

A Study on Channel efficiency of Co-operative Marketing Model with reference to Fresh produce segment in selected areas of Andhra Pradesh

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ABSTRACT

In the current scenario of marketing, farmers are facing difficulties in marketing their fresh produce in the domestic market in India. As per the figures and facts from government and private sources around 25 to 30% is being wasted at different levels in the supply chain. Retailing industry is gaining importance and increasing its shelf space in different retail formats in domestic market and in the international market. Branding, prices, availability, cost of cultivation for the farmers, quality and freshness, mileage of Fresh produce it travels from farmer to end consumers. It is observed that there is a necessity to form a new model that reduces the multiple handling, influence of intermediaries in marketing of Fresh produce. This study focuses on formation of new cooperative marketing model and tries to prove that channel efficiency of cooperative channel is more than the conventional channel. Scope of this study is also to find out the major costs involved in marketing of perishables (Fresh Produce).

Keywords: Efficiency, Marketing channels, operative , Conventional model.

INTRODUCTION:

Fresh Produce is gaining the importance because of the increased health consciousness, changing lifestyles of consumers, concern about environment and other reasons. “The Products that does not hold the freshness for long time and becomes not suitable for human consumption are called Perishable Products”.

India’s Food & grocery market is the world’s sixth largest market out of which retailing contributes to 70% of the total sales. Indian exports of processed food and related products grew at a CAGR of 11.74% between 2011-2016 to reach \$65.4 Bn by 2018 and the value of export market value is \$ 1.3 Bn in 2017. Indian retail market is expected to grow to \$865Bn by 2023. India food processing industry accounts for 32% of country’s total food market. Indian Gourmet food market is \$1.4Bn with annual growth rate of 20%. Interestingly online food ordering and delivery industry grew by 150% year on year and Gross merchandise value is \$ 300 – 375 MN in FY16-17, \$ 600Mn in FY17-18 and touch \$5Bn in 2020 with CAGR of 72%. Around \$7.54 to 8 Bn of Foreign Direct investments has been invested in food processing sector in India.

REVIEW OF LITERATURE:

Onafowokan o. Oluyambo (December 2012) in his Thesis “ The Role of Co-operative Societies in Rural Finance”: Assess the roles played by Co-operative societies, savings and loans services on members’ economic

condition, standard of living and in meeting participants financial needs in rural locations where there is no bank nor other formal financial providers. The study is first empirical investigation in Nigeria that focuses on the relevance of cooperative societies on members' standard of living in rural communities and villages. Ryan Gibson - Rural Development Institute, Brandon University, Canada: This paper is to assess the role that co-operatives may have in northern and remote communities in Manitoba. The paper will investigate the ways in which co-operatives can act as agents towards sustainable community development. They provide a means for addressing many social and economic concerns such as youth retention, community identity/spirit and preventing leakage of local money. K.V.Subramanyam and T.M.Gajanana (2000): Co-operative marketing of Fruits and vegetables. This study emphasized on reasons for success or failure of Co-operative marketing societies with the help of case studies. An in-depth analysis is done about the business and financial performance of the Co-operative marketing societies in terms of growth, rates in membership, share capital, turn over, overheads, profits, financial ratios and their impact on the performance is studied. Deshpande and Gopalappa (2003) This study is about marketing information systems, which gives analytical data about pricing, trading, international markets, trend and use of agricultural marketing to reduce the time lag and increase the efficiency of marketing. Pathak (2009) The Author explained about the importance of agriculture in economic growth of the Country and interdependency between agriculture and allied industries.

OBJECTIVES OF THE STUDY:

1. To know the role of cooperative societies in rural marketing of perishables.
2. To develop a new marketing model for marketing of perishables through cooperative societies.
3. To Compare channel efficiency of traditional model with co operative model.
4. To find the major problems faced by rural farmers in selling their produce.
5. To suggest new ways channels for selling their fresh produce.

