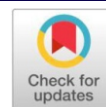


Original Research Article

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Tribal Farmer Producer Organizations Constraints in Turmeric Value Addition



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ABSTRACT

The present study was conducted in Alluri Sitharamaraju district of Andhra Pradesh during 2023-24. Purposive sampling was used to choose 15 FPOs that participated in value addition for the study. Random sampling technique is used in the selection of five respondents each from 15 FPOs and 5 officials making up the total sample size of 80. To ascertain the constraints, Kruskal-Wallis one-way analysis of variance for independent samples and Friedman's test for related samples were used. Five different dimensions of constraints viz., personal, operational, infrastructural, economic and marketing were identified. Kruskal-Wallis one-way ANOVA non-parametric test (Chi-Square = 39.12, df = 4, $p < 0.05$) revealed that the level of influence of different constraints have differed significantly. The mean ranks were determined and grouped based on the ascribed rank of the statements by the respondents. The study concluded that marketing limitations (Mean Rank of 46.17) followed by infrastructural constraints with a mean rank of 42.36 are the major obstacles. Further analysis of the each group of the inhibiting factors was identified using the non-parametric Friedman's test revealed that social norms of members in joining FPOs, land alienation, adoption of local varieties, less know-how on recommended practices, lack of drying yards, lack of package machinery, contract-based agreements, poor access to institutional credit, side selling of farmers are the severe constraints. The study faced few challenges that the selected tribal communities possess entrenched cultural beliefs, which resulted in a reluctance to share information with those outside their group. Additionally, geographical isolation and insufficient infrastructure complicated data collection efforts.

Keywords: Constraints, Farmers, FPO, Infrastructure, Market, Middlemen, Net returns, Tribals, Turmeric, Value addition

INTRODUCTION

Turmeric, popularly known as Indian saffron is one of the most important spice crops known for its culinary, industrial and medicinal use in India since time immemorial. India is the leading country with 80% of global production, followed by China (8%), Myanmar (4%), Nigeria (3%) and 3% by Bangladesh (AMIC, 2024). India is home to more than 30 varieties of turmeric grown in over 20 states in the country. The largest producing states of Turmeric are Maharashtra, Telangana, Karnataka, Tamil Nadu, Madhya Pradesh, Andhra Pradesh, Orissa, West Bengal, etc. In the year 2022-23, an area of 3.24 lakh ha was under turmeric cultivation in India with a production of 11.3 lakh tonnes (DES, 2023). India accounts for almost 62% of the global turmeric trade. Over 380 exporters exported 1.53 lakh tonnes of turmeric and turmeric-related products in 2022-2023, valued at 207.45 million USD. India's top export destinations for turmeric are Bangladesh, the United

Arab Emirates, the United States, and Malaysia (PIB, 2023).

Andhra Pradesh is one of the major turmeric-growing states in India. It produces 10% of the total turmeric produced in the country. In Andhra Pradesh, turmeric is cultivated in 0.17 lakh ha with a production of 3.68 lakh tonnes during 2022-23 final estimates (DES-AP, 2023). In Andhra Pradesh, the major turmeric growing are Alluri Sitharamaraju (8461 ha), Krishna (2012 ha), Bapatla (1276 ha), Guntur (1263 ha) and YSR (1668 ha) districts (e-panta, 2024). Alluri Sitharama Raju (ASR) district of AP is deliberately selected as 82.67% (Census, 2011) of the population of the district are scheduled Tribes only. One of the main crops grown by tribal farmers in the ASR District's agency area is organic turmeric. Turmeric is one of the major agricultural commodities in this region. The objective of the paper is to analyse the challenges faced by the tribal farmer producer organizations in processing and value addition of organic turmeric.

METHODOLOGY

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 are purposefully chosen because they grow organic turmeric. Data collection was conducted in 2023-24 from tribal turmeric Farmer Producer Organizations with a

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structured interview schedule. In 2023-2024, the ASR District Horticulture Department reported that there were 59 FPOs in total, with 25 (42%) of those being based on turmeric. 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 in which random sampling procedure is used for sample selection, accounting to 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. Statistical analysis used for the study was Kruskal-Wallis one-way analysis of variance for independent samples and Friedman's test for related samples.

