in each phase:**

Factors	Farmers	Agents	Distributors	Retail	Customer
Responsibilities	Cultivation, Transportation up to agents	Warehousing, Collection center for the distributors	Transportation from agents to the Coimbatore market, Bulk breaking	Point of sales, storage	Buying the commodities
Costs involved	Cultivation cost, Transportation cost.	Warehousing cost	Transportation cost.	Storage and marketing cost.	Purchase cost
Time taken in supply chain	3 hrs- from ooty to mettupalayam	1 hr- storing at the warehouse	3-4 hrs from the mettupalayam market to the Coimbatore market or retail store	2- 3 days Storage in the retail store	

Some of the main problems with this *Mandi system* are:

- Sometimes farmers will not be given money at the time of selling the goods and will be asked to collect it a later time.
- Farmers are actually getting only 1/3 or 1/4<sup>th</sup> of the final retail price that the customer is paying.
- In case of 2<sup>nd</sup> and 3<sup>rd</sup> grade vegetables, the farmers have to sell their goods at still a lower level.
- The losses of agricultural products in the supply chain are around 15-25%.
- The freshness of the commodity is lost as the vegetable plucked today will be sold in the market during the second or third day.

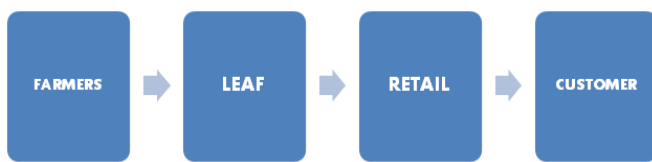
The role of the intermediaries has increased the complexity for the supply chain and has resulted in the reduction of value for the final customer as well as the producer. One of the solutions for this is to reduce the distance between the farmers

and the end users, i.e, the farmers would be able to sell to the final users.

Comparison of the traditional and modern retailing was done based on the factors affecting the efficiency of supply chain to understand which is better.

**5.2. An alternate model for retailing- LEAF:**

Considering the problems in line with the traditional retailing, one most suitable solution to this would be modern retailing. In modern retailing the intermediaries are eliminated and the vegetables are directly procured from the farmers and made available to the final customers. One of the examples for modern retailing which is present today is being followed by the LEAF (Lawrencedale Estates and Farms) organization. This company directly collects the vegetables from the farmers in Ooty, cleans it and transports them in a cold storage to the final retailers, for eg: Kovai Pazhamudir Nilayam, Aditya Birla More, Nilgiris, Reliance Fresh, Big Bazaar, Heritage,etc. By this model, the farmers are getting a fair more price also.



**Fig. 2: LEAF**

**Table 2: Factors analyzed in each phase:**

Factors	Farmers	LEAF	Retail	Customer
Responsibilities	Cultivation	Transportation from the farmers to the retailers, washing, packing, bulk breaking	Point of sales, storage	Buying the commodities
Costs involved	Cultivation cost	Transportation cost plus cleaning and packing cost.	Storage and marketing cost.	Purchase cost
Time taken in supply chain	Less than half an hour since the commodities is collected directly by LEAF at ooty itself.	1 hr for the cleaning and packaging 5-6 hrs for the transportation till Coimbatore market.	2- 3 days Storage in the retail store	

**Advantages of LEAF**

- Time and logistical cost is saved.
- Vegetables are cleaned and packed before selling it to the final customers.

- Farmers could benefit more as they don't have to worry about transport and logistics.
- Helping the farmers with better farming techniques.
- Cold storage will help in retaining the freshness of the vegetables.
- A regular income for the farmers.

Consumers will get more transparency into the safety and quality of the food that they are consuming.

**5.3. Differences- A discussion: Table 3**

Sl. No.	Criteria	LEAF	Traditional supply chain
1.	Number of intermediaries present between the producers and the retailers	1	2
2.	% of wastage in the total quantity	5-10%	20-30%
3.	Washing	√	X
4.	Packaging	√ (With extra charge for it)	X
5.	Time of delivery	Same	Same
6.	Price	Higher	Lesser
7.	Freshness- Shelf life	More	Less
8.	Cold storage	√	X
9.	Help for the farmers in cultivation of agricultural perishables	They help the farmers in giving guidance about better agricultural practices.	Nil
10.	Involvement of farmers in the transportation of agricultural perishables	Nil	Farmers have to take care of the transportation from Ooty to Mettupalayam.

We can see that factors affecting the efficiency of the supply chain are better in case of LEAF when compared with the traditional retailing. The value that the farmers as well as the final customers get is more when compared with the traditional retailing.

**6. SUGGESTIONS**

- A Farmers' co-operative society can be established where someone can take charge of the entire process from the collection of fruits and vegetables and distribute it to the final retailers.
- Effective communication can be maintained between the members of the farmers' cooperative and the service providers in order to sustain consistent supply of products to meet the consumer demand.
- Farmers should be given more information about the current market conditions, so that they can produce accordingly.

## 7. LIMITATIONS & FUTURE RESEARCH

- Could not get some of the details from the intermediaries as they were reluctant in providing the details.
- Some of the big retailers in Coimbatore didn't allow getting details regarding their supply chain operations in view of fearing competition.
- Research about the effectiveness of cold storage and the freshness of the perishables can be done.

## 8. CONCLUSION

The traditional retailing had been prominent in Indian agriculture for more than decades. Most of the farmers are also accustomed with this way of selling their agricultural produce. The organized retailers will face a lot of objections from traditional retailing as the latter already have strong foothold in this economy. From the comparison of traditional and modern retailing, we can understand that latter helps in bringing more value for the farmers as well as the final customers. Modern retailing brings more efficiency and productivity into the supply chain. The farmers also have to be acknowledged about their opportunities that they can use for getting better results.

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