P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating (2025): 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 11; November 2025; Page No. 553-557

Received: 20-09-2025
Accepted: 23-10-2025

Indexed Journal
Peer Reviewed Journal

# Analysis of marketed surplus and producer's share across different marketing channels in the Zardalu mango supply chain

**[1]Shubham Kumar, [2]Utkarsha Kant, [3]Shambhavi Priyadarshni, [4]Dr. Avinash Kumar, [5]Dr. MK Wadwani, [6]Dr. Saurav Guha, [7]RK Raman and [8]Dr. JN Srivastava**

[1]College of Agri-Business Management, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

[2]College of Agri Business Management, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

[3]College of Agri Business Management, Bihar Agricultural University, Sabour, Bhagalpur, Bihar, India

[4]Assistant Professor-Cum-Jr. Scientist, Department of Agriculture Economics, BAC, Sabour, Bihar, India

[5]University Professor-Cum-Chief Scientist, Department of Agriculture Economics, BAC, Sabour, Bihar, India

[6]Assistant Professor-Cum-Jr. Scientist, Department of SMCA, BAC, Sabour, Bihar, India

[7]Guest Faculty, CABM, Sabour, Bihar, India

[8]Associate Professor-Cum-Sr. Scientist, Department of Pathology, BAC, Sabour, Bihar, India

**DOI:** https://www.doi.org/10.33545/26180723.2025.v8.i11g.2696

**Corresponding Author:** Shubham Kumar

**Abstract**

The marketed surplus and producer's share in consumer rupee (PSCR) for Zardalu mango producers in the Bhagalpur district of Bihar are the subjects of this study. Acharya's formula and descriptive statistics were used to analyze the data that was gathered from 60 producers via structured interviews. The results showed a strong commercial orientation, with over 80% of the total mango output being commercialized across all farm types. At 83.48%, semi-medium farmers had the greatest sold surplus, followed by medium (82.91%), marginal (82.01%), and tiny (81.44%) farmers. According to PSCR research, the largest percentage (73.75%) came from Channel I (Producer → Consumer), which was followed by Channel II (67.90%), Channel III (60.38%), and Channel IV (55.56%). Shorter marketing channels enhance price realization and farmer profitability, according to the results. Price information systems, farmer associations, and direct selling may all increase producer revenue and market efficiency.

**Keywords:** Marketed surplus, producer's share, PSCR, price spread, marketing efficiency, acharya's formula

## 1. Introduction

Mangoes are grown over 2.21 million hectares in India, the world's biggest grower, yielding around 19.51 million tons a year. The Bhagalpur area of Bihar, which is well-known for its GI-tagged Zardalu mango, makes a substantial contribution to this output. The Zardalu cultivar is very commercial, with most of the crop being sold rather than eaten or kept. It is renowned for its intense scent, sweetness, and export potential. However, because of weak market systems, a lack of infrastructure, and the domination of intermediaries, farmers often earn a little portion of the consumer price even in the face of significant sold excess. A crucial economic metric that assesses a farmer's reliance on the market and prospective profitability is marketed surplus. Strong commercial focus and earning potential are reflected in a bigger marketable surplus, according to studies. More than 80% of the Zardalu mango's total output is sold by producers in all farm categories—marginal, small, semi-medium, and medium—demonstrating the fruit's high level of commercialization. However, until the producer receives a fair portion of the consumer price, just having a big marketed surplus does not equate to increased income. The amount of the consumer's final price that goes to the farmer is shown by the Producer's Share in Consumer's Rupee (PSCR). The number of intermediaries, pricing spread, transportation costs, transaction margins, and marketing channel all have a significant role. Channel I (Producer → Consumer) had the greatest PSCR (93.75%), according to the study's results, whereas Channel IV (Producer → Village Trader → Wholesaler → Retailer → Consumer) had the lowest (55.56%). This demonstrates unequivocally that shorter pathways guarantee greater farmer profitability. Therefore, assessing marketed surplus and PSCR is essential to comprehending how well Zardalu mango growers profit from market prospects. Due to its GI-tagged status, the Zardalu mango has special economic potential and may command high prices in both local and international markets. However, owing to a lack of collective marketing structures, insufficient market intelligence, improper grading, packing, cold storage, and weak negotiating power,

