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An exploratory study on Efficiency of Different Supply chains in Marketing of Vegetables.

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Abstract

Agriculture is the back bone of Indian economy as three fourth of Indian population depends on it for their livelihood. In last few decades India noticed significant growth in demand for fruits and vegetables as consumers have become more health consciousness. Farmers shifting for cultivation of high value fruits and vegetables. It is estimated post harvest losses of 35-40 percent due to adoption of ineffective supply chain practices. This led to large gap between demand and supply. Hence exploratory study was conducted to analyze efficiency of most prevalent supply chains among farmers. For the study three supply chain formats namely Traditional, Cooperative and modern formats were selected. Five districts viz., Belagavi, Dharwad, Bijapur, Kalaburgi and Bellary districts were study areas.

The results indicated that the efficiency of modern supply chain was significant when compared to cooperative and traditional supply chains due to non existence of intermediaries. This trend was observed in all the districts under study. The performance of cooperative supply chain was next in order. On the other hand More number of intermediaries found in Traditional supply chain and the farmers are forced to pay about 8 per cent of commission. This resulted in inefficiency of traditional format.

Introduction

Agriculture is the back bone of Indian economy as three fourth of Indian population depends on it for their livelihood. The sustenance of agriculture and allied sector is the only option for economic growth on large scale and on a sustainable basis.

Agriculture industry continues to lives in medieval times and was operating at low scale with low productivity and high uncertainty despite the rapid growth in industrial and service sector. (Sazzad Parvez, 2014 and Murthy, 2015). According to reports by government of India (2013-14), the share of agriculture in national income was approximately 13.9 per cent. As per estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors was 15.35 per cent of the Gross Value Added (GVA) during 2015-16 at 2011-12 prices. Among agriculture and allied sectors, horticulture sector contributes 28 per cent of Agriculture Gross Domestic Product (AGDP) and 54 per cent of Agriculture Exports in India (2007-08). Agriculture industry needs to be strengthened by focused attention on value addition through agro processing which is presently at very low level.

In India, it is noticed change in consumption pattern from low value cereals to high value fruits and vegetables due to increased consciousness. As a result demand for horticulture crops particularly fruits and vegetables increasing and forcing farmers to cultivate vegetable crops. The fruits and vegetables sector known for their high productivity, higher returns, higher value addition prospects, scope for employment generation, opportunities for exports and adaptable to diverse climatic conditions. The horticulture crops found to have much higher input-output ratio than field crops. **(Baba *et al.,* 2010; Gaurav Sharma and Singh, 2011).**

The vegetable production in India contributes approximately 14.0 percent in the world production and stands second in world next to china with total production of 167 Million Tonnes **(NHB, 2015)**.

Karnataka is regarded as the "Cafeteria of Horticultural Crops". During 2013, the Department of Horticulture, Government of Karnataka has accomplished distinction of being first in the country to launch program called **Suvarna Bhoomi Yojana (SBY),** for motivating 0.25 million small and marginal farmers to transform their pattern of cultivation from growing low-value crops to high-value horticultural crops. At present in Karnataka horticulture crops occupy 1.87 Million Hectares of area with 17.80 million MT of production, accounting for 7.40% of horticultural production of the country.

Although India has made tremendous progress in vegetable production and ranks second in the world next to China, unable to meet minimum requirement of 300gms of vegetables/day/capita. This can be attributed to adoption of ineffective supply chain, resulting into substantial post harvest loss to the tune of 25-35 per cent, results in instability of prices in the market, improper remunerative prices to the producers, rural impoverishments culminating in farmers' frustrations and suicide **(Shivashankar, 2014).** The post harvest losses can be reduced by designing effective supply chain which assists farmers by providing cost effective cold storage facilities in markets and at farm levels, which increases shelf life of horticulture produces. The value addition to horticultural crops is thrust area in order to maximize their returns. The wastages of fruits and vegetables reduced significantly by practicing advanced supply chain management in agriculture. This increases returns for producers on one hand and consumers by decrease in prices on the other hand **(Sajjad Parwez)**. The study was conducted keeping these points in view with

following objectives

1. To measure the marketing efficiency of traditional, cooperative and modern supply chains.
2. To analyze price spread in traditional, cooperative and modern supply chains.
3. To estimate producer's share in consumer's rupee in traditional, cooperative and modern supply chains.

Literature Review

Saurav Negi and Neeraj Anand (2016) concluded from the study on major issues and challenges of fruits & vegetables supply chain in Uttarakhand (India) that the problems pertaining to post-harvest losses and wastages were due to longthier and disintegrated supply chain, lack of proper transportation, inadequate cold chain facilities, dependency on intermediaries, poor marketing and distribution network, weak linkage between supply chain partners, inefficient mandi system, high cost of packaging, etc. due to which producers realize poor price and consumers pay unreasonable prices.