METHODOLOGY:

Both primary and secondary data sources were used to collect information for the present study. Primary data was obtained through the personal interview with the formers. A structured questionnaire was prepared and administered to ascertain their data. A convenient sample of 600 former has been selected for the present study. Secondary data was collected from the sources of commission agents as well as text books, magazines, journals.

Sampling:

A convenient sample of 600 formers has been selected for the present study.

Place of the Study:

The former of all groups have been covered across the Guntur, Krishna , Prakasam, West Godvari and East Godavari Districts of Andhra Pradesh.

HYPOTHESIS:

Null Hypothesis:

The marketing efficiency of Co-operative marketing channel is higher than the conventional channel (Local Mandi).

Alternative Hypothesis:

The marketing efficiency of Co-operative marketing channel is Not higher than the conventional channel (Local Mandi).

Statistical tools used for calculation of Efficiency are given below:

1. Method of Average.
2. Mean and Population Mean of the data.
3. Standard deviation of the data.
4. T – test.
5. Simple Formulas used for the calculation of total marketing cost, price spread in different channel types are given in the chapter of Data analysis and Hypothesis.

DISCUSSION AND EXPLANATION:

Market Scenario of Fresh Produce in India:

At Present Fresh produce market in India is about Rs.390000 – 395000 crore with CAGR of 14% in last 8 to 10 years. It will touch around Rs.850000 to Rs.900000 crore by 2020. Fresh produce has two broad segments of Fruits and Vegetables. 70% of the market is occupied by vegetables and fruits hold a share of just 30% with a value of Rs.170000 Crore in India. Out of the total market, 60% of business is done in rural market and out of that 75% is occupied by vegetables. Fruits market is mostly urban centric market. India holds 13.6% of production of fruits in the world and hold 14% of worlds’ production in vegetables category.

Table 1: Commodity wise share of exports of Horticulture Products from India 2012-13

Commodity Name	% of Export
Floriculture	3.2%
Fruit and vegetable seeds	2.9%
Fresh Onions	22.1%
Other Fresh Vegetables	16.0%
Walnuts	2.3%
Fresh Mangoes	2.0%
Fresh grapes	11.6%
Other Fresh Fruits	7.1%
Cucumber and Gherkins (Prepared & Preserved)	6.6%
Dried & Preserved vegetables	5.2%
Mango Pulp	5.4%
Other Processed Fruits & Vegetables	15.8%

Source: www.horticulturedept.ap.gov.in

Major costs involved in Marketing of Fresh Produce:

- Market Fees
- Average Transport Cost
- Hamali & Packaging Charges
- Storage Facilities
- Loss due to Rejection (10%)
- Commission (10%)

Hypothesis:

Explanation Cooperative Marketing Model: Important factors considered for calculation of Channel efficiency:

Price:

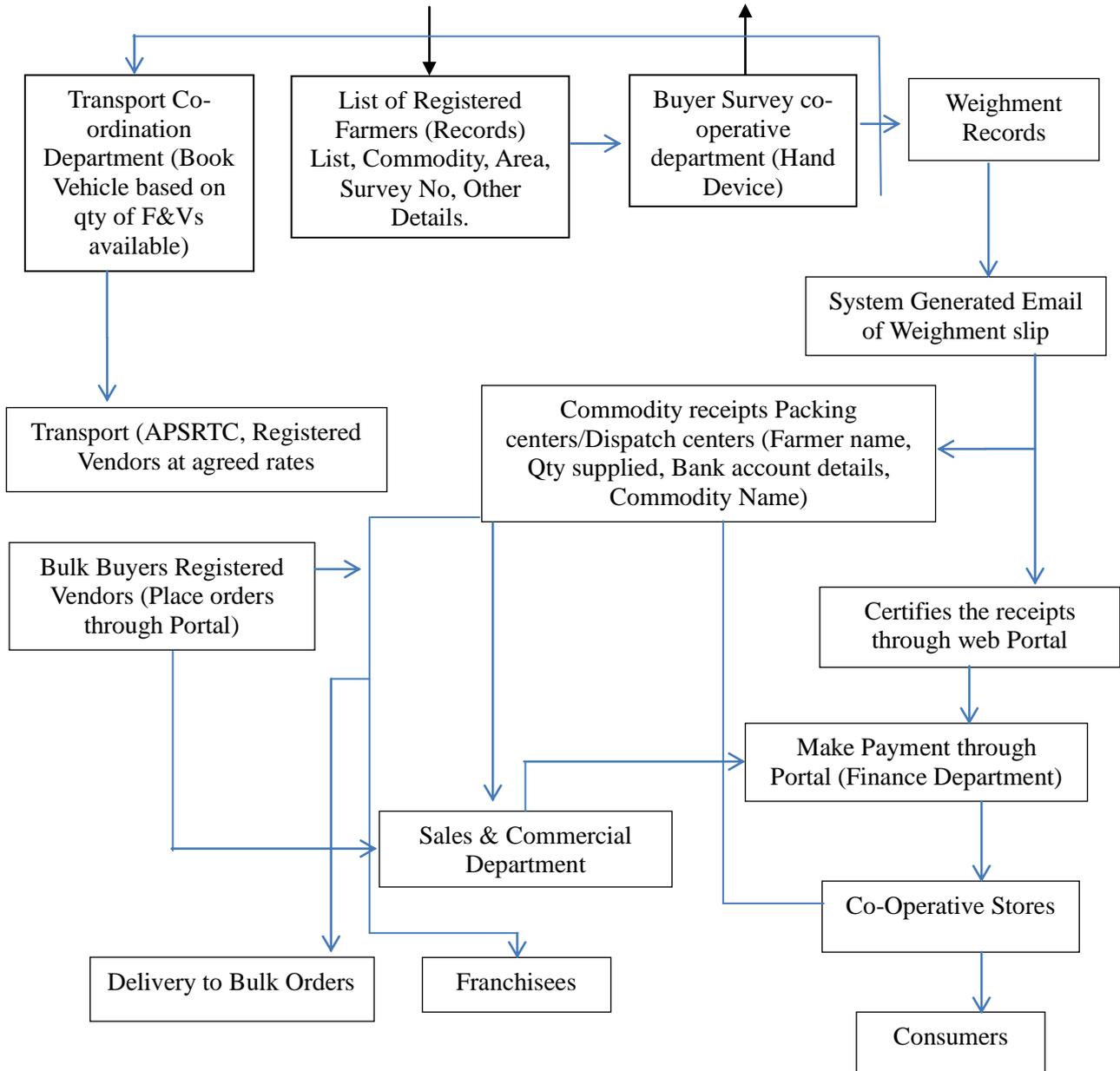
It is observed that farmers are losing heavily because of lower prices paid by commission agents, wholesalers and other intermediaries. So we collected the data of price paid to farmers at by whole salers/ commission agents in local Mandi, modern retailers. At the same time price paid by the consumers at wholesale level, commission agents, modern retailers and retailers. Price spread between the price paid to the farmers and price paid by the consumers is calculated which is the basis for the calculation of marketing efficiency.

Cost of rejection loss:

It is observed that the farmers are losing heavily in the name of rejection loss against the bad quality of F&Vs supplied to them. Rejection loss is around 5% to 10% on average at different marketing channels. Data is collected from different market yards, purchasers of modern retailer local Mandi. Then the cost of rejection loss is added to the total cost to be borne by farmer. Certain cases the rejection loss is as higher as 25% which causes heavy loss to the farmers. On average 10% is considered as rejection over all in the calculation of marketing efficiency

New Channel of Marketing: Figure No.1

Flow Diagram of Web Application for linking Cooperative marketing societies with Cooperative Credit Societies



Working of New Marketing Model:

As per the above Figure, I have proposed new channel of marketing of perishables in which a state level apex body shall formed by the government of Andhra Pradesh(GoAP) by linking the Credit cooperative societies and Cooperative marketing societies. The paid up capital shall be raised by government in PPP Model, out of which 51% share shall be hold by GoAP and the rest shall be invested by private investors. The state level apex body shall establish cooperative stores in all the district headquarters in the first phase and establish franchisees in the Urban and Semi Urban Areas based on the interest of small and middle class entrepreneurs. Simultaneously the process of cooperative marketing of perishables can be extended to rural areas through Public distribution system and self-help groups(SHGs). We assume that SHGs are present in all almost all the villages of Andhra Pradesh and it also helps to improve the handling system in the marketing channel. This process helps the Cooperative system to reach to more customers. The major benefit of the system in this model is the free membership that creates huge customer base in cities, Urban and Semi Urban areas. The goods can be sold to bulk buyers like modern retailers through bulk orders. This can be done through system integration of vendors with Cooperative marketing department as discussed in the chapter No.3 a separate section on “use technology

in the cooperative marketing”.

In this model, Vendors (Farmers) are linked to Cooperative system through Mobile APP and Website. The supplies of farmers are punched through Smart card through which the quantity and commodity supplied are entered through the mobile APP. The vendor details are entered into the IT system either through mobile APP or website WWW.SUNRISEAPCOOP.COM which helps to link the farmers with marketing system of cooperative stores. We have collected the data of commodity cultivated, price realized at different intermediaries (Mandi, Conventional channel, Modern retailer and Cooperative channel). The aim is to prove statistically that the marketing efficiency of Cooperative channel is more than the conventional channel. Consumers are linked to the cooperative stores and franchises as shown in the figures, whereas the bulk buyers will have their own marketing set up.

Benefits of the adapting the new Model:

1. Easy access to farmers to market their fresh produce.
2. Transparency in making payments.
3. Reduced multiple handling of fresh produce.
4. Common transportation will help to reduce transport cost.
5. Regulation of supply chain in fruits and vegetables market which helps to stabilize and establish sustainable supplies to all the major retail marketers.
6. Better reach to the rural and urban market.
7. Increase the efficiency of marketing of fresh produce.

Calculation of Marketing Efficiency for Local Mandi/Conventional Market:

- a) Market Fees (A) = Rs.350/Mt.
- b) Average Transport Cost (B) = Rs.1000/Mt.
- c) Hamali & Packaging Charges (C) = Rs.525/Mt (300+225).
- d) Storage Facilities (D) = Rs. 70/Quintal = Rs.700/Mt.
- e) Loss due to Rejection (10%) (E) = Rs.3500/Mt.
- f) Commission (10%) (F) = Rs.3500/Mt.
- g) Total Marketing Cost (G) = A + B + C + D + E + F = Rs.9575/Mt.
- h) Average Price Paid to Farmer at Local Mandi /Conventional Market (P) = Rs.35000/Mt.
- i) Average Price Paid by Consumer at Local Mandi /Conventional Market (Q) = Rs.70000/Mt.
- j) Price spread (R) = Q – P = 70000-35000 = Rs.35000 /Mt.
- k) Total Gross Marketing Margin (S) = R + G = 35000+9575 = Rs.44575.
- l) Percentage of Producer's Share in Consumer's Rupee (T) = P / Q * 100 = (35000/70000)*100 = 50%.
- m) Marketing Efficiency (ME) = Price paid to Farmer/ Total Gross Marketing Margin.
= (35000/44575) = 0.79.

Calculation of Marketing Efficiency for Modern Retail Channel:

- a) Market Fees (A1) = Rs.350/Mt.
- b) Average Transport Cost (B1) = Rs.1000/Mt.
- c) Hamali & Packaging Charges (C1) = Rs.525/Mt (300+225).
- d) Storage Facilities (D1) = Rs. 70/Quintal = Rs.700/Mt.
- e) Loss due to Rejection (10%) (E1) = Rs.6500/Mt.
- f) Commission (10%) (F1) = Rs.6500/Mt.
- g) Total Marketing Cost (G1) = A1 + B1 + C1 + D1 + E1 + F1 = Rs.15875/Mt.
- h) Average Price Paid to Farmer at Local Mandi /Conventional Market (P1) = Rs.65000/Mt.
- i) Average Price Paid by Consumer at Local Mandi /Conventional Market (Q1) = Rs.104000/Mt.
- j) Price spread (R1) = Q1 – P1 = 104000 - 65000 = Rs.39000 /Mt.
- k) Total Gross Marketing Margin (S1) = R + G = 39000+ 15875 = Rs.54875.
- l) Percentage of Producer's Share in Consumer's Rupee (T1) = P / Q * 100 = (65000/104000)*100 = 62.5%.
- m) Marketing Efficiency (ME1) = Price paid to Farmer/ Total Gross Marketing Margin.
= (65000/54875) = 1.18.

