

"A Comparative Cost–Benefit Analysis of Farmers Before and After Joining Farmer Producer Organizations: With Special Reference to Nalgonda and Mahbubnagar Districts, Telangana State"

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ABSTRACT

The study aims to assess the performance of selected Farmer Producer Organizations (FPOs) in Telangana and examine the association between FPO membership and the economic conditions of farmers in comparison with their pre-membership condition. It also assesses farmers' perceptions regarding the services and functioning of FPOs. The study was conducted among 400 member farmers of six selected FPOs located in Telangana. Primary data were collected through a structured questionnaire during July–December 2025, while secondary data were obtained from government reports, FPO records, research studies and other published sources. Descriptive statistics, Chi-square test, ANOVA and paired sample t-test were employed to analyse farmers' perceptions and differences in economic performance before and after joining FPOs. The findings indicate that farmers' overall perception of FPO functioning was moderate, with 67.0 per cent reporting moderate perception, 28.8 per cent low perception and 4.3 per cent high perception. DMRPCL recorded a comparatively better perception among the selected FPOs. Farmers expressed stronger satisfaction with quality input supply, soil testing and awareness programmes, while relatively weaker performance was observed in crop insurance, storage, processing, marketing and financial services. The paired t-test indicated perceived differences in economic profit per acre between the pre- and post-membership periods. All six FPOs recorded higher mean economic profit in the post-membership period, with the highest mean increase observed in DMRPCL at ₹32,172.69 per acre. The study suggests that FPO membership is associated with improved economic outcomes, particularly in terms of profitability and access to agricultural services. Variations in performance across the selected FPOs highlight the need for stronger infrastructure, professional management, financial support, value addition and market integration to enhance their long-term sustainability and effectiveness. While the post-membership period shows an improvement in economic profit, this change should be interpreted as an association rather than as evidence of a direct effect of FPO membership, as the observed outcomes could have been influenced by factors such as input and output prices, production practices, crop composition, institutional support and prevailing market conditions.

Keywords: Farmer Producer Organizations; FPO Performance; Economic Upliftment; Farmer Perception; Descriptive Statistics.

INTRODUCTION

In India there are about 138 million farm holdings which include 92.8 million marginal holdings and 24.8 million small holdings (Census, 2011) i.e., about 85% of the of total holdings are small and marginal and their share in total operated area is 44.6%. Every year 1.5 to 2.0 million land holdings are added to the marginal and small sector due to land fragmentation (Bakshi, P., 2017). India is the first largest populous country in the world. Agriculture is the key component of the Indian economy. Central Government and the State Governments are implementing many programs and projects to strengthen the agricultural sector since Independence. Agriculture of Telangana is also characterized by a large number of marginal & small farmers, fragmented land holdings, low level of adoption of technologies, low productivity, dependency on monsoon

rainfall, etc. (Telangana 11th Agriculture Census 2021–22). These factors hinder the improvement of agriculture. Government of India, since Independence is implementing various policies that support Primary Sector, particularly the Agriculture, for making the sector economically feasible. These policies have received only partial success. In the process the Government of India has introduced a policy on Farmer Producer Organizations (FPOs) in the year 2000 for supporting the Agricultural sector.

The evolution of Farmer Producer Organizations (FPOs) in India can be viewed as a gradual institutional response to the problems faced by small and marginal farmers. Before the emergence of FPOs, farmers largely depended on cooperatives and Primary Agricultural Credit Societies (PACS) for agricultural credit, inputs and related services. Although PACS played an important role in rural credit, their activities were largely concentrated on credit and input distribution, with relatively limited involvement in aggregation, processing, value addition, branding and organised marketing. This created the need for farmer-owned institutions with a stronger business and value-chain orientation.

The year 2000 marked an important turning point with the recommendations of the Y. K. Alagh Committee, which proposed a suitable legal framework for organising primary producers into professionally managed, member-owned business organisations. These recommendations laid the conceptual foundation for the Producer Company model.

