Exploring the role of supply chain management in Jammu and Kashmir's horticulture apple products

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Abstract:

Supply chain management refers to a network of facilities that originate raw materials, convert them into intermediate items, and then distribute completed products to consumers through a distribution system. From one industry to the next, and from one business to the next, the supply chain is managed differently, as are the many actors' duties. As a result, supply chain management (SCM) has become increasingly important. J & K is India's largest apple producer, accounting for almost 75% of total output. In 2016-17, J & K produced 16.72 lakh tonnes, while Himachal Pradesh supplied 4.92 lakh tonnes. Baramulla, Kupwara, Shopian, and Kulgam are the key apple-producing regions in Kashmir's valley. The apple distribution network is currently inefficient, with several intermediary stages and difficulties obtaining packaging materials. The situation may have gotten worse in J & K because the classification and grading system are primitive in comparison to the rest of the country.

Keywords: Supply Chain management, distribution network

Introduction

In India, J & K is the leading producer of horticultural crops. It grows a diverse range of fruits and vegetables, including apples, pears, peaches, almonds, and tropical fruits. Horticulture's expanding importance can be seen in its contribution to the GDP and its part of the agricultural sector. Jammu and Kashmir's apple-growing region is believed to generate approximately 1.3 million tonnes of apples each year. The entire production is carried out across the valley's several districts. Its agricultural sector accounts for around 19.35 percent of the state's GDP. Horticulture has become an important part of agriculture. Farmers can choose from a wide range of crops. India has achieved 100 percent apple farming coverage and has seen a 121 percent increase in apple production.This is owing to the vast amount of land under cultivation in the country. Apples have the third-largest production area of all the fruits grown in India. They're cumbersome to carry and have a short shelf life. The term "supply chain management" refers to a system model that describes the many stages of a supply chain. It includes all of the value chain's stakeholders, including producers, service providers, and consumers.**. (Peter Singe, 2010).** This study analyzed the impact of the various supply chain risks on the goals of the different actors involved in the supply chain. The importance of the risk measurement system in optimizing the supply chain was also highlighted. It also focuses on the factors that will determine the competitive position of these products in the market. In addition, the impact of each actor's objectives and the overall supply chain objective on risk was assessed. For supply chain network optimization, a risk measurement system is a must-have approach. Consequently, a supply chain risk identification risk in horticultural products that is optimal for each of the supply chain's participants is required. The trouble will be assessed regarding planning, supplying, processing, product delivery, and returns. Kashmir region is inhabited by wonderful varieties **(Ghosh, 2001).** Intensive agriculture in apple orchards results in the development of different diseases among the

