Market Efficiency, Costs and Price Spread Analysis of Sorghum in Bundelkhand region of Uttar Pradesh

ABSTRACT

The economics of the supply chain and the limitations of sorghum in the Bundelkhand region were studied. The Banda district was intentionally chosen due to its larger area and higher productivity. The respondents were selected using a random sampling technique. Twenty market intermediaries and a sample of 120 respondents were chosen through in-person interviews. The research area's findings showed that Channel I had a higher producer's share in consumer rupees (96.21%), followed by Channel III (75.61%) and Channel II (70.15%). Channel I's marketing efficiency was 25.42, while Channel III's was 3.17 and Channel II's was 2.34. Due to direct acquisition of the commodity from the producer, Channel I is more efficient. According to the report, the main issues farmers had with selling sorghum were a lack of information about the market and its unavailability.

Key words: Price spread, supply chain, constraints, and marketing efficiency

Comment [bc1]: It is should be written like (Keywords)

Comment [bc2]: Keywords should be written base on Alphabets arrangement.

INTRODUCTION

One of the major dryland crops that rural communities in arid and semi-arid regions of the world support is sorghum. Sorghum bicolor L. is the term given to sorghum in science. It is also known as the "King of Millets" and goes by the name "jowar" in India. It is an extremely productive agricultural plant that can be used for a number of purposes, such as cereals, fodder, and livestock feed. In the world's food production hierarchy, sorghum ranks fifth, behind cereals such as rice, maize, barley, and wheat.It is also used as an industrial raw material in many different industries in wealthy countries like the United States. Under suitable ecological and managerial conditions, it might successfully rival crops such as maize. 70% of the carbs, 3% of fat, and 10%–12% of protein are found in sorghum grain.
India had a decrease in the overall cultivated area of sorghum crop from 6.17 million hectares in 2014–2015 to 4.24 million hectares in 2020–2021. Moreover, throughout the last five years, or 2015–2021, production has decreased from 5.45 million tonnes to 4.78 million tonnes. However, the production increased from 8.84 quintals per hectare to 11.28 quintals per hectare throughout the same period, albeit with minor volatility.

Comment [bc3]: Please write citations after each paragraphs. Remember, the citations should be written on the scientific way.

Comment [bc4]: Where is the citation?

OBJECTIVES

Comment [bc5]: If it is a research paper, you don't need to write objectives headline separately. You can include it in the introduction section.

i. To look into the Sorghum Supply Chain and determine pricing spread, marketing cost, and marketing efficiency.
ii. To examine the constraints faced by sorghum growers faced in marketing their product.

Material and Methods

The Banda district in Uttar Pradesh's Bundelkhand region was purposefully chosen based on higher area and production; two blocks, Baberu and Naraini, were chosen since they had the largest areas under sorghum agriculture, and four villages were chosen. Only eight villages were included in this study, and fifteen respondents were chosen from each village to

provide a sample of 120 farmers. Data from 20 market intermediaries was also gathered in order to examine the marketing channels.

Comment [bc6]: If you know the total population you can write here, if you do not know the total population you can write that the total population are unknown.

Marketing Cost

The price associated with transporting commodities from producers to consumers. The expenses incurred from the time the crop is harvested until it is in the hands of the final consumer typically make up the marketing cost. It covers the costs of handling, loading, unloading, storing, weighing, labour, market, and other expenses in addition to transportation and other costs.

$C = C_{mf} + C_{m1} + C_{m2} + C_{m3} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + C_{mi}$

Where,

C =Entire cost of marketing Sorghum

C_{mf}= Cost paid by the producer from the time the product lines the farm till it gets sells

C_{mi} = Cost incurred by the I^{th} middlemen in the process of buying and selling of product

Marketing efficiency

Marketing efficiency (Acharya's Method)

$ME = NP_F / MC + MM$

Where,

NP_F = Net price received by respondents

MC = Marketing cost

MM = Total market margin.