In 2002, based on the Alagh Committee recommendations, the Companies (Amendment) Act, 2002 introduced Part IX-A into the Companies Act, 1956, providing a legal framework for Producer Companies. Based on the recommendations the Farmer Producer organizations can be incorporated/ registered either under Part IXA of Companies Act or under Co-operative Societies Act of the concerned States. Therefore the period 2000–2003 can be considered the legal and conceptual foundation phase of FPOs and Farmer Producer Organizations are formed with the Vision “To build a prosperous and sustainable agriculture sector by promoting and supporting member-owned Producer Organisations, that enable farmers to enhance productivity through efficient, cost-effective and sustainable resource use and realize higher returns for their produce, through collective action supported by the government, and fruitful collaboration with academia, research agencies, civil society and the private sector”.

The main objective of a Farmer Producer Organisation (FPO) is to improve the income and economic well-being of farmers by collectively organising them to achieve economies of scale. To achieve this objective, FPOs facilitate farmers’ access to quality inputs, technology, credit, processing, storage and market linkages, thereby enabling them to obtain better prices for their produce, reduce production and marketing costs, and strengthen their collective bargaining power.

During 2003–2012, Producer Companies and other producer organisations gradually expanded with support from government agencies, NABARD and development institutions. The focus increasingly moved towards collective procurement, production, aggregation and market access.

A major milestone was achieved in 2013 with the introduction of the National Policy and Process Guidelines for Farmer Producer Organisations. The policy recognised FPOs as an important mechanism for improving farmers' access to technology, inputs, investment and markets and for strengthening collective action. Based on the guidelines, the following activities and services are to be provided by FPOs.

- Supply quality production inputs like seed, fertilizer, pesticides and such other inputs at reasonably lower wholesale rates.
- Make available need based production and post-production machinery and equipment like cultivator, tiller, sprinkler set, combine harvester and such other machinery and equipment on custom hiring basis for members to reduce the per unit production cost.
- Make available value addition like cleaning, assaying, sorting, grading, packing and also farm level processing facilities at user charge basis on reasonably cheaper rate. Storage and transportation facilities may also be made available.

- Undertake higher income generating activities like seed production, bee keeping, mushroom cultivation etc.
- Undertake aggregation of smaller lots of farmer-members' produce; add value to make them more marketable.
- Facilitate market information about the produce for judicious decision in production and marketing.
- Facilitate logistics services such as storage, transportation, loading/un-loading etc. on shared cost basis.
- Market the aggregated produce with better negotiation strength to the buyers and in the marketing channels offering better and remunerative prices.

Table 1: Registered Number of Farmer Producer Organizations in India State / Union Territory wise, as on 31st March, 2025

State/Union territory	No. of FPOs	Rank
Maharashtra	14,788	1
Uttar Pradesh	6,524	2
Madhya Pradesh	2,330	3
Bihar	1,605	4
Odisha	1,594	5
West Bengal	1,542	6
Tamil Nadu	1,531	7
Karnataka	1,479	8
Punjab & Haryana	1,304	9
Rajasthan	1,263	10
Andhra Pradesh	1,120	11
Assam	1,060	12
Telangana	953	13
Gujarat	920	14
Jharkhand	674	15
Kerala	623	16
Chhattisgarh	448	17
Jammu & Kashmir	313	18
Himachal Pradesh	252	19
Manipur	220	20

Arunachal Pradesh	217	21
Uttarakhand	175	22
Nagaland	145	23
Tripura	120	24
Mizoram	87	25
Delhi	91	26
Meghalaya	64	27
Goa	18	28
Puducherry	11	29
Andaman	8	30
Lakshadweep	2	31
Ladakh	2	32
Total	41,483	
Source: National Association for Farmer Producer Organizations (NAFPO) Database. https://www.nafpo.in/sofpo-reports .		

The next major phase began in 2020 with the launch of the Central Sector Scheme for Formation and Promotion of 10,000 FPOs. The scheme provided financial assistance, equity support, credit guarantees and professional handholding to strengthen FPOs and promote economies of scale, better market access and improved farmer incomes.

From 2024 onwards, the emphasis has increasingly shifted towards making FPOs commercially viable, professionally managed and sustainable, with greater attention to processing, value addition, branding, digital marketing, infrastructure and credit and market linkages.