plants. Because all plants in a monoculture are genetically identical, diseases to which they are immune may wipe out whole populations of plants. Adding variety in planting various kinds of trees in the same area has been proven to help fight illnesses in studies (**Zhu & Youyong, 2000).** Orchards are often planted with a range of cultivars to improve disease resistance. The extremely disease-resistant apple cultivar, Maharaji apple, has been discovered to be hardly noticeable in orchards. Apple trees with fewer varieties are more susceptible to illnesses and rodent infestations. Farmers are unaware of the issue, and they have little understanding of orchard diversity or the significance of pollination. Due to ripe apples' perishable nature, farmers were put in danger due to a lack of apple boxes during peak harvest season. Delayed harvesting causes over-matured fruit. When apples are harvested later in their maturation cycle, they have a shorter shelf life and don't travel well **(Murray et al., 1998)**. In the Kashmir valley, traditional, informal, and unregulated methods of sorting and grading are still in use. Ample light dispersion affects apple production and fruit quality parameters, including size and colour **(Wagenmakers & Callesen, 1995).** In China, solar reflectors are used. Covering apple orchards with hail netting in Australia has become common practice to keep fruit safe during hail storms **(Proctor & Lougheed, 1976).** Japan has been protecting apple fruit in protective bags throughout the development process for many decades (Ibid). There is no such technology available for Kashmiri farmers. Small-scale apple growers must also contend with improper labeling and unregistered trademarks. Agricultural producers have a significant shortage of low-cost cold storage on their fields, as well as refrigerated storage at markets and ports. In Kashmir, there are just a few cold storage facilities, and they are too costly for a small farmer. Different cold storage temperatures have a significant effect on the diameter, weight, volume, hardness, sodium and potassium content, quality, and colour of the fruit's surface, among other characteristics **(Khorshidi et al, 2010).** Furthermore, apple fruit that has been stored for an extended period of time may develop enzymatic browning, which is accompanied with unappealing colours and flavours, as well as nutrient loss **(Goupy et al, 1995).** There is no quality control mechanism in place in the valley to guarantee the quality of apples that are transported outside of the region. According to merchants and distributors, the four most serious quality problems with apples are immaturity, over-ripeness, improper grading, marks, and blemishes. Immaturity is defined as the state of being too ripe or too ripe. In Kashmir, fruit growers who carry their produce to the wholesale market in unrefrigerated trucks have the option of selling at the present market price or storing their produce in the hope of a higher price in the future. Furthermore, truck transportation is costly due to the lack of a rail link between Kashmir and Jammu in this region. Many wholesale fruit markets (mandies) across the country engage in unethical practices, which are highly criticized. The majority of marketing in the valley is controlled in this way **(Javid, 2004).** Because of the predominance of middlemen in the current apple fruit supply chain, especially commission brokers, farmer income has suffered as a result. Farmers are unable to control the whole apple fruit distribution chain, and the government has taken no measures to regulate it. Growers and contractors are subject to price risk since there is no guarantee that minimum supporting prices will be met and that the market price of the crop will continue to rise in the future. A pattern of collusion between intermediaries and apple merchants has been seen across the valley in order to control prices, leading to widespread exploitation of marginal farmers. Aside from that, manufacturers are exposed to a range of scams as a result of the lack of a regulated market, such as the deduction of excessive charges, the quoting of a lower price than the actual price, and the charging of exorbitant fees by intermediaries. Therefore, the farmers are unable to create an economically feasible marketing strategy. Because of the current economic climate and globalization, supply chains are becoming more complicated **(Varma et al., 2006)**, making their design, organization, and interaction difficult **(Gold et al., 2010a, b).** Increasing environmental and social issues necessitate a shift in emphasis from the company to the SC level, as well as a link between organizational objectives and sustainability goals **(Gold et al., 2010a, b)**. To ensure sustainability, the SC's stakeholders must collaborate. Until explicit regulations are implemented, organizations will be hesitant to adhere to sustainable norms. The success of sustainable projects is measured differently by each company **(Searcy et al., 2009).** Apples are grown in Jammu and Kashmir, Himachal Pradesh, Uttarakhand, and Arunachal Pradesh, among the most popular temperate fruits. Jammu & Kashmir generated more than 80% of the country's total apple production in the 2011-12 fiscal years **(National Horticulture Board, 2012)**. The state is known for its apple, plum, cherry, pear, walnut, almond, saffron, and other horticulture products. Apple, on the other hand, controls the lion's share of the state's land and production. Apple is mainly a commercial product, and almost every manufacturer makes it for sale. Farmers' margins and net income would be

reduced due to an inefficiency in the marketing channel, reducing their quality of life and diminishing their willingness to grow the fruit.

In recent years, India's fruit and vegetable marketing efficacy has been a subject of significant worry. Poor marketing channel efficiency and infrastructure are blamed for not just high and fluctuating consumer prices but also that only a tiny portion of the consumer rupee reaches farmers **(Gandhi & Namboodiri 2002, Kaul, 1997, Ashturker & Deole, 1985).** Marketing costs contribute to around 20% of the selling price of vegetables, according to Birth et al., 2005. Reduced intermediate costs and waste due to effective marketing allow for a lower consumer price and a larger market share while maintaining production efficiency. Markets must be improved for two reasons: first, they may act as an incentive to increase production; second, if the market fails to supply consumers with goods at reasonable, compatible, and affordable prices and following the time and place required, increased production appears to have no meaning in the welfare of society **(Gunwant et al., 2012).** J&K generated 67 per cent of the country's total apple production in 2010 and exported 50% of the country's total apple exports. Every year, India exports 400 million rupees worth of apples, with 200 million rupees worth of apples originating from the Kashmir Valley in J&K's northern region **(Reshi et al., 2010).** In 1865, the British introduced apples to the country in the Kullu Valley of Himachal Pradesh, and in 1917, they introduced colourful "delicious" kinds of apples to the Shimla highlands of the same state. The apple cultivar 'Ambri' is indigenous to Kashmir and was grown there long before Western imports **(Bhardwaj et al., 2012).** Apples are said to have been cultivated in the state since the dawn of time. Apple manufacturing is said to have received a boost and encouragement under Lalitaditya's reign. After the introduction of many European varieties, commercial apple production in the state started in the second half of the nineteenth century and the beginning of the twentieth century **(Masoodi, 2003)**