Market margin

This is the total profit that different market intermediaries make on a particular product after subtracting the expenses they incur in processing it.

Price Spread

It is the discrepancy between the net price that the buyer pays and the producer gets paid for producing the same amount of goods. It is made up of marketing margins and costs.

Price Spread = Tc + Tm

Where,

Tc= Total marketing cost

Tm = Total market margin

Producer's Share: It shows the percentage share of producer in the price paid by the consumer.

Ps = Pf / Pc * 100

Where,

Ps = Producer's share in consumer's rupee

Pf = Price of the produce received by a farmer

Pc = Price of the produce paid by the final consumer

Supply Chains

The organisation of all the people, businesses, assets, processes, and technological advancements involved in the creation and marketing of a product is known as a supply chain.

In the research area, three supply networks were discovered. The marketing supply chains listed below were examined.

i. Supply Chain I: Producer-Consumer
ii. Supply Chain II: Producer ------Commission agents ------- Wholesaler ------ Retailer----- Consumer
iii. Supply Chain III: Producer ------ Retailer-------- Consumer

Constraints

The issues that growers encountered when marketing sorghum were gathered. Following a conversation with the respondents who were asked to rate the restrictions, Garret's Ranking Technique was utilised to determine the constraints.

For converting rank into per cent Garrett's formula was given:

Per cent position = 100 * (Rij – 0.5) Nj

Where,

Rij = Rank given for I^{th} factor by J^{th} individual

Nj = Number of factors ranked by J^{th} individual

RESULTS AND DISCUSSION

In Banda district, the study was done on the economics and marketing aspects of Sorghum and identified three supply chains. Among three different Supply Chain, Channel III handled large quantity of produce 41 per cent of 49 farmers followed by Channel I (32 per cent) 39 farmers the channel I involved direct sale of sorghum in the village,and Channel II (27 Per cent) 32 farmers respectively. A lack of knowledge or awareness of the market pricing may be the reason why the majority of farmers and producers decide to sell their produce through Channel III.

Comment [bc7]: It is better to write the description of the data under the tables.

Table 1. Distribution of Farmers/ Producers adopting different Supply Chains

	Farmer's Category				
Supply Chains	**Marginal**	**Small**	**Medium**	**Large**	**Total**
Channel I	18(34.61)	15(42.85)	4(16)	2(25)	39(32)
Channel II	13(25)	7(20)	8(32)	4(50)	32(26.66)
Channel III	21(40.38)	13(37.14)	13(52)	2(25)	49(40.83)
Total	52	35	25	8	120

