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RESEARCH ARTICLE

Marketing efficiency and channel dynamics of tribal turmeric FPOs in Andhra Pradesh

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Abstract

The present study was carried out in the Alluri Sitharama Raju (ASR) district of Andhra Pradesh during 2022–2024. A purposive sampling method was employed to select 15 Farmer Producer Organizations (FPOs) engaged in turmeric value addition. From each FPO, five respondents were randomly chosen, along with five officials, resulting in a total sample size of 80. Acharya's modified method was applied to evaluate the efficiency of the identified marketing channels. The study identified four major marketing channels. The Producer -Consumer channel, though utilized by only 5 % of participants, recorded the highest producer share (67.4 %) and highest marketing efficiency (2.07) due to the direct sale mechanism. Conversely, the Village Trader-Wholesaler-Retailer-Consumer channel, which had the highest adoption rate (65 %), exhibited the lowest efficiency of 0.21, indicating significant intermediary margins and reduced returns for farmers. The FPO-led channel showed moderate efficiency, ranging from 0.26 to 1.18, suggesting that with stronger institutional support from Dr YSRH University, ITDA, ANGRAU and line departments could provide more balanced benefits. The GCC-based cooperative channel, primarily followed in tribal areas, demonstrated efficiency values between 0.33 and 0.56. This indicates that while the channel is cost-effective, it offers limited potential for value addition. This evidence-based analysis offers a clearer understanding of the income potential and efficiency across marketing channels, while highlighting the practical factors influencing farmers' choices. Turmeric marketing is crucial for enhancing farm income, reducing post-harvest losses and improving value chain efficiency, especially in key producing regions like ASR district. Strengthening marketing systems supports the livelihoods of small and tribal farmers, promotes rural entrepreneurship and ensures better price realization. The study provides essential insights for stakeholders, including farmers, FPOs and policymakers to identify and strengthen appropriate marketing strategies for turmeric.

Keywords: farmer producer organization; market; tribals; turmeric; value addition

Introduction

India's turmeric cultivation during the 2023-24 season covered approximately 3.05 lakh hectares, yielding a total production of 10.54 lakh tonnes, with an average productivity of 3656 kg/ha (1). In Andhra Pradesh, turmeric continues to play a crucial role in supporting the livelihoods of numerous small and marginal farmers, particularly in key districts such as ASR, Krishna, YSR, Bapatla and Guntur. During the same period (2023-24), the state reported a cultivated area of 22.37 thousand hectares, producing 38.03 thousand tonnes of turmeric, resulting in a productivity of 1.7 MT/ha. However, this marked a decline in area by 11.05 thousand hectares compared to the 33.42 thousand hectares recorded in the previous year (2022-23). These fluctuations reflect the significant inter-annual variations in acreage, production, productivity and market trends observed over time, influenced by climatic conditions, market dynamics and shifts in cropping decisions. A study conducted on analyzing India's turmeric production from 1950 to 2020 years reported that compound annual growth rates of 2.60 % (area), 4.02 % (production) and 1.40 % (productivity) (2). While some progressive farmers have embraced superior turmeric varieties *viz.,* IISR Kedaram, IISR Pragati, IISR Prabha, IISR Prathibha, IISR Alleppey Supreme, IISR Suguna and IISR Sudharsana and enhanced agronomic techniques *viz.,* optimizing land preparation, rhizome selection and treatment, planting methods, irrigation, nutrient management and pest & disease control, resulting in higher yields and profits, numerous traditional growers still adhere to traditional practices, which leads to diminished productivity (3). Remarkably, turmeric cultivated in the key growing region of Andhra Pradesh, particularly in the tribal-dominated ASR district is renowned for its superior quality, characterized by high curcumin content ranging from 5.8 % to 6.0 % and a distinctive, pleasant aroma according to Times of India reported in 2025. The region's cooler climatic conditions

contribute significantly to these desirable attributes, enhancing both the therapeutic and market value of the crop. In the ASR district, farmers continue to cultivate traditional turmeric varieties that typically produce lower yields compared to improved ones, primarily because these landraces are renowned for their high curcumin content and rich aroma. Despite their susceptibility to pests and diseases and longer maturity durations, which increase their exposure to environmental stress, farmers favor them due to the premium prices they fetch in niche markets for their superior quality. Moreover, a deep-rooted familiarity and cultural preference for these varieties, along with limited access to improved seeds and scientific practices, make farmers hesitant to adopt newer, high-yielding alternatives.