Objectives:

1. To study the significant constraints that come in supply chain management of apples in J&K

2. To find out the rankings of significant constraints that occur in supply chain management of apples in J&K

3. To examine the supply chain model of apples in J&K

4. To recommend the solution for efficient and effective implementation of supply management of apple UT of J&K

Research Methodology

This research was conducted in the Sopore District of Jammu and Kashmir. This research aimed to identify existing problems in the horticultural product supply chain, which led to the formulation of a problem and research objectives. Expert respondents were included in the study because they are directly connected to horticultural products supply chain management and are horticulture producers from the Sopore regions. This research utilized primary and secondary data, both qualitative and quantitative, in this way. Data acquired directly via observation, interviews, and expert opinion is referred to as preliminary data. The literature, the Internet, journals, and other supporting materials were used to gather secondary data. A questionnaire was utilized in this research, including two phases for each of the performers. The questionnaire was used in the initial step of identifying and mapping risk in the supply chain. The second part of the questionnaire evaluated and quantified risk in a horticulture business entity in terms of supply.

The present investigation will be carried out in 2021. The sampling structure and techniques adopted in the inquiry has been described as follows: -

- **Locale of the study:** J&K was selected for the study as this is to the primary and central area of apple production in northern India
- **Sample size:** The research was conducted with the help of a schedule/questionnaire based on the information collected from various apple traders in J&K

- **Data collection:** The present study will adopt both primary data as well as secondary data collection techniques
- **Methods of analyzing data:** Descriptive Statistics, pie chart, bar graph and other statistical tools will be adopted for analyzing purposes along with the Hennery Garrett ranking technique
- **Henry garret rating technique:** In this technique, the percentage position of each rank obtained is converted into scores by referring table given by Henry Garret. Then for each factor, the scores of individual respondents are added together and divided by the total number of respondents from whom the scores are added.

Formulae = 100 (Rij-0.5/n);

Rij is the rank, N number of items

Results and Discussion

The result of the present study Uncovering the impact of supply chain performance on horticultural apple products in Jammu and Kashmir title has been presented in the following tabular form.

Demographics: -

Table 1. A business description of traders (apples)

A business description of traders	Retailer	Wholesaler	C&F Agents
No. of respondents	6	17	1
Percentage	24	68	8

The study's title uncovered the impact of supply chain performance on horticultural apple products in Jammu and Kashmir of traders were wholesalers while 24 per cent were retailers and the remaining 8 per cent were carrying and forwarding agents.

Table 2. Season income of traders (from apple business)

Monthly income	Below 1 lac	1lac-2 lac	2lac -3lac	3lac -4lac	>4 lacs
Number	1	2	5	12	4
Percentage	39	14	7	51	19

Table 2 revealed that out of 24 respondents, 12 traders lie in the season income slab of 3lac-4lac, 4 traders in the slab of >4 lac. 5 traders lie in the income slab of 2-3 lac, 2 traders lie in the slab of 1-2 lac, 1 trader in the slab of < 1 lac/ season.

Table 3. Experience of respondents

Experience	< 1year	1-5 year	5-10 years	10-15 years	15-20 years	>20 years
No of respondents	0	2	2	1	4	16
%	0	8	8	4	16	64

As quite evident in the table above (table no.3), it signifies the experience of the traders (respondents) in the sphere of apple production, which clearly shows that maximum respondents have more than 20 years of experience, with 64% of the total respondents.

Table 4:

Primary constraints in supply chain management of apples in J&K (in percentage)

S. No	Constraints	1	2	3	4	5
1	**Transport facility**	0	13	19	15	53
2	**Storing facility**	15	19	19	9	37
3	**Government facility**	0	7	25	31	37
4	**Package constraints**	0	21	19	29	31
5	**Marketing issues**	7	0	31	19	41
6	**Dearth of information**	0	0	0	41	59

--Scale --

1. Fairly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

In table no.4: - since transportation is very significant in the supply chain, without proper transportation, goods cannot be delivered to customers at the right time and in good quality. As far as transportation facilities are concerned in the present study, 53 per cent of the respondents believe that transportation is the primary constraint in the supply chain of apples in the Union Territory of J&K.