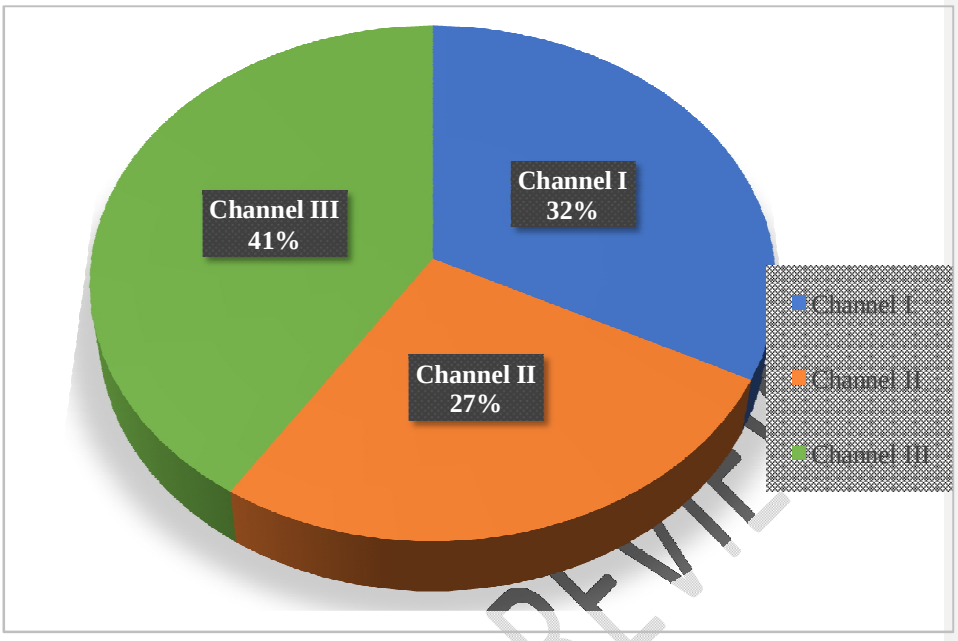

Fig 1. Sale of Sorghum through different Channels

Table 2:Price spread of Channel I, marketing cost, marketing margin, and marketing efficiency

Supply Chain I		Farmer's Category				
S.NO	**Particulars**	**Marginal**	**Small**	**Medium**	**Large**	**All farms**
1.	Consumer's Price	3500	3500	3500	3500	3500
2.	Total Marketing Cost	132.4	132.4	133	132	132.45
3.	Total Marketing Margin	0	0	0	0	0
4.	Net price received by the farmer	3367.3	3367.6	3367	3368	3367.47
5.	Producer's share in Consumer's price (per cent)	96.20	96.21	96.2	96.22	96.21
6.	Price Spread	132.4	132.4	133	132	132.45
7.	**Marketing efficiency (Acharya's method)**	**25.43**	**25.43**	**25.31**	**25.51**	**25.42**

Table 2 showed the producer's portion of the consumer rupee, the farmer's net price, the price spread, and the marketing effectiveness of sorghum in the research area. With a net price received by farmers of Rs. 3367.47/q, a price spread of Rs. 132.45/q, and a producer's share of the consumer price of 96.21 percent, Channel I had an overall marketing efficiency of

25.42. In the case of marginal 25.43, small 25.43, medium 25.31, and large 25.51, the marketing cost was low and the marketing margin sustained by an intermediary in the channel, making it much more efficient than another channel. (Ravekar and others, 2015). had additionally made a contribution to the producer-consumer rupee share, which was largest in channel I.

Table 3: Marketing cost, Marketing margin, Marketing efficiency, and Price Spread of Channel II (Rs./q)

Supply chain II		**Farmer's category**				
S.NO	**Particulars**	**Marginal**	**Small**	**Medium**	**Large**	**All farm**
1.	Consumer's Price	4500	4800	5000	5000	4825
2.	Total Marketing Cost	524	613	554	739.25	607.25
3.	Total Marketing Margin	708.21	848	940.27	895.5	847.99
4.	Net price received by the farmer	3188	3334.3	3527.01	3488	3384.32
5.	**Producer's share in Consumer's price (per cent)**	**70.84**	**69.46**	**70.54**	**69.76**	**70.15**
6.	**Price Spread**	**1232.21**	**1461**	**1494.27**	**1634.75**	**1455.55**
7.	**Marketing efficiency(Acharya's method)**	**2.58**	**2.82**	**2.36**	**2.13**	**2.47**

Table 3 showed the price spread, producer's share of the consumer rupee, farmer's net price, and the marketing effectiveness of sorghum in the research area. It was noted that Channel II was less efficient than other channels, that the number of market intermediaries had increased, and that the channel's marketing margin and cost were the greatest. The overall marketing efficiency in the cases of marginal farmers (2.58), small farmers (2.82), medium farmers (2.36), and large farmers (2.13), is 2.47. The net price obtained by farmers is Rs. 3384.32/q, the price spread is Rs. 1455.55/q, and the producer's share of the consumer's price is 70.15 percent. This study is in partnership with Hile, et al. (2013), who found that the channel I (producer, commission agent, wholesaler, retailer, and customer) had the highest marketing margins for rabi sorghum.