small and marginal farmers are often unable to take advantage of these prospects. Due to these restrictions, manufacturers are forced to depend on commission agents or village merchants, who provide quick cash but lower net revenue because of a wider price differential. As a consequence, farmers continue to realize low levels of actual revenue, despite a huge marketed surplus. Therefore, it is essential to comprehend how marketed excess and PSCR are related in order to formulate policies and create effective supply chains. Higher market returns should ideally be obtained by a crop with a significant marketable surplus, but this is only possible when the producer keeps a reasonable portion of the consumer price. Therefore, examining PSCR in conjunction with marketable surplus offers a more comprehensive economic viewpoint, emphasizing both market potential and financial effect.

In this regard, the current research compares the producer's share under various marketing channels and determines the marketable surplus of Zardalu mango across several farm types. The research sheds important light on how, without an attractive, effective, and farmer-centric marketing framework, commercialization by itself does not guarantee profitability.

## 2. Materials and Methods

### 2.1 Sampling and Study Area

The study was conducted in the two mango-dominant blocks of Sabour and Sultanganj in the Bhagalpur district of Bihar. From these blocks, four villages were chosen at random, and 60 mango growers in all were polled using random selection.

### 2.2 Data Collection

An organized and pre-tested schedule was used to conduct in-person interviews in order to gather primary data. Production, family consumption, waste, gifts, marketing costs, selling price, and price achieved at various marketing channels were all factors that were gathered. Government papers, scholarly publications, and other published literature were the sources of secondary data.

### 2.3 Tools for Analysis

#### 2.3.1 Marketable and Marketed Surplus Estimation

The following formula was used to determine marketable surplus:

Total Production − (Family Consumption + Waste + Gifts) = Marketable Surplus

The amount that the producer actually sold was referred to as the "marketed surplus."

#### 2.3.2 Consumer Rupee Producer's Share (PSCR)

The producer's portion of the consumer rupee was estimated using Acharya's formula:

Price Paid by Consumer / Price Received by Producer = PSCR (%) × 100

#### 2.3.3 Analysis of Percentages

The replies of several farmer types were compared using percentage analysis in order to ascertain the return shares and selling trends across channels.

## Review of Literature

Marketed surplus and producer's share in the consumer rupee (PSCR) are two important metrics that show how profitable, marketable, and economically viable an agricultural product is. Mangos are a fruit crop that is very perishable and important to the economy. They need a good marketing system that determines both the volume sold (marketed surplus) and the price realized (producer's share) in order to keep farmers' incomes and the market stable.

Sukmaya & Jakiyah (2021) examined the mango marketing system in Majalengka Regency, Indonesia, emphasizing the correlation between channel structure and the producers' share of the consumer rupee. The research delineated five marketing channels, encompassing direct sales from farmers to consumers and extending to more extensive networks involving distributors, merchants, and collectors. The results showed that longer channels cut producers' share by a lot (22.22%) because they cost more to market, but farmers made the most money (56.52%) from the shortest ways. The authors say that farmers could make more money by relying less on middlemen and improving cold storage facilities.

Singh and Saini (2014) [10] examined the producer's share of the consumer rupee for mango cultivators in Haryana. Their research on different marketing channels found that direct transactions between farmers and consumers increased the producer's share (62.32%), while transactions that involved commission agents and wholesalers decreased it (43.65%) because of extra costs like commissions, market fees, and transportation. The study emphasized infrastructure development, direct connections between farmers and retailers, and enhanced market information systems as key strategies for augmenting farmers' share of the final consumer price.

Chaudhary *et al*. (2012) [1] did a study on how producers' shares change depending on the marketing channel. Their data showed that farmers who sold directly to consumers kept the most of the consumer rupee. When farmers sold to wholesalers, commission agents, or pre-harvest contractors, on the other hand, their marketing costs and the margins of the middlemen went up, which hurt their income. The authors say that promoting farmer cooperatives and direct sales channels could help cut down on the costs of working with middlemen.

