

Comparative Analysis of Different Distribution Channels with Regard to Price of Select Vegetables: An Analytical Study of Telangana Region

Debopam Chakrabarti*, Kavitha Desai**

**Research Scholar, AIMS Centre for Advanced Research Center (Affiliated to University of Mysore), Bengaluru, Karnataka, India.*

***Associate Professor, Department of Professional Studies, Christ University, Bangalore, Karnataka, India.
Email: desaikavitha@gmail.com*

ABSTRACT

The purpose of this paper is to understand the price realized by farmers from different distribution channels for their vegetable. Price is one of the primary drivers for an efficient supply chain. This analysis was part of a study to find the efficiency of different channels for vegetable supply chain and to find out what are the reasons and how farmers can get the right remuneration for their vegetables. The data was collected based on questionnaire from 410 farmers who are using different channels. The data analysis is based on the sample data for four districts of Telangana and three selected vegetables which are assumed to be representative of the overall sample frame. It was observed that there is significant variation of price received from different channels and the variation exists between different districts. It was also observed that there is significant difference between maximum and minimum price realized due to wide gap of supply and demand. There is no crop planning exists aligned with historical demand. Also, there is no systematic approach to divert the excess production to alternate market. This study will help in understanding the farmer's price realization from different channels and create a framework to improve the situation for farmers by getting a better price.

Keywords: Distribution Channel, Vegetables, Price

INTRODUCTION

The vegetable supply chain is part of Agri-fresh produce (sometimes referred as perishable food supply chain) differs from regular supply chain in many ways. As per Agricultural and Processed Food Products Export Development Authority (APEDA), India is the second largest producer of vegetables in the world. But, the price realized by the farmers in India is generally $1/5^{\text{th}}$ or $1/6^{\text{th}}$ of final market price. This is driven by presence of multiple non-value-added intermediaries and inefficient planning of supply and demand to address the market equilibrium situation. Following are some of the channels for supply chain network of vegetables.

Channel 1: Local Market

This is one of the common channel where farmers are carrying their vegetable to a local market with semi-permanent structure and sell directly to the end consumers

generally in less quantity. Farmers get immediate cash on hand and use it for their immediate livelihood needs. End consumers buy the vegetables to get fresh vegetable at a reasonable price.

Channel 2: Wholesale Market

This channel is used by the farmers for bulk quantities and purchased by the wholesaler through a spot bidding process. The commission agents play a significant role to drive the bidding process and arrange for buyers. In turn, they collect commission against the sale. There is an organized market committee who manages the operation of the market and they also maintain the information of vegetable arrival and pricing on a daily basis.

Channel 3: Rythu Bazaar

This channel is operational in combined Andhra Pradesh from 1990 with the idea of creating an organized market

where farmers can sell directly to end consumers without any middleman.

Channel 4: Super Market

This channel is primarily governed by the super market chains to collect best quality vegetables from the farmers directly. Sometimes, they create contract with the farmers to buy different vegetables without any firm commitment and they also work closely with the farmers on quality.

There can be other variants of supply chain network which are not considered in this study.

It is important to understand the price realized by different farmers from the different distribution channels.

LITERATURE REVIEW

More than 200 peer reviewed papers related to vegetable supply chain were reviewed from international journals and few relevant articles related to this specific topic are discussed below.

Ahumada and Villalobos (2009) discussed the contribution of production and distribution planning. The price implication was discussed through different models and highlighted the volatility of price.

Foivos and Nigel (2015) discussed the impact of collaboration within vegetable supply chain management players on price and efficiency.

Riikka, Iskra, and Lauri (2013) took a detail view of how the reduction of waste and sustainable performance can be achieved through successful information sharing specifically on demand and shelf life.

Sagheer, Yadav, and Deshmukh (2009) tried to provide a landscape of different types of supply chain and possibilities of linking the small producers of the agri-food with the alternate global market and making Indian agri-food more competitive in international market.

Willem, Roberto, and Van der Vorst (2014) tried to assess the effectiveness of existing sourcing strategy to supply product with appropriate quality and acceptable wastage for international perishable supply chain.

Shikha and Manoj (2016) dealt with collaboration aspect of agri-food supply chain and tried to explain the how information sharing across supply chain helps in getting appropriate price for the channel partners.

OBJECTIVE

The objective of the current study is to analyze the price received by the farmers from different channels and This

study will help objectively to understand the reasons of price difference of different channels and highlight some of the issues on vegetable price realized by the farmers.