In the state of Andhra Pradesh, the primary districts for turmeric cultivation include ASR (8461 ha), Krishna (2012 ha), Bapatla (1276 ha), Guntur (1263 ha) and 1668 ha in YSR district (4). The ASR district has been specifically chosen for study since 82.67 % of its population belongs to scheduled tribes, according to the 2011 Census. Organic turmeric is a primary crop grown by tribal farmers in the agency area of the ASR District, rendering turmeric an important agricultural product in this locality. The objective of the paper is to analyse the marketing channel efficiency in tribal FPOs in processing and value addition of organic turmeric.

Marketing channels are essential for the success and sustainability of FPOs, especially in improving farmers' income and access to markets (5). Effective marketing channels enable FPOs to consolidate produce, lessen reliance on intermediaries (6) and secure better prices for member farmers. By optimizing the flow of goods from producers to consumers, these channels promote timely sales, reduce post-harvest losses and allow for value addition through branding, processing and packaging (7). For smallholder and tribal farmers, who frequently encounter market marginalization, the well-established marketing connections via FPOs act as a significant means of integrating into formal supply chains (8). Moreover, diverse marketing channels such as direct marketing, institutional purchasers and electronic markets can strengthen the bargaining power of FPOs. These channels also help reduce transaction costs and promote entrepreneurship within farmer collectives (9). Therefore, marketing channels are not just routes for the movement of produce; they are strategic facilitators for achieving economic viability, empowerment and the growth of FPOs in rural India (10). The study identified various marketing channels in the area and analysed their associated costs and marketing efficiency.

Materials and Methods

Ex post facto research design is used in the study. Since Andhra Pradesh is one of the major states in India that produces turmeric, it was chosen for this study. Tribes in Andhra Pradesh's ASR district were purposively selected due to their cultivation of organic turmeric. Data collection was conducted in 2022-24 from tribal turmeric FPOs with a structured interview schedule. In 2023-2024, survey data collected from the ASR District Horticulture Department and Integrated Tribal Development Agency data base, reported a total of 59 FPOs in the district, of which 25 (42 %) were turmeric-based. Out of them, 15 FPOs that engage in value addition were chosen for the study by purposive sampling. A total of 75 respondents from 15 FPOs and 5 officials were selected using random sampling, making a total sample size of 80. The study includes primary data from a survey and secondary data from official sources *i.e.* Horticulture Research Station, Chintapalli; Spice Board Field Office, District Horticulture Department and Integrated Tribal Development Agency (ITDA), Paderu. The analytical tools used in this study are detailed below.

Marketing cost concepts

Marketing cost

The overall expenses associated with marketing, whether in monetary form or through other means, incurred by the producer and various intermediaries involved in the distribution of the produce until they reach the final consumer. The calculation was performed with Eqn 1 as follows:

$$C = C_f + C_{m1} + C_{m2} + \ldots + C_{mi} + \ldots + C_{mn} \quad \text{(Eqn. 1)}$$

Where,

C = Total cost of marketing of the commodity

C_f = Cost incurred by the farmer

C_{mi} = Costs associated with the ith middleman

i = ranges from 1 to n

Marketing margin

This represents the difference between the aggregate payments (Cost + Purchase Price) and the revenue (Sale Price) of the intermediaries. The computation was carried with Eqn 2 as follows.

$$\text{Marketing margin of the } i^{th} \text{ middleman} = P_{ri} - (P_{pi} + C_{mi}) \quad \text{(Eqn. 2)}$$

Where,

P_{ri} =Sale price of the i^{th} middleman

P_{pi} = Purchase price of i^{th} middleman

C_{mi} = Cost incurred by the i^{th} middleman on marketing

Price spread

This term denotes the difference between the amount consumers pay and the net revenue received by the farmer. It illustrates the gap between the final price paid by consumers and the price obtained by farmers. An increased price spread typically signifies reduced marketing efficiency, as a greater share of the consumer's expenditure is allocated to intermediaries instead of the farmer. The price spread is calculated with given Eqn 3 as follows.