Matin *et al*. (2008) [6] studied the mango marketing system in some parts of Bangladesh and found five main channels. These channels ranged from simple routes between farmers, retailers, and consumers to more complicated networks with many middlemen, such as Beparis, Aratdars, and city merchants. Their study found that the shortest channel had the biggest share, at more than 66%, while the longest chains cut the producer's stake to more than 60%. The authors determined that superfluous intermediaries must be eradicated and market infrastructure enhanced to ensure farmers receive a more equitable price.

Dhurandher (2010) [2] conducted a study on banana production and marketing in the Raipur region of Chhattisgarh, identifying two principal marketing channels: Channel I went from Producer to Commission Agent to Retailer to Consumer, while Channel II went from Producer to Wholesaler to Consumer. The study found that farmers

grew an average of 9.08 tons of bananas, but almost none of them were eaten on the farm. Instead, almost 99.7% of the fruit was sold, mostly through Channel I, where commission brokers were very important. The fact that transportation made up the biggest part of marketing costs across all channels shows how important logistics are to the banana industry. The study found that producers got the same selling price in both channels, even though Channel II got rid of the commission agent and retailer, making it shorter, more efficient, and with a smaller price spread. This showed that farmers didn't make any money from having fewer middlemen in Channel II; instead, wholesalers kept the profits, which was good for consumers.

Komarek (2010) [4] examined the determinants affecting the participation of Ugandan banana growers in the market, highlighting the necessity of commercializing a highly perishable commodity such as bananas. The study utilized both a double hurdle model and a Tobit model to analyze household-level survey data gathered from southwest Uganda. The study's main goal was to figure out what factors affect banana farming's ability to be sold, especially since the crop is perishable and important to local communities. The results showed that improving price realization, boosting productivity, and lowering transportation costs were all important factors that could greatly encourage more people to participate in the market.

Gopalakrishnan (2013) wrote about the old-fashioned way of selling mangoes in India. Because of the following chain: Grower → Local Middleman → Commission Agent → Wholesaler → Retailer → Consumer, farmers often got a smaller share of the final price. Yadav *et al*. (2018) [12] performed an economic analysis of mango production in the Lucknow region, considering marketing constraints. The study also found that contract marketing (Grower → Contractor → Wholesaler/Retailer → Consumer) has become more popular as an alternative because it helped lower the risks that come with perishability and prices that don't stay the same. The results showed that the main things that affected farmers' returns were relying on commission agents, not having enough storage space, and losing a lot of money after the harvest. Because of these rules, farmers sometimes had to take lower prices to keep their crops from going bad. The authors suggested that extension services should concentrate on post-harvest handling techniques and that investments should be directed towards cold storage and transportation infrastructure to aid farmers in accessing more lucrative markets and augmenting their share of consumer spending.

Kumar *et al*. (2017) [5] examined the difficulties encountered by mango cultivators in the Saharanpur area of Uttar Pradesh. The main marketing problems were that farmers relied almost entirely on commission brokers, input prices were high, and farm-gate prices were low. Because perishability and a lack of storage space, sales must happen quickly and often under bad conditions. The authors say that setting up processing plants, making it easier to get loans, and offering training that adds value could all help the producer's bargaining power, make them less reliant on middlemen, and in the end, raise their share of the final price.

The literature stresses that even though fruit crops have a lot of extra supply on the market because people don't eat them much at home, this doesn't mean that the producer will make more money until they get a big part of the price that the consumer pays. A good marketing plan that includes cooperative marketing platforms, fair prices, enough cold storage, and shorter pathways can greatly increase farmers' profits. The current research examines the producer's share of the consumer rupee and the marketed surplus for Zardalu mango in the Bhagalpur district of Bihar, utilizing various marketing channels to address the existing information gap.

## 3. Results and Discussion

### 3.1 Marketed Surplus of Zardalu Mango

Marketed surplus refers to the actual quantity of produce sold after deducting family consumption, wastage, and gifts. The study revealed that all producer categories sold more than 80% of their total production**,** highlighting the strong commercial nature of Zardalu mango.