Marketing Efficiency Calculation for Co-Operative Channel:

- a) Market Fees (A3) = Rs.500/Mt.
- b) Average Transport Cost (B3) = Rs.1000/Mt.
- c) Hamali & Packaging Charges (C3) = Rs.525/Mt (300+225).
- d) Storage Facilities (D3) = Rs. 70/Quintal = Rs.100/Mt.
- e) Total Marketing Cost (E3) = Rs.2125/Mt.
- f) Average Price Paid to Farmer at Local Mandi /Conventional Market (P1) = Rs.65000/Mt.
- g) Average Price Paid by Consumer at Local Mandi /Conventional Market (Q1) = Rs.104000/Mt.
- h) Price spread (R1) = Q1 – P1 = 104000 - 65000 = Rs.39000/Mt.
- i) Total Gross Marketing Margin (S1) = R + G = 39000+2125 = Rs.41125.
- j) Percentage of Producer’s Share in Consumer’s Rupee (T) = P1 / Q1 *100 = (65000/104000)*100 = 62.5%.
- k) Marketing Efficiency (ME1) = Price paid to Farmer/ Total Gross Marketing Margin.
 = (65000/41125) = 1.58.

Table 2: Hypothesis Test of channel efficiency of Commodity –I (manago)

Details of the item	Conventional Market	Modern Retail	Cooperative Market	
SQRT(SUM/N) or SD of the Sample	0.19	0.13	0.25	
N	84	84	84	
N	30	30	30	
Confidence Level	95%	95%	95%	
Population Mean	0.86	1.32	1.84	
Mean of X(Sample)	0.86	1.35	1.90	
Square Root (n) i.e. n=30	5.48			
T Value			One Tailed Test	Skewness is positive
T value for Cooperative Market	1.32			
Degree of Freedom(n-1)	29			
Table Value at given Degree of Freedom is	1.699			
Null Hypothesis is accepted as Table value is greater than Calculated value				

Source: calculated

Standard deviation of the sample is obtained from the above table the population size for the commodity is 84, out of which 30 farmers are selected randomly for study. As the sample size is less than or equal to 30, we have used Student’s T – test for testing the hypothesis at the confidence level of 95%.

Formulas:

- 1. Standard deviation (σ) = SQRT [$\Sigma(X_i - \bar{x})^2 / N$].
- 2. Student’s t test formula $t = \frac{\bar{x} - \mu_{Ho}}{\sigma / \sqrt{n}}$

Where the degree of freedom is n-1.

Calculation is as shown here: $\bar{x} = 1.90$, $\mu_{Ho} = 1.84$, $\sigma = 0.25$, $\sqrt{n} = 5.48$, So the calculated t value is 1.32, where the table value of ‘t’ is 1.699 at degree of freedom n-1 (30-1 = 29). As per the observation table value is greater than the calculated value, so the Null hypothesis is accepted. Student t test is one tailed as the skewness of the values obtained is positive and also the population mean is lower than the sample mean.

Hence marketing efficiency of the new co-operative channel is more than the marketing efficiency of the conventional channel, Null Hypothesis is accepted

Hypothesis testing of Commodity II (Bhendi):

Out of the selected vegetables, Bhendi is one of the biggest and regularly used commodities in terms of quantity and value, so hypothesis is tested over the population of 87 and sample of 30 farmers. Data collected is from the farmers during the sale at different market yards. However the price of Bhendi In Co-operative channel is considered as highest among local Mandi and Modern retailer which is an assumption, as there is no fresh data

available in the market. Hypothesis is tested between population mean and sample mean. As the sample size is less than 30, Student’s t-test is used to test the hypothesis. Also hypothesis for the other commodities can be tested in the similar way.