Table 4: Marketing cost, Marketing margin, Marketing Efficiency, and Price Spread of Channel III (Rs./q)

Supply Chain III		Farmer's Category				
S.NO	**Particulars**	**Marginal**	**Small**	**Medium**	**Large**	**All farm**
1.	Consumer's price	4500	4600	4800	4800	4675
2.	Total Marketing Cost	445.72	428	431	403.5	427.05
3.	Total Marketing Margin	780.81	634	681	681	694.20
4.	Net price received by the farmer	3273.47	3538	3688	3685.5	3546.24
5.	Producer's share in Consumer's Price (per cent)	72.74	76.91	76.83	76.78	75.81
6.	Price Spread	1226.53	1062	1112	1084.5	1121.25
7.	**Marketing efficiency (Acharya's method)**	**2.66**	**3.33**	**3.31**	**3.39**	**3.17**

Table 4 revealed the producer's share in consumer rupee, Net price received by farmer, price spread and marketing efficiency of Sorghum on the study area. In Channel III, it was observed that the marketing efficiency of marginal farmers (2.66), Small(3.33), Medium(3.31), and Large(3.39).Overall marketing efficiency is 3.17, price spread is Rs. 1121.25/q , Net price received by the farmer is Rs.3546.24/q, and Producer's share in Consumer's price is 75.81 per cent. Similar work related to present investigation was done by (Kumar *et al.*, 2022).Sidhu *et al.(*2011) also estimated channel wise marketing efficiency of green peas which is comparable to the present study.A few observations on pricing spread, market margin, and marketing costs in various Fig marketing channels were made by Bhosale et al. (2011). In Punjab, Singh et al. (2018) provided some information on the pricing distribution and marketing trends of green fodder. Additionally, Mounika et al. (2020) provided some

statistics on the price spread, market margin, and marketing costs associated with sorghum in various distribution channels.

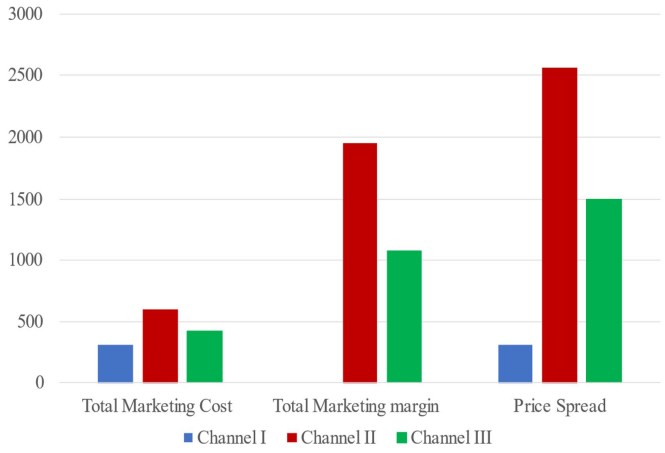

Fig 2 : Marketing cost, Marketing margin and Price Spread of Sorghum under three Supply chains

Constraints in marketing of sorghum

Table 5 Constraints handled by farmer in marketing of Sorghum

Constraints	**Mean score**	**Rank**
Price Fluctuations	29.3	VIII
Malpractice in weighing	32.37	VI
Market Places are far away	70.38	II
A small quantity of Marketable surplus	30.22	VII
Non-availability of Market-related information	72.40	I
Limited buyer'sin Market	63.75	III
Poor transport facility	51.84	IV
High Cost of Transportation	48.7	V