$$PS = RP - PNP \quad \text{(Eqn. 3)}$$

Where,

PS = Price Spread

RP = Retailers Selling price

PNP = Producers (farmer) Net Price

Producer's share in consumer's price

Illustrates the fraction of the total price that the consumer pays which is allocated to the producer (farmer). It is worked

out by Eqn 4 employing the formula suggested by (11) as follows:

$$Ps = (Pf / Pr)*100 \quad \text{(Eqn. 4)}$$

Where,

Ps = Producer's share in consumer's price

Pf = Net Price received by the farmer

Pr = Retail price

Marketing efficiency

The calculation of marketing efficiency has been performed using the Eqn 5 modified marketing efficiency approach proposed (11). An increase in the ratio denotes improved marketing efficiency, while a reduction implies the diminished efficiency.

The Acharya's Modified Marketing Efficiency (MME) is computed as follows:

$$MME = NPF / (MC + MM) \quad \text{(Eqn. 5)}$$

Where,

MME = Modified Marketing Efficiency

NPF = Net Price Received by the farmer

MC = Total Marketing Cost

MM = Total Market*ing Margin*

Statistical analysis

The data were statistically analysed with the above mentioned marketing costs and efficiency formulas using MS Excel. Weighted score analysis of the factors influencing selection of marketing channels was analysed with SPSS software and interpreted accordingly.

Results and Discussion

Marketing channels are structured pathways that facilitate the flow of agricultural products from producers to consumers (12). These pathways involve multiple intermediaries (13) such as village traders, FPOs, wholesalers, retailers and government agencies like Girijan Cooperative Corporation Ltd (GCC) each playing a vital role in the stages of procurement, aggregation, transportation, processing, storage and sale of the produce (14). *Based on FPO membership and active participation, farmers in the study area follow four marketing channels.*

The Major Marketing Channels identified in the present study are:

Channel I- Producer-Consumer (P-C)

Channel II: Producer-Village Traders- Wholesaler- Retailer-Consumer (P-V-W-R-C)

Channel III: Producer-FPO-Wholesaler-Retailer-Consumer (P-FPO-W-R-C)

Channel IV: Producer-Govt procurement agency (GCC)-Consumer (P-GCC-C)

Analysis of marketing efficiency across FPO marketing channels

In the turmeric value chain, farmers in the study area market three product forms: unpolished fingers, polished fingers and turmeric powder. This study aims to evaluate the marketing efficiency of different channels utilized by FPOs, with a particular focus on the predominant product form marketed within each channel. In Channel I (Producer-Consumer), the majority of farmers sell turmeric in powdered form, targeting local markets, daily village shandies, tourist outlets and personal buyers. In Channels II and III (involving village traders and FPO-wholesaler-retailer chains respectively), the products are marketed in both unpolished and powdered forms, reflecting semi-processed and value-added forms through multiple intermediaries. In Channel IV (Producer-GCC-Consumer) Andhra Pradesh Girijan Cooperative Corporation Ltd (GCC) primarily procures unprocessed raw turmeric, either in unpolished or polished finger form, for onward sale through cooperative networks. This classification of product forms by channel is critical to the study, as it directly influences marketing costs, margins, value addition opportunities and ultimately the marketing efficiency of each channel.

Channel I: Producer-Consumer (P-C) channel

It is a direct marketing pathway where tribal farmers, often organized under FPOs, sell their produce directly to end consumers without involving conventional intermediaries (15) such as traders, wholesalers, or retailers. In tribal areas, this channel is typically adopted in localized contexts such as daily local shandis, tourist destinations, direct-to-home delivery or personal contact sales. The ASR district serves as a tourist attraction area where farmers select specific locations to market their products in a value-added form. A glance at data (Table 1) shows that in this channel, the price paid by the consumer (Rs. 415/kg) is fully received by the farmer, with no leakage to middlemen, making the system completely transparent. After incurring marketing cost of Rs. 135/kg which includes expenses for polishing, grinding, transportation, packaging and market setup, the net price realized by the farmer is Rs. 280/kg. This result in a price spread of Rs. 135, entirely attributed to the farmer's own marketing efforts. With a producer's share in the consumer price at 67.4 %, it is the highest among all channels analysed. The marketing efficiency, as calculated by Acharya's method, stands at 2.07, indicating that for every rupee spent on marketing, the farmer earns Rs 2.07. This reflects a highly efficient and profitable channel for the farmer (16). The study results are similar to the findings of one systematic study where in the direct marketing is more efficient than any other channels (17).