Table 1 presents the state-wise distribution of Farmer Producer Organisations (FPOs) in India, with a total of 41,483 FPOs. The distribution indicates considerable variation in the number of FPOs across states. Maharashtra has the highest number of FPOs (14,788), followed by Uttar Pradesh (6,524) and Madhya Pradesh (2,330). Telangana has 953 FPOs, accounting for approximately 2.30 per cent of the total 41,483 FPOs in India (National Association for Farmer Producer Organizations (NAFPO) Database. <https://www.nafpo.in/sofpo-reports>). Thus, the table demonstrates that Telangana occupies an important position in the national FPO landscape, providing a relevant basis for examining the performance and functioning of FPOs in the state.

REVIEW OF LITERATURE

The study of earlier research work will certainly help the researcher in presenting the report in a clear and precise manner with valuable suggestions and conclusions. In fact, a brief history of yesteryear's surveys and research articles in the similar area helps as a 'backbone' for the present study. Therefore a review of the past, related studies in the field are as important as the present study.

The literature on Farmer Producer Organisations (FPOs), Farmer Producer Companies (FPCs), Producer Organisations (POs) and farmer collectives has evolved from conceptual discussions of collective action to empirical assessment of their economic, social and organisational outcomes. Early studies by Ortmann and King (2007), Challuri Babu et al. (2007), Dubey et al. (2009), Trebbin and Hassler (2012), Ragasa and Golan (2012), Chaudhari (2014), Raji Reddy (2014), and Tagat and Tagat (2016) established that collective institutions can overcome the limitations of fragmented smallholder agriculture by improving access to markets, credit, inputs, technology and extension services. However, these studies also indicate that organisational governance, financial contribution, external linkages, management capacity and institutional support are important determinants of collective performance.

Subsequent studies increasingly examined the formation, functioning and value-chain role of FPOs. Huang et al. (2015), Sankri and Ponnusamy (2015), Kandeeban (2015), Aditya (2015), Sawairam (2015), Neupane et al. (2015), Tolno et al. (2015), Salokhe (2016), and Milovanovic et al. (2016) demonstrated that collective organisations can improve production, productivity, market participation, income and livelihood opportunities. Sankri and Ponnusamy emphasised awareness, training, demonstrations, exposure visits and stakeholder linkages in FPO formation, while their Erode case showed the importance of technical, managerial and marketing support. Kandeeban and Aditya, particularly relevant to Telangana and Karnataka, highlighted financial patterns, market competitiveness, organisational structure and value-chain linkages.

The empirical literature from 2017 onwards provides stronger evidence of changes in farmers' outcomes following collective participation. Rani Nidhi et al. (2017) reported a 10 per cent improvement in production and at least a 20 per cent increase in net income after FPO formation. Darshan et al. (2017) found that FPOs improved income and savings by reducing input, transportation and labour costs and improving marketing intelligence. Posner (2017) examined the experiences of small farmers participating in Sahaja Aharam in Telangana. Nikam et al. (2019) highlighted improvements in demand articulation, service provision, finance, capacity building and extension services. Sahoo et al. (2022) and Srikar et al. (2022) further identified FPOs/FPGs as mechanisms for income enhancement and economic empowerment, particularly among small, marginal and tribal farmers.

More recent studies provide evidence on income, profitability and livelihood changes. Veda Sri and Mishra (2021) found that group membership, crop area, hired labour, proportion of produce sold and market size were positively associated with farmers' income. Gurung et al. (2023) reported positive effects of FPO membership on net returns, return on investment and profit margins, although the magnitude of impact varied across farmer categories. Malviya and Kumar (2026) associated FPO participation with income generation through institutional participation, information access and collective marketing. Malaisamy et al. (2025) found improvements in farm income, market access and adoption of modern practices, while Rafi et al. (2025) reported improvements after joining millet FPOs in income, occupational days, savings, credit access and debt management.

Studies have also examined social, empowerment and livelihood dimensions. Ramesh et al. (2018) and Ravinder and Pratap (2007) highlighted the role of women in cooperative enterprises but also pointed to limitations in decision-making. Praveen Kumar and Babu (2018) emphasised women farmer groups and community-level capacity building. Sharma et al. (2023) highlighted FPO training as a means of improving income opportunities among rural youth. Nirosha et al. (2024), importantly for the present study, used a paired-sample approach and found a significant difference in income before and after joining a Women Farmer Producer Organisation. Das and Singh (2024) similarly reported improvements in income, input and service access, market access, collective marketing, efficiency, livelihoods and women's empowerment.