Jaiprakash Bisen (2015) the research was undertaken to study "Supply Chain Management in Fruit and Vegetable Markets in Hisar and Karnal district of Haryana State: A Comparative Analysis. They found that though the producers benefitted from modern supply chain but they faced major challenges such as lack of contracting agencies, inadequate standardization and grading facilities, unethical practices followed by intermediaries and non-availability of proper
packaging materials, inadequate cold storage facilities in Traditional supply chain. Thus, development of market infrastructure to curtail the existing markets inefficiency, government should promote contract farming, direct marketing channels to minimize the gap between producer and consumer were some recommendations of the study.

Usha Rani Gori and Sheela Kharkwal (2016), carried out research to compare structure and performance of two major fruits and vegetables markets under Uttarakhand APMC. It is revealed from the study that the proportion of costs incurred by producers for marketing fruits and vegetables varied between 38 per cent and 58 per cent of the total cost incurred for marketing of different vegetables. Marketing efficiency index reported to be significantly high for marketing of potato, tomato and cabbage in Dehradun. Whereas, this index was high for apple in Haldwani arket. The price spread for Apple varied from 105 to 116%, while it was lowest in case of potato i.e., 58.81% in Dehradun market.

An exploratory study was conducted on supply chain management in vegetable marketing in Belgaum city of Karnataka **(Shivashankar, 2014)** and reported that the cost incurred by farmers for marketing of their produce in traditional and modern supply chains was Rs.1.6 per Kg and Rs.0.46 per Kg respectively. Whereas, the marketing cost incurred by retailers were Rs.1.60 per Kg and Rs.0.80 per Kg of vegetable in traditional and modern supply chains respectively. The modern supply chain has recorded significantly highest net returns compared to traditional formats. The modern supply chain was found to be more efficient with lowest price spread of Rs. 4.10 per kg when compared to traditional formats having significantly highest price spread i.e., Rs. 8.31 per kg. He suggested the farmers based on the findings to trade vegetables through modern supply chain and even through cooperative supply chain like HOPCOMS, Safal etc.

Shilpa (2008) studied comparative analysis of different supply chains in vegetable marketing in Bangalore. The study involved three supply chain formats namely traditionalsupply chain, cooperative supply chain and modern supply chains. Sample size of 45 producers, 4 middlemen, 5 retail formats and 60 consumers were picked for the study and found that the average cost incurred for marketing per quintal of vegetables by farmers in traditional, cooperative and modern supply chain was Rs. 116.96 per quintal, Rs. 83.57 per quintal and Rs.42.86 per quintal respectively. This difference in marketing cost was due to presence of more middlemen in the chain resulting longer length of the chain. The index of marketing efficiency for traditional, cooperative and modern supply chain was estimated to be 1.97, 2.10 and 4.32 respectively. The study indicated that the farmers are advised to transact through modern supply chain and cooperative supply chain as they found to be efficient of less operational expenses and reduced wastages due to mechanical losses in the supply chain. As a result producers gain more prices to total gross marketing margins.

Research Methodology

The study was conducted in five districts of North i.e., Dharwad, Belagavi, Vijayapur, Kalaburgi and Bellary. The three supply chain formats widely practiced by farmers were selected for the study viz., Traditional, Cooperative and Modern Formats. In every district, sample size of a sample size of 20 farmers, 4 intermediaries, 5 traditional retail formats and 20 consumers from all three formats. Total of total of 60 farmers, 4 intermediaries, 15 retail formats and 60 consumers were selected from all the supply chains operating in different districts under study. The marketing efficiency of different supply chain formats under study was analyzed with the help of following formulas.

Marketing efficiency index

The degree of market performance is called as marketing efficiency. The marketing efficiency essentially constitutes technical efficiency and economic efficiency. The marketing efficiency of different supply chain formats was estimated using Acharya's formula. According to **Acharya (2004),** suggested measure for estimating marketing efficiency. This is helpful in correlating the efficiency of alternate marketing systems available for producers. There is positive relation between the ratio and marketing efficiency i.e., bigger the ratio greater would be marketing efficiency and vice versa. The following formula used to estimate marketing efficiency;

$$ME = FP \div (MC+MM)$$

Where,

ME = Marketing efficiency

FP = Net Price received b the producer/farmer

MC = Total Marketing costs

MM = Net Marketing Margins

Price spread Analysis

An efficient market ensures the fair price to the efforts and sacrifice of the customers. The magnitude and price spread of the commodity helps in judging marketing efficiency. There is inverse relation between price spread and marketing efficiency. Higher price spread indicated lower marketing efficiency or vice versa. Generally it is obtained by deducting the price received by the producers per unit of the commodity from the price paid by the ultimate consumer. This analysis helps in estimating the share of various supply chain stakeholders in the consumer's rupee. This would further help in understanding and correlating the relative efficiencies of alternate marketing channels.