Table 1. Marketing costs and efficiency in channel I

Cost item	Amount (Rs./kg) Turmeric (Powder form)
Net price received by farmer	280
Marketing cost incurred by farmer	135
Price received by farmer	415
Price paid by consumers	415
Total marketing cost	135
Total market margin	-
Price spread	135
Producers share in consumers price	67.4
Acharya's Modified Marketing Efficiency	2.07

Source: Primary survey data (2023-2024), compiled by the authors

Channel II: Producer-Village Traders- Wholesaler- Retailer-Consumer (P-V-W-R-C)

In this channel, farmers sell their produce often in unpolished or powder form at the village level to local traders (18), who then transfer it through a series of intermediaries, including wholesalers and retailers, before it reaches the final consumer. Since the village trader collects the produce directly from farmers at their doorstep, the farmers do not incur any marketing costs. The data depicted (Table 2) showed that price received by the farmer is significantly lower compared to the final price paid by the consumer, leading to a reduced producer share (as low as 17.3 % in unpolished fingers) and high price spread. The marketing efficiency of this channel is also the lowest (0.21) among all channels analysed, indicating a poor return for every rupee spent on marketing (19). Similar findings on inter-channel comparison of price spread in cereal crops were reported (20).

Table 2. Marketing costs and efficiency in channel II

Cost item	Amount (Rs./kg)	
	Unpolished fingers	Powder form
Net price received by farmer	80	250
Marketing cost incurred by farmer	-	-
Price received by farmer	80	250
Price paid by village trader	80	250
Marketing cost incurred by village trader	40	25
Margin of village trader	24	13
Price paid by wholesalers	144	288
Marketing cost incurred by wholesalers	28	14
Margin of wholesaler	28	28
Price paid by retailers	200	330
Marketing cost incurred by retailers	160	65
Margin of retailers	100	65
Price paid by consumers	460	460
Total marketing cost	228	105
Total market margin	152	106
Price spread	380	210
Producers share in consumers price	17.3	54.3
Acharya's Modified Marketing Efficiency	0.21	1.18

Source: Primary survey data (2023-2024), compiled by the authors

Channel III: Producer-FPO-Wholesaler-Retailer-Consumer (P-FPO-W-R-C)

The Producer-FPO-Wholesaler-Retailer-Consumer (P-FPO-W-R-C) channel represents a structured marketing channel that leverages the collective strength of FPOs to improve farmers' access to markets and their share in the consumer price. The economics of this channel (Table 3) shows that, the producer's share in the consumer price in this channel ranges from 20.8 % to 54.1 %, depending on the efficiency of the FPO and the form of the product. The marketing efficiency varies accordingly, with Acharya's index ranging from 0.26 to 1.18, reflecting moderate to good efficiency. In this system, individual farmers supply their produce usually in turmeric powder or unpolished form to the FPO, which acts as an aggregator and intermediary. The FPO then processes, grades, packages and negotiates bulk sales with wholesalers, who in turn sell to retailers before the product reaches the final consumer (21). This channel offers several advantages over traditional trader-based systems. By aggregating produce, FPOs enhance bargaining power, achieve economies of scale and ensure better price realization for farmers (22). In many cases, FPOs also provide post-harvest services, quality control and branding, which help in fetching higher prices in the market. According to a study (23) approximately 75 % of farmers concurred that cooperative marketing is a viable option, owing to the interdependence and reliance among farmers. Moreover studies conducted on various aspects of marketing channels in different crops revealed similar findings (24).