The findings presented in Table 5 illustrate the diverse obstacles encountered by the sorghum cultivators within the research region. According to the study, the main obstacles farmers in the study area face when marketing sorghum are the lack of market-related information (rank I, mean score: 72.40), market locations that are far away (rank II: 70.38), few buyers in the market (rank III: 63.75), poor transport facilities (rank IV: 51.84), high transportation costs (rank V: 48.7), weighing errors (rank VII: 32.37), and price fluctuations (rank VIII: 29.3). The respondents expressed dissatisfaction at the lack of information relevant to the market. The majority of farmers are unable to obtain market information. The reason for this was the involvement of middlemen. Research akin to the current study was conducted on strawberries by Sharma et al. (2022) and bananas by Mungalpara et al. (2017). The main issue with pearl millet marketing was lack of transportation facilities, which was followed by high transportation costs (Tandel et al., 2018).When finger millet was studied for marketing channels and marketing effectiveness in the Kolar area of Karnataka, price fluctuations (56%) and a lack of market intelligence (45%) were found to be the main issues. (Venkatamanaet al., 2015).

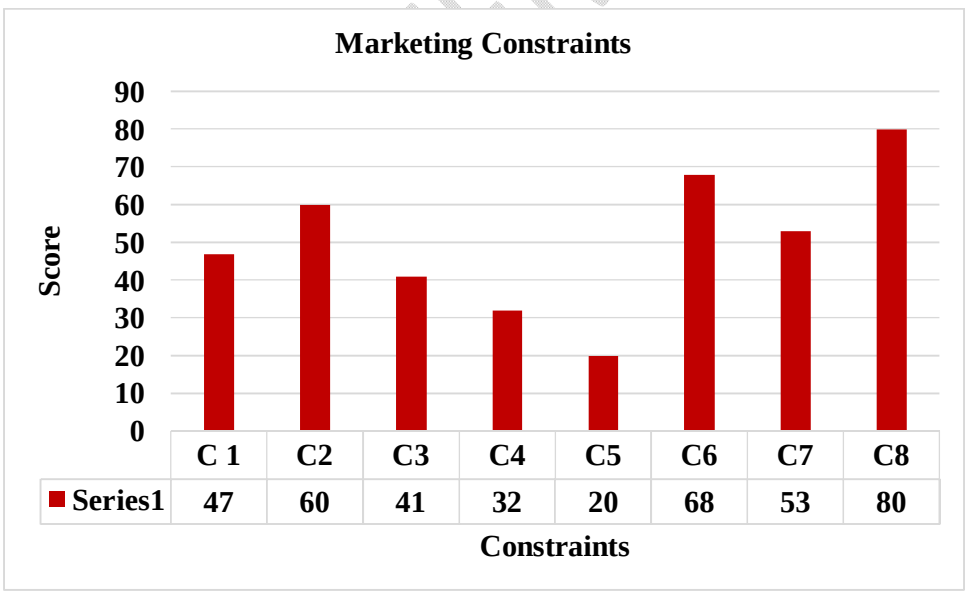

Fig 3: Constraints in marketing of Sorghum

Comment [bc8]: It is better to write the column of graphs from max to min.

CONCLUSIONS

The present investigation was intended to represent the image of Sorghum growers in Banda district of U.P Bundelkhand region. The previous discussion on various aspects of study led to draw the following conclusions.

The study revealed that, there are three Supply chain identified,Out of the three supply chain, Channel I (Producer----Consumer), is more efficient than Channel III (Producer---- Retailer---- Consumer), and Channel II (Producer---- Commission agent---- Wholesaler---- Retailer----Consumer).

In respect of market efficiency, Channel I producer's share in the consumer's rupee was 96.21 per cent , the total marketing margin was zero because there is no middleman involvement, the total marketing cost was Rs.132.52/q, Price Spread was Rs.132.52/q, the Net price received by the farmer was Rs.3367.47 and marketing efficiency was 25.42. The marketing efficiency decreased by increase in number of intermediaries.

In Channel II producer's share in the consumer's rupee was 70.15 per cent , the total marketing margin was Rs. 847.99, the total marketing cost was Rs. 607.56, Price Spread was Rs.1455.55, the Net price received by the farmer was Rs.3384.32/q, and marketing efficiency was 2.47.