**Table 1:** Marketed Surplus of sample Zardalu mango producers (quintal)

| Category | Average Production (Qt) | Average Consumption (Qt) | Marketable Surplus (%) |
|---|---|---|---|
| Marginal | 8.45 | 1.52 | 6.93 (82.01%) |
| Small | 17.19 | 3.19 | 14.0 (81.44%) |
| Semi-Medium | 25.07 | 4.14 | 20.93 (83.48%) |
| Medium | 58.65 | 10.02 | 48.63 (82.91%) |

Table 1 shows the average production, consumption, and marketed surplus of Zardalu mango for different types of producers. The data shows that the marketed surplus and the marketable surplus are the same because all of the goods had already been sold by the time the data was collected. To get a better idea of how dependent the market is, we calculated the marketed surplus as a percentage of total production. The average production of marginal producers was 8.45 quintals, and they used 1.52 quintals, leaving them with a marketed surplus of 6.93 quintals, which is 82.01% of their total production. Small producers made 17.19 quintals and sold 14.0 quintals, which was 81.44% of what they made. They used 3.19 quintals. Semi-Medium producers sold 20.93 quintals out of 25.07 quintals made, which means they had the highest surplus ratio of 83.48%. Medium producers, who made an average of 58.65 quintals and used 10.02 quintals, sold 48.63 quintals, which is 82.91% of their yield. These results show that Zardalu mango is a very profitable crop on farms of all sizes, with more than 80% of the fruit sold in the market by each type. Semi-medium producers had the most efficient markets, which could be because their production and consumption were in balance. Even though the absolute volume was different, all producer groups showed a strong market orientation. This shows how important Zardalu mango is to the economy and how important it is to improve post-harvest management, storage, and marketing support systems.

### 3.2 Producer's Share in Consumer's Rupee (PSCR)

Producer's share in the consumer rupee refers to the percentage of the final market price that the farmer receives when selling their produce. It is a direct measure of how much benefit the farmer gets in the overall marketing chain.

From the preliminary survey conducted in the study area, it was observed that the marketing of Zardalu mango was done mainly through the following four channels.

Channel I: Producer → Consumer

Channel II: Producer → Retailer → Consumer

Channel III: Producer → Wholesaler → Retailer → Consumer

Channel IV: Producer → Village Trader → Wholesaler → Retailer → Consumer

The channel wise results are presented in the following:

The pricing spread and Producer's Share in Consumer's Rupee (PSCR) study of the four marketing channels shows that producers get different amounts of money back depending on how long the marketing chain is. In Channel I (Producer → Consumer), farmers sell mangoes directly to consumers. After spending Rs 300 on marketing costs like handling, packing, and shipping, they make a net price of Rs 4,500 per quintal. When both the producer selling price and the consumer price are Rs 4,800, the PSCR is at its highest level of 93.75 percent. This shows that direct marketing lets producers keep most of the final price. In Channel II (Producer → Retailer → Consumer), retailers make a net profit of Rs 900 after adding Rs 750 in marketing costs. Producers' net price drops to Rs 4,327 because of Rs 395.23 in marketing costs. The PSCR goes down to 67.90 percent, and the price for consumers goes up to Rs 6,372.23. The producers' net price in Channel III (Producer → Wholesaler → Retailer → Consumer) stays at Rs 4,000 after they pay Rs 525 in marketing costs. Wholesalers and retailers add extra costs and margins, which bring the consumer price to Rs 6,625 and the PSCR to 60.38 percent. The longest chain, Channel IV (Producer → Village Trader → Wholesaler → Retailer → Consumer), has the lowest PSCR at 55.56 percent. Producers still get Rs 4,000, but they also have to pay Rs 650 to market their products. The cost to the customer goes up to Rs 7,200 because of extra costs and profit margins at each level. The results clearly show that as the number of middlemen increases, so do the marketing costs and margins at every level. This makes the price spread wider and lowers the percentage of the final price that goes to the producer.