Table 3. Marketing costs and efficiency in channel III

Cost item	Amount (Rs./kg)	
	Unpolished fingers	Powder form
Net price received by farmer	100	260
Marketing cost incurred by farmer	10	10
Price received by farmer	110	270
Price paid by FPO	110	270
Marketing cost incurred by FPO	44	27
Margin of FPO	22	14
Price paid by wholesalers	176	310
Marketing cost incurred by wholesalers	35	16
Margin of wholesaler	19	32
Price paid by retailers	230	358
Marketing cost incurred by retailers	160	72
Margin of retailers	90	50
Price paid by consumers	480	480
Total marketing cost	249	125
Total market margin	131	96
Price spread	380	220
Producers share in consumers price	20.8	54.1
Acharya's Modified Marketing Efficiency	0.26	1.18

Source: Primary survey data (2023-2024), compiled by the authors

Channel IV: Producer-GCC-Consumer (P-GCC-C) channel

This channel represents a government-facilitated procurement and marketing system that primarily operates functioning in tribal and remote regions. In this model, tribal or smallholder farmers supply their produce mostly in unprocessed or semi-processed forms such as unpolished or polished turmeric fingers directly to the Girijan Cooperative Corporation (GCC). GCC serves as a single-point aggregator and marketer, responsible for procurement, processing and eventual distribution to consumers either through government-run retail outlets, exhibitions, or public supply chains. It gives a Minimum Support Price to the farmers and purchases the produce. The computations (Table 4) illustrated that the total marketing cost is relatively low, *i.e.* Rs 120 for unpolished and Rs 90 for polished reflecting the cooperative's streamlined handling process and no involvement of private intermediaries. However, despite the low marketing cost, the total market margin remains fixed at Rs 90 for both polished and unpolished forms, indicating limited value addition or pricing flexibility in this channel. The price spread is Rs 210 for unpolished and Rs 180 for polished turmeric. This indicates

Table 4. Marketing costs and efficiency in channel IV

Cost item	Amount (Rs./kg)	
	Unpolished fingers	Polished fingers
Net price received by farmer	70	100
Marketing cost incurred by farmer	10	10
Price received by farmer	80	110
Marketing cost incurred by GCC	110	80
Margin of GCC	90	90
Price paid by consumers	280	280
Total marketing cost	120	90
Total market margin	90	90
Price spread	210	180
Producers share in consumers price	25	35.7
Acharya's Modified Marketing Efficiency	0.33	0.56

Source: Primary survey data (2023-2024), compiled by the authors

that while the marketing chain is short, farmers still receive only a modest portion of the final consumer price. The producer's share stands at 25 % for unpolished and 35.7 % for polished fingers. Acharya's Modified Marketing Efficiency ranges from 0.33 to 0.56 in this channel.

Comparative analysis of marketing channels

The analysis of marketing channels reveals significant variation in terms of different parameters (25). The comparative analysis of tribal based turmeric marketing channels (Table 5) reveals significant variation in their adoption (26), marketing efficiency (27) and benefits to farmers (28). The channel I (Producer-Consumer), though adopted by only 5 %, offers the highest producer share (67.4 %) and excellent efficiency (2.07) due to direct sales, but its adoption remains limited due to infrastructure and logistical challenges. In contrast, the channel II, Village trader involved is the most widely used (65 %), driven by ease and immediate cash returns, yet it is the least efficient (0.21) with a high price spread (Rs 380) and low producer share, indicating significant intermediary margins. The FPO-led channel, adopted by 15 %, presents a balanced model with moderate to high producer shares (20.8-54.1 %) and variable efficiency (0.26-1.18), reflecting its potential if supported with better management and market linkages. The GCC channel, also at 15 % adoption, is moderately efficient (0.33-0.56), offering assured procurement and fair pricing for tribal and remote farmers.

Further, the choice of marketing channels by the farmers is influenced by different factors such as market accessibility, price realization, transaction costs, trust in intermediaries and availability of institutional support (29). These factors determine the extent, to which farmers can access markets and realize fair prices to their produce. The factors influencing the selection of marketing channels by farmers and FPOs, using a structured scoring system using a 1 to 5 scale, where 1 = Very Low Influence; 2 = Low Influence; 3 = Moderate Influence; 4 = High Influence and 5 = Very High Influence. The scoring and weighted score analysis is detailed (Table 6).