The producer's share of the consumer's rupee in Channel III was 75.81 percent; the total marketing cost was 427.05; the price spread was Rs. 1121.25; the net price obtained by the farmer was Rs. 2872.94; and the marketing efficiency was 3.17.

Out of the eight restrictions, the lack of market-related knowledge rank I (with a Garrett score of 72.40) and market locations being far distant rank II (with a Garrett score of 70.38) posed the biggest challenges to farmers selling sorghum. Low number of buyers in the market rank III (Gartner score: 63.75), inadequate transportation infrastructure rank IV (Gartner score: 51.84), and high transportation costs rank V (Gartner score: 48.7) Poor transport facility rank VII (with a Garrett score of 51.84), Price fluctuation rank VIII (with a Garrett score of 29.3), and malpractice in weighing rank VI (with a Garrett score of 32.37).

Comment [bc9]: What are your recommendations for the next researchers? You can added here.

REFERENCES

Comment [bc10]: References should be written on the standard way. You can choose the APA style.

Acharya, SS, and Agarwal N.L. (2011) .Agricultural Marketing in India. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi,pp. 1-506.

Bhosale, M.Y., Shelke, R.D., Aher, V.K. and Shenewad, B.A.,(2011) Marketing cost, market margin and price spread in fig. *Agriculture Update*, *6*(2):42-45.

Hile, R.B., Gulave, C.M. and Namdas, S.C. (2013). Economics of production and marketing of rabi sorghum in western Maharashtra. Agricultural Situation in India. 70(3): 21- 28.

Kumar, M., Bhopale, A.A., Shende, N.V. and Nemade, D.K., (2022). Economic Analysis of Production and Marketing of Maize in Bhilwara District. *PKV Res. J*, *46*, p.65.

Mungalpara, K.U., Viraja, C.V. and Thumar, V.M., (2017). Constraints faced by the banana growers in production and marketing in Bharuch district in South Gujarat. *Trends in Biosciences*, *10*(23):4891-4892.

Mounika, M. and Maurya, M.K., (2020). An Economic Analysis of Sorghum to Estimate Marketing Channels, Marketing Cost, Marketing Margin and Price Spread in Each Channel of Distribution in Kurnool District of Andhra Pradesh. *Ind. J. Pure App. Biosci*, *8*(6):262-266.

Ravekar, S.F., Tayade, P.M. and Jakate, M.M., (2015). Economics and marketing of cauliflower and cabbage in Hingoli District of Marathwada region of Maharashtra state. *International Research Journal of Agricultural Economics and Statistics*, *6*(2):403-409.

Reddy, V.V., Venkataramana, M.N., Swamy, P.D. and Kumar, H.H., (2015). Economic analysis of marketing channels and efficiency of marketing of finger millet (Ragi) in Karnataka. *International Research Journal of Agricultural Economics and Statistics*, *6*(1):27-31.

Sharma, P., Singh, S.P., Dwivedi, S., Bakshi, P., Samanta, A. and Verma, A. (2022). An evaluation of constraints in production and marketing of strawberry in Jammu region of J&K (UT). The Pharma Innovation Journal. 11(7): 4211-4214.

Sidhu, R.S., Sidhu, M.S. and Singh, J.M., (2011). Marketing efficiency of green peas under different supply chains in Punjab. *Agricultural Economics Research Review*, *24*(347-2016-16961):267-274.

Singh, H., Singh, V.P. and Kaur, I., (2018). Marketing Pattern and Price Spread of Green Fodder in Punjab. *Indian Journal of Economics and Development*, *14*(2):267-273.

Tandel, V.B., Thumar, V.M., Singh, N. and Gamit, P.V., (2018). Economics of Marketing and Constraints of Finger Millet in South Gujarat Region. *Indian Journal of Economics and Development*, *14*(1a):180-184.