Table 3: Hypothesis Test of channel efficiency of II (Bhendi)

Details	Conventional Market	Modern Retail	Cooperative Market	
Sqrt(Sum/n) or SD of the Sample	0.37	0.34	0.88	
N	87	87	87	
n	30	30	30	
Confidence Level	95%	95%	95%	
Population Mean	1.24	1.61	2.54	
Mean of X(Sample)	1.19	1.58	2.48	
Square Root (n)	5.48			
T Value			One Tailed Test	
T value for Cooperative Market	-0.37			
Degree of Freedom(n-1)	29			
Table Value at given Degree of Freedom is	2.045			
Null Hypothesis is accepted as Table value is greater than Calculated value				
Null Hypothesis is accepted				

Source: calculated

Standard deviation of the sample is obtained from the table No.8, the population size for the commodity is 84, out of which 30 farmers are selected randomly for study. As the sample size is less than or equal to 30, Student’s T – test is used for testing the hypothesis at the confidence level of 95%..

Where the degree of freedom is n-1.

Calculation is as shown here: $\bar{x} = 2.48$, $\mu_{Ho} = 2.54$, $\sigma_s = 0.88$, $\sqrt{n} = 5.48$, So the calculated t value is -0.3737, where the table value of ‘t’ is 2.045 at degree of freedom n-1 (30-1 = 29). As per the observation table value is greater than the calculated value, so the Null hypothesis is accepted. Student t test is one tailed as the skew ness of the values obtained is negative and also the population mean is greater than the sample mean.

Hence the marketing efficiency of the new co-operative channel is more than the marketing efficiency of the conventional channel, Null Hypothesis is accepted

As per the data available and after thorough analysis, It can be conclude that the marketing efficiency of newly developed co-operative market is far better than conventional channel. However the study reveals that there are several factors like production, weather, seasonality of fruits and vegetables, middle men which affect the prices and there by availability at the nearest markets.

FINDINGS:

1. Cost of marketing is increased by the increase in number of intermediaries in the supply chain of perishables.
2. Farmers are facing problem due to lack of support from government regarding infrastructure facilities like storage, marketing mechanism and lack of supervision over the department of marketing and cooperative credit societies.
3. Observed that cooperative marketing societies can be linked with Cooperative marketing societies through enterprise resource planning which helps to establish better marketing system for Perishables (Fruits &Vegetables).
4. We can reduce the cost of transportation for movement of goods from the place of Farmer to regional hub and then to proposed location of Stores or Franchisees (Common transportation for more number of farmers).
5. Supply chain mechanism in the marketing of Fresh produce can be regularized by establishing common platform for bulk buyers.
6. Major observation is that out Rs.390000 crore market of Fruits & vegetables In India 60% Is occupied by vegetables and 75% of the vegetable’s business is being done in rural areas.

7. People in rural areas are becoming more environmental conscious because of the more usage of pesticides in cultivation of Fruits and Vegetables.
8. Multiple handling in supply chain of Perishables increases the rejection losses.
9. Government regulations on FDI In retail sector, Food Processing and creation of infra-structure facilities is taking shape in the recent years which is a boon to increase the shelf life.
10. One of the Major finding is that around 30 to 45% in the rural and urban areas are below the middle class, how ever increasing Upper middle class population has created good market potential for marketing of Frutis and Vegetables.
11. Huge variation in supply and demand is observed because of seasonality in production of Fruits and vegetables.