HYPOTHESIS FOR THE STUDY

The hypothesis tested for the current study is the following:

Null Hypothesis (H01): There is no significant difference on the price realized from different distribution channels.

Null Hypothesis (H02): The price realized for select vegetables from different districts is similar.

RESEARCH DESIGN

The various research design components are discussed below.

Sample Selection

The Telangana state was considered for the scope of this study. Production data of major crops of the state for five years (2012–2016) was collected from Telangana Horticulture department in January 2017. Accordingly, top three commonly used vegetables (tomato, brinjal, and lady's finger) were selected for study.

Once the vegetables were selected, a multistage area sampling method was used, and each district is considered as a sub-area. The top 4 districts (Medak, Warangal, Mahabunagar, and Rangareddy) were selected for sample selection.

The further analysis was conducted to select the Mandal and random sampling of farmers was done from the selected Mandal. The district wise distribution of sample for different channels is shown below in Table 1.

Table 1: District Wise Summary of Data for Different Channels

District/ Channel ->	1	2	3	4	Grand Total
Mahabunagar	30	28	51		109
Medak	26	33	11	33	103
Rangareddy	25	25	27	23	100
Warangal	24	49	25		98
Grand Total	105	135	114	56	410

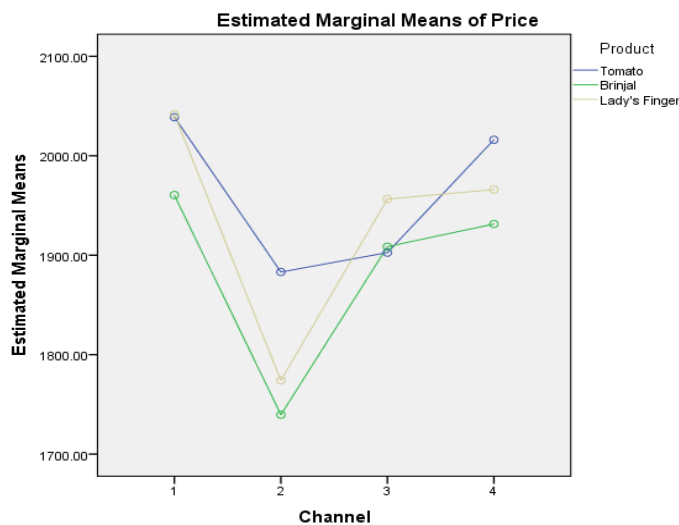
Questionnaire Design

The price information was collected as a part of the bigger questionnaire to understand the supply chain efficiency of different channel. The relevant portion of the questionnaire is produced below in table 2.

Table 2: Price Collection Format

Approximate Price Received from Different Channels Last One Year (Per QT.).

	Tomato			Brinjal			Lady's Finger		
	High	Low	Average	High	Low	Average	High	Low	Average
Local market									
Wholesale market									
Rythu Bazaar									
Super Market									

**Fig. 1: Two-way ANOVA Graph for Price with Different Channels and Product**

The three levels of price data (highest, lowest, and average) were collected from the farmers for different channels. The objective was to get a sense of average price that they get from different channels and also the price variation at different seasons due to different reasons.

DATA ANALYSIS

The collected data was analyzed using ANOVA to understand the significance of variation of price between different channels and null hypothesis H01 in section 4 was tested.

The graph shows a difference of price between different channels and the ANOVA analysis data is summarized below in Table 3.

The Table 4 below further summarizes the p-value for different vegetables between channels to understand the difference between channels.

Table 3: ANOVA Analysis of Price for Different Channels (Univariate Tests). Dependent Variable: Price

	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Contrast	3807618.45	3	1269206.15	12.681	0.0001	0.068
Error	52445427.3	524	100086.693			

The F tests the effect of Channel. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

Table 4: P- value Based on ANOVA Analysis for Price Difference between Channels

Channel comparison		Tomato p-value	Brinjal p-value	Lady's finger p-value
Channel A	Channel B			
1	2	0.012*	0.001**	0.0001**
1	3	0.047*	0.472	0.314
1	4	0.714	0.657	0.28
2	3	0.768	0.016*	0.023*
2	4	0.025*	0.002**	0.003**
3	4	0.089	0.743	0.917

* p-value significant with 0.05 significance.

** p-value significant with 0.01 significance.

Highlights the difference with channel 2.

Based on the information in Table 3 and 4 the null hypothesis H01 is rejected, and the alternative hypothesis is accepted that there is significant difference of price for different channels.