Price spread= Consumer's price – Producer's price

Producer's Share in Consumer's Rupee

The share of vegetable producers in consumer's rupee is dynamic and subject to change. There is positive relation exists between producer's share and marketing efficiency. Higher the producer's share greater would be the marketing efficiency or vice versa. This specifies the price received by the vegetable producer and indicated in percentage of rupee paid by the consumer's. It is estimated using the following formula;

$$Fs = (Fp / Cp) \times 100$$

Where,

Fs = Farmer's share in consumer rupee (percentage)

Fp = Farmer's net selling price

Cp = consumer's price

Results and Discussion

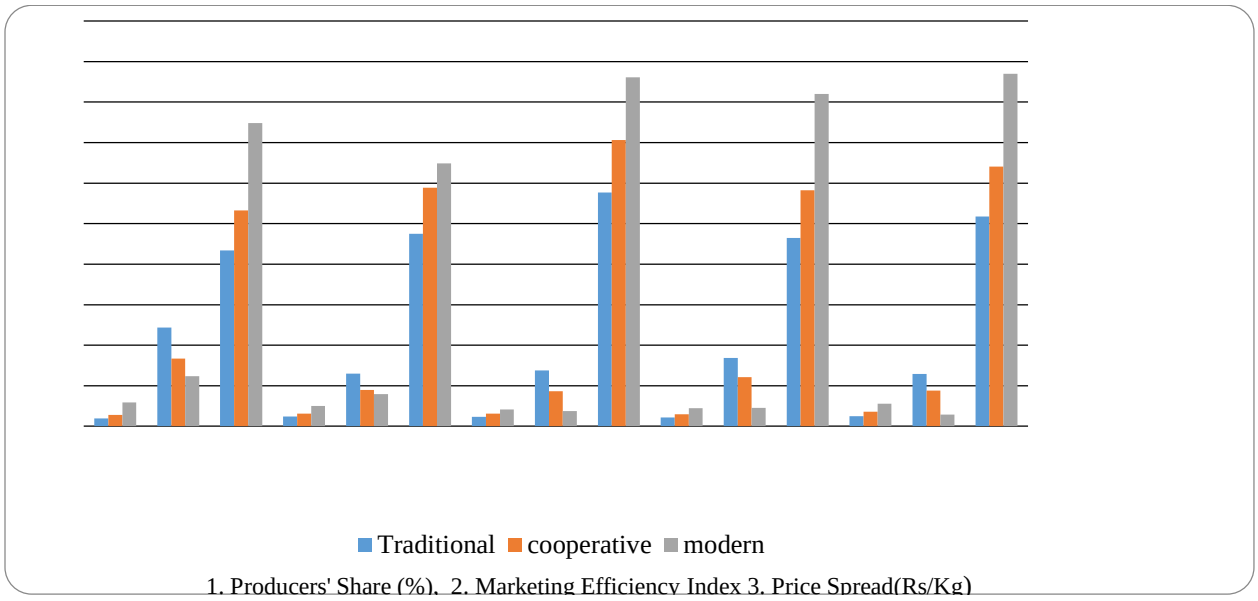
The study was conducted to analyze the efficiency of different supply chains used by producers study area. The marketing efficiency of different supply chains were analyzed and presented in below table No.1 and depicted in Figure No.1.

Table No.1: Efficiency of Supply Chain formats in Vegetable Marketing in selected districts of North Karnataka.

	Dharawad			Belagavi			Vijayapura			Kalaburgi			Bellary		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Traditional	1.9	24.38	43.42	2.41	13	47.47	2.33	13.75	57.69	2.14	16.88	46.44	2.49	12.94	51.77
cooperative	2.77	16.69	53.25	3.09	8.94	58.9	3.11	8.625	70.62	2.97	12.13	58.2	3.56	8.81	64.04
modern	5.9	12.38	74.79	5.03	7.9	64.89	4.12	3.75	86.11	4.42	4.5	82	5.54	2.88	86.95

1- Producer's share in Consumer's Rupee**, 2-** Mrketing Efficiency, **3-** Price Spread

Figure No. 1: Efficiency of Supply Chain formats in Vegetable Marketing in selected districts of North Karnataka.