Kruskal-Wallis one-way analysis of variance for independent samples

It is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are independent or not related. The parametric equivalence of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA). The factual null hypothesis is that the population from which the samples originate has the same median. When the Kruskal-Wallis test leads to significant results, then at least one of the samples is different from the other samples. It is an extension of the Mann-Whitney U test for comparing 3 or more groups. The test statistic (for large sample) is

$$K = \frac{12}{N(N+1)} \sum_{i=1}^g \left(\frac{\sum_{j=1}^{n_i} r_{ij}}{n_i} - \frac{N+1}{2} \right)^2$$

which follows a χ^2 distribution with $(g-1)$ degrees of

freedom, where g is the number of groups n_i is the number of observations in i^{th} group, r_{ij} is the rank (among all observations) of j^{th} observation from group i and N is the total number of observations across all groups.

Friedman's test for related samples

It is a non-parametric statistical test for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are related. When Friedman's test leads to significant results, then at least one of the samples is different from the other samples. The test statistic is given by

$$Q = \frac{SS_k}{SS_e} \chi^2_{(k-1)},$$

where k is the number of related groups,

$$SS_k = n \sum_{j=1}^k \left(\frac{\sum_{i=1}^n r_{ij}}{n} - \frac{\sum_{i=1}^n \sum_{j=1}^k r_{ij}}{nk} \right)^2 \text{ and } SS_e = \frac{1}{n(k-1)} \sum_{i=1}^n \sum_{j=1}^k \left(r_{ij} - \frac{\sum_{j=1}^k r_{ij}}{k} \right)^2$$

r_{ij} represents the rank of j^{th} observation from group i .

RESULTS AND DISCUSSION

Tribal Farmer Producer Organizations confront unique limitations in processing and value addition of turmeric due to cultural, geographic, and socio-economic obstacles. These limitations affect their capacity to efficiently process, brand, and market the produce.

Constraints of tribal turmeric FPOs in value addition

Five different dimensions of constraints *viz.*, personal, operational, infrastructural, economic and marketing were identified. Under each category, five statements were finally selected for the construction of 5 5-point summated rating scale. Kruskal-Wallis one-way ANOVA non-parametric test (Chi-Square = 39.12, $df = 4$, $p < 0.05$) revealed that the level of influence of different constraints have differed significantly. The mean ranks were determined and grouped based on the ascribed rank of the statements by the respondents. Heterogeneity in perception is shown by mean ranks with distinct letters (A, B, C, and D), which differed significantly.

Table 1: Constraints based on mean ranks as per Kruskal-Wallis test (N=80)

Constraints	Mean Rank	Groups			
Marketing constraints	46.17	A			
Infrastructural constraints	42.36	A			
Economic constraints	39.87		B		
Personal constraints	23.18			C	
Operational constraints	12.31				D

The capacity of Tribal Farmer Producer Organizations (FPOs) to raise farmer income and encourage value addition is hampered by numerous obstacles that limit their expansion and sustainability. Perusal of the table 1 showed that marketing limitations (mean rank 46.17) are the major obstacles. Tiwari *et al.*, (2021) highlighted that marketing challenges expressed by Udaipur FPOs of Rajasthan were severely inhibited the organization's growth. It is followed by infrastructural constraints with mean rank of 42.36. Additionally, limited access to financing (mean rank 39.87), personal limitations (mean rank 23.18) and lack of operational efficiency (mean rank 12.31). In the study conducted by Srikar *et al.*, (2021), 74 % of the FPO members mentioned that there was lack of adequate infrastructure to increase value and product quality assurance. According to Verma *et al.*, (2021), lack of transportation options, poor storage facilities, competition among members for important roles, lack of expertise in grading and packaging were the main obstacles of the member farmers within the organization. Bishnoi *et al.*, (2020) delineated the constraints of FPO members are difficulty in farmers mobilization, skill of management, financial aspects, equity grant and suitable policies.

Further analysis of each group of the inhibiting factors was identified using the non-parametric Friedman's test. From the Friedman test statistic value and its significance, each component in each category differed in respondent's view.