The price difference across different district is also analyzed and the null hypothesis H02 as mentioned in section 4 was also tested. The ANOVA result is summarized below in Table 5.

Based on the result above in Table 5 and corresponding low p-value the null hypothesis H02 is rejected and alternate hypothesis is accepted that the price realized in different districts are different.

Further analysis of difference with p-value shows that Medak and Warangal have better price than Rangareddy and Mahabubnagar.

The fluctuation of vegetable price is another significant problem. ANOVA analysis for variation of maximum and minimum price is shown below in Fig. 2.

Table 5: ANOVA Analysis of Price for Different Districts (Univariate Tests)

Dependent Variable		Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Price_Tomato	Contrast	6137348.41	3	2045782.8	29.801	0.0001	0.266
	Error	16956250.7	247	68648.788			
Price_Brinjal	Contrast	6536452.48	3	2178817.49	61.044	0.0001	0.426
	Error	8816105.63	247	35692.735			
Price_Lady's finger	Contrast	2952327.68	3	984109.226	33.871	0.0002	0.291
	Error	7176488.82	247	29054.611			

The F tests the effect of District cat. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

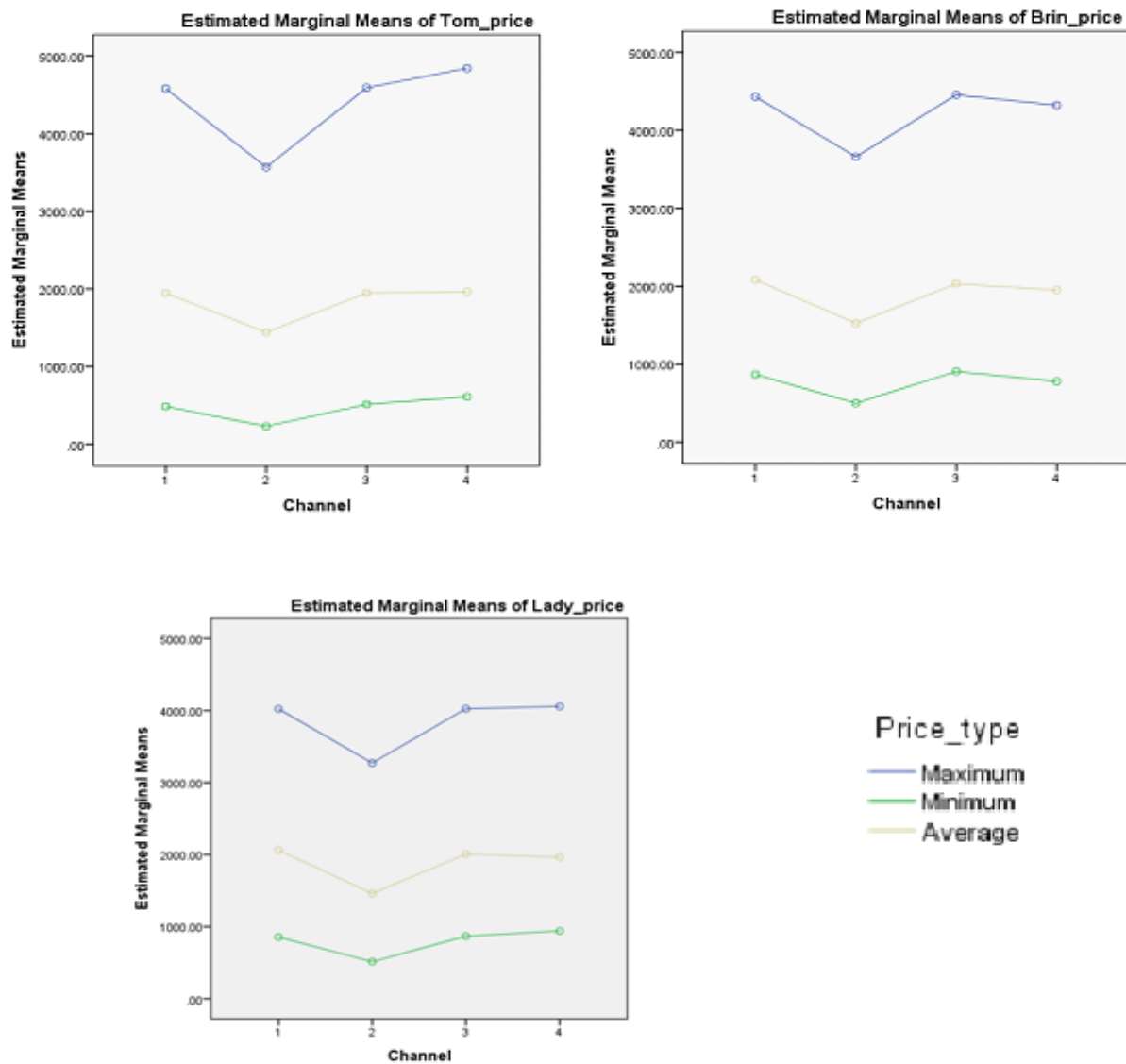


Fig. 2: Variation Between Maximum/Minimum Price for Different Vegetables

FINDINGS

The above analysis through Fig. 1 and Table 3 & 4 leads to the findings that there is significant difference of prices for all products across different channels.

It shows that channel 1 has the highest price realization and prices from channel 3 and 4 are comparable channel 1. But, price for channel 2 is significantly different from other channels. The reason for low price realization in channel 2 is primarily the high commission (8–10%) from commission agents and manipulation of market price at time through wholesaler's cartel with the help of commission agents.

It was also observed from Table 5 that there are significant differences of price between different districts. Medak and Warangal have better price than Rangareddy and Mahabubnagar based on further underlying data analysis. The better price in those districts is due to quality seeds and better irrigation that leads to quality of produce.

The significant gap between maximum and minimum price was also observed which is a major problem for the farmers. The market supply-demand situation plays a significant role in defining the market price. But, a possible intervention through efficient supply chain management may significantly impact the fluctuation of price in spite of the natural reasons like climate and yield difference as seen from data analysis.