Table 6 presents the weighted score analysis of the factors influencing selection of marketing channels. The scores combining reasons for channel selection and adoption percentages reveals that the channel II (Village Trader - Wholesaler - Retailer - Consumer channel), despite offering the least benefit to farmers in terms of income and marketing efficiency, remains the most influential and widely adopted marketing channel (65 % adoption; weighted score: 25.35). This dominance is driven by strong field-level realities such as immediate cash requirement of tribes, lack of post-harvest infrastructure, lack of storage, lack of transport facilities, limited awareness on alternative channels and most importantly convenience of doorstep procurement. In contrast, more beneficial channels like FPO-based marketing (weighted score: 7.65) and GCC-supported systems (weighted score: 7.20) are underutilized due to operational, institutional and geographic limitations. The Producer-Consumer direct marketing channel, though the most efficient (producer share: 67.4 %, efficiency: 2.07), scores the lowest in weighted impact (1.70) due to minimal adoption (5 %), largely attributed to logistical challenges and market access issues.

Table 6. Factors influencing the selection of marketing channels

Influencing Factors	Channel I	Channel II	Channel III	Channel IV
Higher income realization	5	2	4	3
Immediate cash requirement	2	5	3	3
No need for transport/ storage	2	5	3	4
Ease and convenience	2	5	3	4
Price control	5	1	3	2
Market proximity	4	5	3	3
Collective bargaining	1	1	5	3
Training/support services	1	1	5	3
Trust in system	2	3	4	5
Government price support	1	1	2	5
Availability of infrastructure	3	2	4	3
Lack of awareness of alternatives	1	5	3	3
Risk of exploitation	4	2	4	4
Membership requirement	1	1	5	3
Total Score	**34**	**39**	**51**	**48**
Adoption %	**5 %**	**65 %**	**15 %**	**15 %**
Weighted Score	**1.70**	**25.35**	**7.65**	**7.20**
Rank	**IV**	**I**	**II**	**III**

Source: Primary survey data (2023-2024), compiled by the authors

Conclusion

This study examined the marketing efficiency and selection behaviour across different turmeric marketing channels used by tribal FPOs, particularly in the ASR district. Channel II, which involves village traders, is the most prevalent, with a 65 % adoption rate, primarily due to its convenience and immediate cash returns. A weighted score analysis, integrating both the adoption and reasons for selection showed that channel II remains the most influential and widely adopted marketing channel in the tribal regions. The findings outlined comparative efficiencies and farmer benefits. The results have significant relevance for improving market access, guiding FPO interventions and informing policymakers on where to invest in infrastructure and institutional support to enhance value addition and reduce transaction costs. Overall, the analysis highlights a disconnect between economic efficiency and actual farmer behaviour, indicating the urgent need for strengthening of FPOs, infrastructure development intensive awareness

Table 5. Cross comparison of turmeric marketing channels

Channel number	Adoption %	Producer Share %	Price Spread (Rs)	Efficiency	Inference
Channel I	5 %	67.4 %	135	2.07	High benefit, low adoption due to infra/ logistics
Channel II	65 %	17.3-54.3 %	220-380	0.21-1.18	Most common, least efficient
Channel III	15 %	20.8-54.1 %	220-380	0.26-1.18	Balanced returns, needs strengthening
Channel IV	15 %	25-35.7 %	180-210	0.33-0.56	Minimum price, cost-effective

Source: Primary survey data (2023-2024), compiled by the authors

campaigns and e-marketing strategies to shift farmers from intermediary-driven to farmer-centric channels.

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Authors' contributions

The study was conceptualized by BH, MSM. Methodology was designed by YS, HRS, VSGRN. Results were validated by CHB, VJ and LKP. Investigation was done by BH, SUR and CHB. Required resources were collected by BH and CHB. Manuscript was written by HB. Visualization was done by HB and LKP. The research was supervised by MSM. Funding acquisition was done by ICAR-NIRCA. All authors have read and agreed to the published version of the manuscript.

Compliance with ethical standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

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