- As far as a storage facility is concerned, the sample respondents in the present study revealed the must-have adequately planned and well-maintained storage facility in the concerns of apple supply chain management. As shown in the above table number, no 4, 37 per cent of the respondents still believe that they do not have adequate storage facilities for keeping the produce, especially in care apples.
- Taking the constraints, dearth of Government facilities into consideration, the sample respondents believe that there is a lack of facilities of initiatives taken by the government for the improvement of supply chain management of apples in UT of J&K, 37 per cent of the respondents think that there is lack of facilities provided by the government in this genre.
- Package constraints are another variable identified and acknowledged in the present study. As apples is a perishable item and require packing for handling to keep them fresh, 31 per cent of respondents in table no 4 signified that there is a problem with apple packaging in the UT of J&K. costly packing makes the concern complicated an additional burden on price levels.
- Issues in marketing, lack of information regarding the existing market, price, demand etc., are the significant issues in the efficient supply chain management of apples. 41 per cent of the respondents strongly agreed that there are several issues in the marketing concerns of the apple industry in UT of J&K.
- The dearth of information flow is another factor that hinders the smooth functioning of the supply chain management of apples. 59 per cent of the sample respondents strongly agree with the statement that there is a dearth of information flow in the supply chain industry in UT of J&K.

Table no: - 5

Table showing Garret ranking of main constraints in the supply chain of apples in J&K

S. No	Factors	Total	Average	Ranking
1	Transport Facility	1155/24	46.51	5th
2	Storing Facility	1390/24	55.66	Ist
3	Government Facility	1171/24	47.10	4th
4	Package Constraints	1225/24	49.01	3rd
5	Marketing Issues	1330/24	53.22	2nd
6	Dearth of information	1058/24	42.01	6th

Since in the above table, Garrett rank have been calculated and assigned to the factors that hinder the supply chain management of apples in UT of J&K. since by using Garrett formula, Garrett ranks were obtained. According to table no 5. The 6th rank is attained by the factor. 'Dearth of Information flow' with 42.01% average score, similarly 5th rank goes to transport facility (46.51% average score), 4th rank goes to Government facility (47.01% average score), 3rd rank goes to package constraints (49.01% average score) 2nd rank goes to marketing issues (53.22% average score). The 1st rank goes to the storage facility, which signifies that maximum respondents ranked it as the significant issue in supply chain management of apples in UT of J&K.

To examine the supply chain model of apples in UT of J&K. supply chain between farmers till end consumers, supply chain management (SCM) has a crucial role to play in the marketing of apples in J&K. it not only helps in increased production and consumption but also contributes to the economic development of the country. As far as responses from the respondents, two models were identified.

Model 1: - has 3 phases.

Phase1) Farmer → Agent → Mandi → Wholesaler → Retailer

Phase2) Farmer → Agent → Mandi → Wholesaler → Retailer → Consumer

Phase3) Farmer → Mandi → Wholesaler → Retailer → Consumer

Model 2: Model II comprises of

Farmer → Agent (commission) → Wholesaler → Retailer → Consumer

So, evidently, apples are being supplied using different distribution channels with many intermediaries like agents, commission agents, wholesalers, retailers, etc. it is also found that local agents are common to almost all phases.

Conclusion:

The supply chain is crucial when it comes to getting apple produce from growers to end users. Apples should have a supply chain that is both efficient and effective. The goal of this research was to figure out the distribution hierarchy by looking at the prices and constraints of the apple industry in J&K. The most significant impediment to the SCM of apples in J&K was the storage facility. In Jammu and Kashmir, the government should offer suitable infrastructure and marketing facilities to traders, as well as a smooth exchange of information between participants in the supply chain. According to the research, parking facilities are insufficient, and the government should investigate this as well. As a result, proper storage is one of the most important aspects of the apple supply chain, which is currently lacking in UT J&K. Having a functional storage facility could help with the establishment of an integrated supply chain model.

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