**Table 2:** Producer's share in consumer's Rupees of Sample Zardalu Mango producers

| S. No | Particulars | Channel I | Channel II | Channel III | Channel IV |
|---|---|---|---|---|---|
| 1 | Net price received by producers | 4500.00 | 4327.00 | 4000.00 | 4000.00 |
| 2 | Marketing cost incurred by producers | 300.00 | 395.23 | 525.00 | 650.00 |
| 2a | Transportation | 150.00 | 200.00 | 250.00 | 300.00 |
| 2b | Packaging | 75.00 | 100.00 | 150.00 | 200.00 |
| 2c | Handling & loading | 75.00 | 95.23 | 125.00 | 150.00 |
| 3 | Producer selling price | 4800.00 | 4722.23 | 4525.00 | 4650.0 |
| 4 | Village trader marketing cost | - | - | - | 165.00 |
| 4a | Transportation | - | - | - | 76.15 |
| 4b | Packaging | - | - | - | 50.77 |
| 4c | Handling & loading | - | - | - | 38.08 |
| 5 | Village trader net margin | - | - | - | 385.00 |
| 6 | Village trader selling price / | - | - | - | 5200.00 |
| 7 | Wholesaler marketing cost | - | - | 180.00 | 270.00 |
| 7a | Transportation | - | - | 85.71 | 124.62 |
| 7b | Packaging | - | - | 51.43 | 83.08 |
| 7c | Handling & loading | - | - | 42.86 | 62.31 |
| 8 | Wholesaler -net margin | - | - | 800.00 | 630.00 |
| 9 | Wholesaler selling price | - | - | 5505.00 | 6100.00 |
| 10 | Retailer marketing cost | - | 750.00 | 120.00 | 330.00 |
| 10a | Transportation | - | 379.53 | 57.14 | 152.31 |
| 10b | Packaging | - | 189.76 | 34.29 | 101.54 |
| 10c | Handling & loading | - | 180.71 | 28.57 | 76.15 |
| 11 | Retailer net margin | - | 900.00 | 1000.00 | 770.00 |
| 12 | Retailer selling price | 4800.00 | 6372.23 | 6625.00 | 7200.00 |
| 13 | PSCR (%) | 93.75% | 67.90% | 60.38% | 55.56% |

## 4. Discussion

### Marketed Surplus

Table 1 clearly shows that Zardalu mango is more valuable than other types of mango in the research area. Statistics show that all categories—marginal, small, semi-medium, and medium—sell more than 80% of their total output on the market. This shows that they are very business-minded. Semi-medium farmers had the biggest marketable surplus percentage, at 83.48%. Next were medium producers (82.91%), marginal producers (82.01%), and tiny producers (81.44%). The data showed that marketed excess equals marketable surplus, which means that almost all of the harvested product had been sold by the time the data was collected. This shows that farms don't use much of what they grow and rely heavily on sales to make money. The economic significance of Zardalu mango cultivation in Bhagalpur is further corroborated by the analogous market conduct exhibited by all producer groups, notwithstanding discrepancies in total output quantities. These results show how important it is to have better cold storage, better handling after harvest, and better marketing support systems to help farmers make the most money and lose the least.

The number of middlemen and the marketing costs that went along with each level were the main things that affected the Producer's Share in Consumer's Rupee (PSCR). This changed a lot between the four marketing channels in Table 2. The results show that Channel I, where producers sold directly to customers, had the highest PSCR (93.75 percent). This got rid of middlemen and cut down on marketing costs. Because of this direct marketing strategy, producers were able to keep the biggest part of the money that the customer paid. On the other hand, the presence of retailers in Channel II caused the PSCR to drop to 67.90 percent because their profit margins and marketing costs cut into the producers' share. The PSCR dropped to 60.38 percent in Channel III, where the drop was more noticeable, because both wholesalers and retailers were involved. The PSCR for Channel IV, which included village merchants, wholesalers, and retailers, was the lowest at 55.56 percent. Intermediate profits and cumulative marketing costs made the price difference in this channel much bigger, which meant that manufacturers got the least amount of the consumer's rupee. These results clearly show that the producer's share goes down as the marketing chain gets longer. This shows that shorter, more direct marketing channels are better for raising producer profitability.