` In Dharwad market, it is evident from the study that the marketing efficiency index as significantly high (5.90) with modern supply chain, which was followed by cooperative (2.77) and modern supply chain formats (1.90). The lowest price spread (Rs.12.38 per Kg) and highest producers' share in consumers' rupee (74.79 per cent) was observed in modern supply chain. On the other hand, the highest price spread (Rs.24.38 per Kg) and lowest producers' share in consumers' rupee (43.42 per cent) was observed in traditional format. The price spread of Rs.16.69 per Kg and producers' share in consumers' rupee 53.25 per cent were observed in cooperative supply chain. The highest efficiency of marketing with modern supply chain could be attributed to absence of marketing intermediaries and reduces post harvest losses. With respect to Belagavi district, the modern format was proved to be efficient with the marketing efficiency index of 5.03. Cooperative formats with 3.09 and traditional format with 2.41 were next in order. The price spread was (Rs. 13.00 per Kg) observed in case of traditional formats. This was preceded by cooperative formats and modern formats with Rs.8.94 per Kg and Rs.7.90 per Kg of vegetables respectively. The share of producer in rupee paid by the consumer was significantly highest in modern

format i.e., 64.89 per cent. This was followed by cooperative formats and modern supply chain formats and modern supply chain formats with 58.90 per cent and Rs.47.47 per cent respectively. Similar trend of Dharwad and Belagavi districts were observed with Vijayapura district. The highest marketing efficiency index 4.12 as recorded with modern supply chain, which was followed by cooperative supply chain (3.11) and traditional supply chain (2.33). The price spread was significantly high in traditional formats (Rs. 13.75 per Kg) when compared with cooperative (Rs. 8.62 per Kg) and modern retail formats (Rs. 3.75 per Kg). The share of producer in consumer's rupee was significantly highest in modern format i.e., 86.11 per cent. The cooperative supply chain formats and modern supply chain formats with 70.62 per cent and Rs.57.69 per cent were stands in next order.

The marketing efficiency index significantly high with modern supply chain formats i.e., 4.42 in Kalaburgi District, followed by cooperative (2.97) and traditional retail formats (2.14). The highest price spread was found in case of traditional format i.e., Rs.16.88 per Kg, followed by cooperative and modern formats with Rs. 12.13 per Kg and Rs.4.50 per Kg of vegetables. The share of producer in consumers' rupee was significantly highest with modern format i.e., 82 per cent. The cooperative supply chain and traditional supply chain formats recorded producers' share in consumers' rupee of 70.62 per cent and 57.69 per cent respectively. Where as in Bellary district, the modern supply chains found to be significantly efficient which was indicated by higher marketing efficiency index i.e., 5.54, followed by cooperative (3.56) and traditional supply chain formats (2.49). The price spread was highest in case of traditional retail outlets i.e., Rs.12.94 per Kg. This was preceded by cooperative format with Rs.8.81 per Kg of vegetables and modern format with Rs. 2.88 per Kg of vegetables. The share of producer in rupee received from consumer was significantly highest in modern supply chain i.e., 86.95 per cent. This was followed by cooperative supply chain formats and modern supply chain formats supply chain formats with 64.04 per cent and Rs.51.77 per cent respectively.

It can be evident from the study that similar trend was observed with respect to index of marketing efficiency, price spread and share of producer in consumer's rupee in all the five districts. The highest marketing efficiency index and share of producer in consumer's rupee was found with Modern format. But, the price spread was lowest in modern supply chain format. This was followed by cooperative and traditional format. Further, traditional format recorded lowest marketing efficiency index and producers' share in consumers' rupee, The highest price spread was noticed in traditional supply chain. This could be attributed to short chain of modern formats. The total cost of modern supply chain reduced drastically due to non prevalence of commission charges paid to intermediaries at various levels. Similar results were obtained by **Shilpa (2008) and Vinayakumar Gunwant (2012).**

Conclusion

The study reveal that Majority of the farmers in all the districts under study have marketed their produce through the traditional supply chain as the intermediaries were located very near for their disposal and because of financial assistance offered by intermediaries. But the farmers forced to pay huge commission charges to the tune of 8 percent to intermediaries. As a result the cost of vegetable marketing increases in traditional supply chain, recorded lowest marketing efficiency and highest price spread. The modern supply chain such as Reliance fresh, More, Nilgiris though effective, relatively less popular in all

these districts. Modern supply chains are significantly superior with respect to marketing efficiency and producers' share in consumers' rupee. Therefore, it is advised to adopt modern supply chain with forward and backward linkages. This will help in reducing bullwhip effect by sharing information between various stakeholders operating at various levels in supply chain, matching demand and supply. This results in significant reduction in post harvest losses and total marketing cost.

Government and Non-Government bodies advised to establish cold storage and refrigerated transportation facilities to reduce the losses and make the vegetables available throughout the year to meet the demand. Forward and backward integration should be encouraged among producers to help in enhancing producer's share by coordinating and integrating the stake holders for sharing information which reduce the bullwhip effect and maximize producer's share by minimizing post harvest losses and reducing total marketing cost.

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