Imbalance between supply and demand in vegetable supply chain is similar to any other supply chain. The uncertainty factors are more severe in case of vegetable supply chain. But, the supply chain response system should be flexible enough to absorb this unplanned behavior of supply and demand. Exploring alternate market is one such mitigation to the risk of oversupply during peak harvesting season. The primary reason for significant gap between maximum and minimum price is due to inefficient supply of vegetable and in some cases lack of exploring alternate channels to divert the excess supply.

CONCLUSION

This study helped in understanding the differences of prices for different channels and districts of Telangana for select vegetables. It also highlighted the issues related to high price fluctuation for vegetables in different markets. The quality of seeds in different districts plays a significantly role in producing quality crops which can demand better price.

The gap between maximum and minimum price of vegetables is driven primarily by market dynamics. The imbalance between supply and demand was identified as the key contributor to price fluctuation. There needs to be an integrated plan by understanding the supply pattern and exploring additional pockets of demand to balance the supply-demand mismatch. This will help in stabilizing the price for both farmers and end customers. Food processing units are another opportunity where close collaboration needs to be built by the marketing wing. Opportunity of setting additional food processing unit depending upon the vegetable supply from the area needs to be explored.

The current study can be utilized for any future initiative to build a framework of effective supply chain for vegetable farming.

REFERENCES

- Ahumada, O., & Villalobos, J. R. (2009). Application of planning models in the agri-food supply chain: A review. *European Journal of Operational Research*, 195(1), 1–20.
- Foivos, A., & Nigel, P. (2015). Emergent supply chains in the agri-food sector: Insights from a whole chain approach. *Supply Chain Management: An International Journal*, 20(4), 353–368.
- Riikka, K., Iskara, D. P., & Lauri, L. (2013). Creating sustainable fresh food supply chains through waste reduction. *International Journal of Physical Distribution & Logistics Management*, 43(3), 262–276.
- Sagheer, S., Yadav, S. S., & Deshmukh, S. G. (2009). Developing a conceptual framework for assessing competitiveness of India's agri-food chain. *International Journal of Emerging Markets*, 4(2), 137–159.
- Shikha, A., & Manoj, K. S. (2016). Towards a grounded view of collaboration in Indian agri-food supply chains. *British Food Journal*, 118(5), 1085–1106.
- Willem, A. R., Roberto, R., & Van der Vorst, J. G. A. J. (2014). Effective sourcing strategies for perishable product supply chains. *International Journal of Physical Distribution & Logistics Management*, 44(6), 494–510.
- Telangana State Horticulture Department data. Retrieved from <http://horticulture.tg.nic.in>
- Agricultural and Processed Food Products Export Development Authority (APEDA). Retrieved from http://apeda.gov.in/apedawebsite/six_head_product/FFV.htm