SUGGESTIONS:

1. Establishment of Co-operative stores through Cooperative Marketing societies (CMS) and link with Cooperative credit societies by forming a State level Apex organization in Public Private Partnership Model in 51: 49 Ratio with Autonomous status. GoAP shall invest 51% as Promoter’s stake in the state level apex body.
2. All the infra-structure facilities for regular operations shall be provided through Cooperative marketing associations.
3. It is suggested that government does not interfere politically in the establishment of co-operative stores and Franchisees that may lead to failure in the system because of in-experience in future.
4. Implement Geo-tagging and linking of transportation in this process that help farmers to easily do weighment and transport their fresh produce to regional dispatch centers with in time and sell at good and profitable prices. It increases operational efficiency of cooperative marketing channel.
5. One major suggestion is that Co-operative stores can acts as supply chain manager and supply Fruits &Vegetables at best available prices for big retail giants in the market, which increase and improves the operational efficiency.
6. Dispatch centers shall be established through central ware Housing Corporation as part of rural development schemes, which reduces the cost.
7. Reduce the seasonality impact by increasing storage time at clod storages to maximum extent there after convert to alternative forms like packed and preserved ready to eat varieties like soup mixes, fruit pulps & jelly, squashes, Fruit juices, powders &flavours), organic F&Vs etc.

CONCLUSION:

As per the hypothesis test, it is proved that efficiency of the cooperative marketing channel is higher than the conventional marketing channel. With the available data and analysis, we hope and suggest the state government to take initiative and establish this new marketing and distribution model for marketing of Fruits and vegetables in the state of Andhra Pradesh, which increases the best purchase experience and satisfaction towards purchase of fruits, and Vegetables in all the areas of Andhra Pradesh. I thank all the farmers who have responded positively and given their valuable insights to understand different procurement mechanisms prevailing in the market, cost of marketing, price fixation mechanism and revenue incurred by the farmers. I sincerely dedicate this thesis to all my beloved farmer soldiers who are helping my country to bring the fodder from the soil to dishes. In addition, I hope this project may help the farmers to market their fresh produce at best possible manner and earn more returns from this new marketing and distribution model.

DATA TABLES RELATED:

Table: 4 Productivity of Vegetables in Andhra Pradesh

Name of the Vegetable	2013-14 (MT/HA)	2014-15 (MT/HA)	2015-16 (MT/HA)
Beans	12	8	10
Cauliflower	43	14	13
Green Chillies	15	17	17
Bhendi	15	11	12
Tomato	20	27	39
Leafy Vegetables/Tindoora	12	11	13

Source: www.horticulturedept.ap.gov.in

Table 5: Productivity of Fruits in Andhra Pradesh

Name of the Fruits	2013-14	2014-15	2015-16
Mango	9	9	9
Sapota	10	12	12
Guava	15	16	16
Sweet Oranges	13	17	17
Limes/Lemons	15	13	13
Banana	35	44	45

Source: www.horticulturedept.ap.gov.in

Table 6: Post-Harvest losses in Major Fruits and Vegetables.

Crop	Post – Harvest loss (%)
Mango	17.1 – 36.7
Banana	11.0 - 14.0
Oranges	8.3 – 30.7
All Fruits	6.0 – 36.7
Onion	13.0 – 30.0
Tomato	13.0 – 16.0
All Vegetables	13.0 – 30.0

Source: Calculated

Table 7: Hypothesis testing of Commodity I(Mangoes):

S.NO	Marketing Efficiency Conventional Market	Marketing Efficiency (Modern Retail Channel)	Marketing Efficiency (Cooperative Channel)
1	0.79	1.18	1.58
2	0.95	1.44	2.08
3	0.69	1.49	2.17
4	0.79	1.39	1.97
5	0.75	1.20	1.61
6	1.23	1.32	1.84
7	0.52	1.35	1.89
8	0.77	1.27	1.74
9	0.70	1.47	2.14
10	0.74	1.46	2.11
11	0.96	1.47	2.14
12	0.65	1.27	1.74
13	1.23	1.37	1.94
14	0.81	1.20	1.61
15	1.08	1.56	2.33
16	0.61	1.60	2.41
17	0.78	1.18	1.58
18	0.99	1.47	2.14
19	0.98	1.18	1.58
20	0.66	1.32	1.84
21	0.88	1.27	1.74
22	1.23	1.37	1.94
23	0.89	1.32	1.84
24	0.91	1.56	2.33
25	0.67	1.14	1.51
26	1.01	1.47	2.14
27	0.71	1.37	1.94
28	1.08	1.18	1.58