Table 2: Personal constraints severity comparison based on Friedman's test (N=80)

Personal constraints	Mean Rank	Groups			
Myths and social norms	4.89	A			
Land alienation in tribal areas	4.12	A			
Small and marginal land holdings	3.98		B		
Lack of knowledge on ICT tools	3.47		B		
Lack of awareness on value addition	2.67			C	

****Mean ranks having same letters are not significantly different**

A glance at Table 2 showed that a set of personal limitations prevent tribal farmer producer organizations from participating in processing and value addition. Friedman's test statistic for personal constraints is Chi-Square = 42.14 ($df = 4$, $p < 0.05$).

As the societal norms and myths are deeply ingrained in tribal communities, members show reluctance and inactivity to join FPOs (mean rank 4.89). Srikar *et al.*, (2021) opined that because of societal pressure and taboos, many farmer communities do not follow advanced methods and instead adhere to conventional methods. This is a prevalent phenomenon among indigenous tribes, and 55% of respondents cited it as a restraint. About one-fourth of respondents (26%) thought that the least restrictive factor among the FPGs under consideration was poor communication and less involvement among members. Tribal farmers varied social, and political backgrounds make it extremely difficult to organize them into farmer-producer organizations. Furthermore, problems like land alienation in tribal areas limit their access to arable land, which makes it challenging for farmers to make additional investments after harvest (mean rank 4.12). Most tribal farmers own small, marginal land holdings (mean rank 3.98), which restricts their ability to produce and makes it difficult to set aside funds for value-added or processing operations. Additionally, their inability to use ICT tools hinders their ability to adopt digital payment systems, acquire market data, and use technology for branding and sales (mean rank 3.47). Their capacity to transform raw produce into marketable commodities is further limited by a notable lack of knowledge about value addition (mean rank 2.67), which results in a sustained reliance on middlemen and less prospects for net returns.

Table 3: Operational constraints severity comparison based on Friedman's test

(N=80)

Operational constraints	Mean Rank	Groups		
Adoption of local varieties	4.13	A		
Less know how on recommended practices	4.08	A		
Lack of awareness on hygienic processing	3.65		B	
High incidence of pests and diseases	3.46		B	
Inadequate technical guidance	2.99			C

****Mean ranks having the same letters are not significantly different**

Friedman's test statistic for operational constraints is Chi-Square = 31.89 (df = 4, $p < 0.05$). Adoption of local varieties *viz.*, *Chintapalli* local turmeric variety, which is culturally valued but frequently yields less is one of the main obstacles (mean rank 4.13). Furthermore, farmers are less knowledgeable about improved practices (mean rank 4.08), which results in ineffective farming techniques and subpar post-harvest processing. Their competitiveness in the market is further diminished by their inability to develop value-added products that adhere to food safety regulations due to a lack of knowledge about hygienic processing (mean rank 3.65). Reduced productivity and frequent crop losses are caused by the high prevalence of pests and diseases in tribal agricultural areas (mean rank 3.46). Furthermore, because professional assistance and extension services are less available in distant tribal areas, there is a lack of technical guidance (mean rank 2.99). The systematic study conducted by Markelova *et al.*, (2009), nearly 83% of members stated that not all members received training, and 92% of respondents believed that there were insufficient personnel at the grassroots level to provide guidance.

Table 4: Infrastructural constraints severity comparison based on Friedman's test

(N=80)

Infrastructural constraints	Mean Rank	Groups		
Lack of drying yards and storage facilities	5.00	A		
Lack of package machinery	4.86		B	
No proper transportation	3.72			C
Lack of processing infrastructure	3.69			C
Lack of proper meeting halls	3.24			C