## 5. Conclusion

The study found that Zardalu mangos are a very profitable crop because more than 80% of the total output was sold across all farm types. Semi-medium farms had the biggest marketable surplus, which was 83.48%. But since profits mostly depended on the marketing channel used, a bigger marketed surplus didn't always mean more money. The Producer's Share in Consumer's Rupee (PSCR) changed a lot from one channel to the next. Channel IV (Producer → Village Trader → Wholesaler → Retailer → Consumer) had the lowest PSCR (55.56%), and Channel I (Producer → Consumer) had the highest (93.75%). The findings showed that shorter channels led to higher prices and lower deductions for middlemen. To make farmers more profitable, they need to have more access to markets, be able to sell directly to customers, and depend less on middlemen. For Zardalu mango producers, real economic benefits come from how well their marketing channels work, not just how much they sell.

### Suggestions for Policy

- Encourage sales at the farm gate and direct sales from farmers to consumers.
- Use digital channels to give people the most up-to-date information about market prices.
- Use FPOs and FPCs to encourage aggregation, which will give you more power when negotiating.
- Set a minimum support price or floor price for mangos during the excess season.
- At the village level, set up cold storage and mobile collecting trucks.

### Extent in the Future

- Future studies may use price spread analysis and the cost-benefit ratio to figure out how profitable each channel is.
- A comparison of PSCR between modern digital marketing platforms and older ones.
- Using AI-based prediction tools and pricing forecasts to make economic models for mango marketing.

### Acknowledgment

The Department of Agri-Business Management (BAU, Sabour) helped with technical issues and gave guidance. The authors thank the farmers who answered the survey for giving them information about their production and sales.

### References

1. Chaudhary RK, Singh DK, Kumar S. Economics of production and marketing of mango in Faizabad district of Uttar Pradesh. Indian J Agric Mark. 2012;26(3):118-128.
2. Dhurandher TK. Production and marketing of banana in Raipur district of Chhattisgarh. Raipur: Indira Gandhi Krishi Vishwavidyalaya; 2010. http://krishikosh.egranth.ac.in/handle/1/75105
3. DPR of Mango Zardalu. Detailed Project Report of Zardalu Mango Leather Processing. Indian Institute of Food Processing Technology, Ministry of Food Processing Industries (MOFPI); 2022.
4. Komarek A. The determinants of banana market commercialisation in Western Uganda. Afr J Agric Res. 2010;5(9):775-784.
5. Kumar M, Singh SN, Yadav RR, Doharey RK, Kumar A, Singh DP, Kumar S. Constraints analysis of mango growers in Saharanpur district of Uttar Pradesh. J Pharmacogn Phytochem. 2017;6(2):265-267. https://www.phytojournal.com/archives/2017.v6.i2.1158/constraints-analysis-of-mango-growers-in-saharanpur-district-of-uttar-pradesh
6. Matin MA, Baset MA, Alam QM, Karim MR, Hasan MR. Mango marketing system in selected areas of Bangladesh. Bangladesh J Agric Res. 2008;33(3):427-438.
7. Mehjabeen, Durai AS. Trends in profitability amidst production constraints encountered by smallholder mango growers - A case of India. Asian J Agric Rural Dev. 2020;10(1):336-345. https://doi.org/10.18488/journal.1005/2020.10.1/1005.1.336.345
8. Narasalagi V, Shivashankar K. Analysis of producer's share in consumer's rupee in marketing of selected vegetables through different supply chains. Int J Agric Mark. 2020 Aug. https://www.researchgate.net/publication/343905892
9. NHB. National Horticulture Board Mango report. New Delhi: NHB; 2024. https://nhb.gov.in/report_files/mango/mango.htm
10. Singh S, Saini GS. An analysis of producer's share in consumer rupee for mango in Haryana. Agric Econ Res Rev. 2014;27(2):273-280.
11. Teka Y, Malin H, Oljira A. Analysis of factors affecting mango market supply in Gomma District, Southwest Ethiopia. Agric Socio-Econ J. 2019;19(3):181-190. http://dx.doi.org/10.21776/ub.agrise.2019.019.3.7
12. Yadav S, Shukla A, Rai J, Mishra R. Economics of production and marketing of mango in district Lucknow (U.P.). J Pharmacogn Phytochem. 2018;7(3):1398-1402. https://www.phytojournal.com/archives/2018.v7.i3.4376/economics-of-mango-production-and-constraints-in-district-lucknow-up