S.NO	Marketing Efficiency Conventional Market	Marketing Efficiency (Modern Retail Channel)	Marketing Efficiency (Cooperative Channel)
29	0.79	1.37	1.94
30	0.88	1.30	1.78
Sum	25.73	40.60	57.15
Mean	0.86	1.35	1.90

Source: Calculated

Table 8: Population Mean calculation

Population Mean Calculation					
-0.07	-0.17	-0.32	0.01	0.03	0.11
0.95	1.44	2.08	0.91	2.08	4.31
0.69	1.49	2.17	0.48	2.21	4.70
0.79	1.39	1.97	0.63	1.93	3.86
0.75	1.20	1.61	0.56	1.45	2.61
1.23	1.32	1.84	1.51	1.76	3.39
0.52	1.35	1.89	0.27	1.82	3.56
0.77	1.27	1.74	0.59	1.62	3.04
0.70	1.47	2.14	0.49	2.16	4.56
0.74	1.46	2.11	0.54	2.13	4.45
0.96	1.47	2.14	0.93	2.16	4.56
0.65	1.27	1.74	0.42	1.62	3.04
1.23	1.37	1.94	1.51	1.89	3.75
0.81	1.20	1.61	0.65	1.45	2.61
1.08	1.56	2.33	1.17	2.44	5.45
0.61	1.60	2.41	0.37	2.55	5.81
0.78	1.18	1.58	0.60	1.40	2.49
0.99	1.47	2.14	0.99	2.16	4.56
0.98	1.18	1.58	0.97	1.40	2.50
0.66	1.32	1.84	0.44	1.75	3.37
0.88	1.27	1.74	0.77	1.62	3.02
1.23	1.37	1.94	1.51	1.89	3.75
0.89	1.32	1.84	0.79	1.75	3.37
0.91	1.56	2.33	0.84	2.44	5.45
0.67	1.14	1.51	0.45	1.31	2.27
1.01	1.47	2.14	1.03	2.16	4.56
0.71	1.37	1.94	0.51	1.89	3.75
1.08	1.18	1.58	1.16	1.40	2.49
0.79	1.37	1.94	0.63	1.89	3.75
0.88	1.30	1.78	0.77	1.68	3.18
		Sum of Squares	22.47	54.05	108.32
		Sum of squares/n	0.27	0.64	1.29
		SD	0.52	0.80	1.14

Source: Calculated

Table 9: Market Efficiency Calculation

S.NO	Marketing Efficiency (Conventional Channel)	Marketing Efficiency (Modern Retailer)	Marketing Efficiency (Cooperative Market)
1	0.41	1.62	2.47
2	0.71	1.34	1.88
3	1.31	1.73	2.74
4	1.57	1.13	1.49
5	1.17	1.67	2.59
6	1.43	1.28	1.77

7	1.23	1.42	2.04
8	1.00	1.65	2.55
9	1.39	1.34	1.88
10	1.39	1.46	2.11
11	1.43	1.19	1.59
12	1.23	1.55	2.31
13	0.74	1.73	2.74
14	1.39	1.55	2.31
15	1.39	1.89	3.16
16	1.43	1.05	1.36
17	1.23	1.67	2.59
18	1.52	1.73	2.74
19	0.39	1.46	2.11
20	1.52	2.21	4.18
21	0.34	1.19	1.59
22	1.48	1.67	2.59
23	0.82	1.34	1.87
24	1.39	1.46	2.11
25	0.65	2.40	4.91
26	1.48	1.34	1.88
27	1.27	1.92	3.24
28	1.43	1.62	2.48
29	1.53	1.46	2.11
30	1.39	2.40	4.91
Total	35.66	47.46	74.30
Mean	1.19	1.58	2.48

Source: Calculated

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