****Mean ranks having the same letters are not significantly different**

Friedman's test statistic for infrastructural constraints is Chi-Square = 62.45 (df = 4, $p < 0.05$). The absence of drying yards and storage facilities is a significant problem that requires farmers to sell their produce immediately after harvest, frequently at lower rates due to its perishability (mean rank 5.00). They are also less competitive in bigger marketplaces since they are unable to effectively brand and market their products due to a lack of package machinery (mean rank 4.86). The problem is made worse by inadequate transportation, which makes it harder for farmers to reach markets, move raw materials, to effectively distribute value-added products (mean rank 3.72). Furthermore, tribal farmers are forced to rely on intermediaries and outside processors due to the absence of processing infrastructure, which restricts their ability to add value (mean rank 3.69). The absence of suitable meeting spaces affects even the most fundamental operating requirements, limiting the ability of FPOs to hold discussions, training sessions, and meetings for decision-making (mean rank 3.24). Motiram *et al.*, (2007) mentioned that to make the most of the resources available, a suitable working environment and amenities are indispensable. According to 74% of the respondents, there was inadequate infrastructure and 66% of FPO members acknowledged that lack of post-harvest management facilities was causing them difficulties.

Table 5: Economic constraints severity comparison based on Friedman's test

(N=80)

Economic constraints	Mean Rank	Groups		
Contract based agreements	4.97	A		
Poor access to institutional credit	4.91	A		
Low investment capacity	4.06		B	
Complex loan procedures	3.25			C
Lack of continuity in support from promoting institutions	3.19			C

****Mean ranks having same letters are not significantly different**

Friedman's test statistic for economic constraints is Chi-Square = 52.17 (df = 4, $p < 0.05$). Contract-based agreements present a significant obstacle, as farmers frequently enter into fixed agreements due to poor financial capacity, and lack of bargaining strength, which results in lower profits (mean rank 4.97). Additionally, FPOs find it challenging to invest in necessary equipment, infrastructure, and market expansion due to limited access to institutional funding (mean rank 4.91). The low investment ability of individual tribal farmers, who find it difficult to provide funds for group expansion, exacerbates this problem even more (mean rank 4.06). Complex loan procedures deter farmers from applying, even when financing options are available because they frequently lack the financial literacy to understand the process (mean rank 3.25). Since many government or NGO-led projects offer early assistance but fall short of providing long-term counsel and financial backing, the lack of continuity in support from promotional institutions is another major obstacle (mean rank 3.19).

Table 6: Marketing constraints severity comparison based on Friedman's test

(N=80)

Marketing constraints	Mean Rank	Groups		
Price fluctuations	4.14	A		
Side selling by individual farmers	4.06	A		
Exploitation by middle men	3.43		B	
Lack of timely market information and distant market	3.21		B	
Lack of awareness on promotional strategies	1.87			C

****Mean ranks having the same letters are not significantly different**

Friedman's test statistic for marketing constraints is Chi-Square = 59.36 (df = 4, $p < 0.05$). Price volatility is a significant obstacle that makes it hard for farmers to schedule sales and guarantee steady profits (mean rank 4.14). Pujara (2016) stated that farmers obtain profit margins of above 60%, but they do not gain because of the small volume of transactions. Additionally, because some members sell their produce to middlemen for quick cash rather than through FPO, side selling by individual farmers reduces the collective bargaining power of FPOs (mean rank 4.06). As a result, middlemen continue to extract farmers by offering lower prices by taking advantage of their immediate cash demands and lack of access to markets (mean rank 3.43). Lack of reliable market information and remote markets exacerbate the situation because tribal farmers frequently struggle to transport their commodities to lucrative markets and have little understanding of demand trends (mean rank 3.21). Moreover, FPOs are less visible to potential customers due to their inability to properly brand and market their items due to a lack of knowledge about promotional tactics (mean rank 1.87). The results are in tune with the findings of Barham *et al.*, (2009) and Chirwa (2005) indicated that nearly 88 percent of the FPO members admitted that they lack marketing skills.

CONCLUSION

The study on the limitations that Farmer Producer Organizations (FPOs) encounter in the value addition of turmeric identified several issues that impede their efficiency and expansion. Despite the challenges in data collection from tribal areas, the study made crucial contributions toward understanding the socio-economic realities of tribal FPOs. It is concluded that the main challenges are marketing (Mean Rank 46.17) and infrastructure constraints (Mean Rank 42.36) of tribal FPOs. Social norms of members in joining FPOs, land alienation, adoption of local varieties, less know-how on recommended practices, lack of drying yards, lack of package machinery, contract-based agreements, poor access to institutional credit, and side selling of farmers are the severe constraints. The findings obtained are instrumental in crafting more effective policies and support systems that cater to their specific needs, thereby encouraging sustainable agricultural progress and economic empowerment. The future scope of studying the constraints faced by Tribal Farmer Producer Organizations (FPOs) in turmeric value addition includes several key areas *viz.*, technological interventions, capacity building, skill development, market linkages, integration of digital platforms, policy inputs etc.

Conflict of interest

The authors do not have any conflict of interest.

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REFERENCES

1. AMIC (Agricultural Market Intelligence Centre), Turmeric Outlook-January (2024). PJTSAU. <https://www.pjtsau.edu.in/files/AgriMkt/2024/January/Turmeric-January-2024.pdf>
2. Barham J & Chitemi C, Collective action initiatives to improve marketing performance: lessons from farmer groups in Tanzania, *Food Policy*, 34 (2009), 53 - 59.
3. Bishnoi R K & Kumari S, Challenges faced by FPOs & strategies to overcome: A Review. *International Journal of Advances in Agricultural Science and Technology*, 7(6) (2020), 25-33.
4. Census, (2011). Available at <https://allurisitharamaraju.ap.gov.in/demography/>
5. Chirwa E, Dorward A, Kachule R, Kumwenda I, Kydd J, Poole N, Oulton C & Stockbridge M, Farmer organisations for market access: principles for policy and practice, (2005). Available at [https:// assets. Publishing .service.gov.uk /media/ 57a08c60ed915d622c0012e1/R8275_040524_ PolicyBriefingPaper.pdf](https://assets.publishing.service.gov.uk/media/57a08c60ed915d622c0012e1/R8275_040524_PolicyBriefingPaper.pdf).
6. DES (Directorate of Economics and Statistics), Agricultural Statistics at a Glance. Statistics & Evaluation Division, Department of Agriculture & Farmers Welfare Economics, Ministry of Agriculture & Farmers Welfare, (2023). Available at <https://desagri.gov.in/document-report-category/agriculture-statistics-at-a-glance/>
7. DES-AP (Directorate of Economics and Statistics- Government of Andhra Pradesh). Agricultural Statistics 2023-24 at a Glance - Andhra Pradesh, (2023). Available at https://des.ap.gov.in/jsp/social/ASAG_2023-24.pdf
8. e-panta, Andhra Pradesh District Wise Abstract on Extent of crop area, (2024). Available at <https://karshak.ap.gov.in/ecrop/crbookingabsIntf>
9. Markelova H, Meinzen Dick R, Hellin J & Dohrn S, Collective action for smallholder market access. *Food Policy*, 34(1) (2009) 1-7.
10. Motiram S, & Vakulabharanam V, Corporate and cooperative solutions for the agrarian crisis in developing countries, *Review of Radical Political Economics*, 39 (2007): 360-367.
11. PIB (Press Information Bureau), Government of India notifies establishment of National Turmeric Board, (2023). <https://pib.gov.in/PressReleasePage.aspx?PRID=1964083>

12. Pujara M, Problems and Issues facing Farmers groups and cooperatives in Agriculture marketing. *Agricultural Technology and Management Agency*, 12 (1) (2016): 420.
13. Srikar K, Asokhan M, Karthikeyan C, & Patil S G, Constraints Perceived and Suggestions Offered by the members of Tribal Farmer Producer Groups (FPGs). *Madras Agricultural Journal*. 108 (2021): 1-5. Available online at <https://doi.org/10.29321/MAJ.10.000356>
14. Tiwari N & Rajshree U, Constraints faced by the members of the farmer producer organizations in Udaipur district of Rajasthan, *The Pharma Innovation Journal*, 10(12)(2021) 320-324.
15. Verma A K, Singh V K, Asha K, Dubey S K & Verma A P, Constraints Perceived by the Members and Non-members towards Functioning of FPO-AKPC in Kannauj District of Uttar Pradesh, *Economic Affairs*, 66(2) (2021): 335-341.