At the same time, the literature shows that FPO benefits are not automatic and may vary according to organisational performance. Kathiravan et al. (2017) identified lack of coordination as a major constraint, while Dixit and Nayaji (2021) highlighted broader challenges affecting FPO functioning. Dev (2018) identified governance, external networks, capital, technology, member contribution and financial performance as determinants of FPC viability. Jain and Naranware (2018) showed that the success of farmer collectives depends on local institutional conditions and alignment with external agencies. Shanmugam et al. (2024)

identified awareness, infrastructure, finance and support constraints, while Patel et al. (2023) highlighted small landholdings, indebtedness, finance and the need for stronger institutional and market support. Thus, the literature suggests that the extent of improvement after joining an FPO may differ according to the quality and intensity of services received by members.

The literature also contains important methodological differences. Some studies are conceptual or review-based, including Ortmann and King (2007), Trebbin and Hassler (2012), Tagat and Tagat (2016), Navaneetham et al. (2017) and others. Several are case studies, such as Posner (2017), Darshan et al. (2017), Ramesh et al. (2018), Dev (2018), and Sankri and Ponnusamy (2015). Other studies use quantitative approaches, including efficiency analysis, regression and statistical comparisons. Munde et al. (2025) used Data Envelopment Analysis and reported higher technical and allocative efficiency among members, whereas Gurung et al. (2023) examined economic returns and heterogeneity. Nirosha et al. (2024) used a paired-sample test to compare income before and after membership. These methodological differences show that the evidence is broad, but the studies differ substantially in geographical coverage, indicators and analytical techniques.

Importantly, Telangana-specific studies remain relatively limited and are often organisation- or dimension-specific. Kandeegan (2015) examined market competitiveness and financing patterns, Aditya (2015) focused on organisational structure and value chains, Posner (2017) studied farmers' experiences in Sahaja Aharam, and Praveen Kumar and Babu (2018) examined women farmer producer groups in Yacharam. These studies provide useful contextual understanding but do not comprehensively measure changes in the same farmers' cost of cultivation, productivity, revenue, accounting profit and economic profit before and after FPO membership.

Research Gap

Existing studies establish that Farmer Producer Organizations (FPOs) contribute to enhancing farmers' income, productivity, efficiency, market access, and profitability. While the literature has examined FPOs from various perspectives—covering institutional roles, market linkages, and individual economic outcomes—there remains scope for further enrichment through comprehensive comparative analyses of farmers' experiences before and after joining FPOs. In particular, dimensions such as cost of cultivation, yield, revenue, accounting profit, and economic profit have not been systematically integrated into a single framework of evaluation. Moreover, Telangana-specific evidence, especially in the districts of Nalgonda and Mahbubnagar, is relatively underexplored in terms of multidimensional economic changes. Against this backdrop, the present study, entitled 'A Comparative Cost–Benefit Analysis of Farmers Before and After Joining Farmer Producer Organizations: With Special Reference to Nalgonda and Mahbubnagar Districts, Telangana State', seeks to contribute to the existing literature by providing a comprehensive assessment of farm-level economic indicators, thereby enriching the understanding of FPOs' performance and their impact on member farmers.

Need for the Study

Farmer Producer Organizations can be one of the significant organizations that can help in the empowerment, poverty alleviation and advancement of farmers and the rural poor. It is little over two decades since the Government of India has put impetus on FPOs for strengthening agriculture. Hence there is a need to conduct research studies for analyzing the Performance of Farmer Producer Organizations from the perspective of the farmers, particularly in the newly formed Telangana State, for assessing whether these FPOs are able to achieve the intended objectives.

Objectives of the Study

The main Objective of this study is to examine whether membership in Farmer Producer Organizations (FPOs) has contributed to the economic upliftment of farmers by providing additional benefits in comparison to their pre-membership condition.

- To analyze the concept and structural framework of Farmer Producer Organizations (FPOs), highlighting their intended role in enhancing collective action and farmer welfare.
- To assess the perceived benefits of FPO membership among farmers, with particular focus on changes in their economic conditions in comparison with their pre-membership condition.

RESEARCH METHODOLOGY

In pursuit of above mentioned objectives the following methodology is adopted.

Sources of Data

Both Primary and Secondary sources are used for collecting the Data for the Study.

Primary Data: A structured questionnaire is used for the purpose of the study. The structured questionnaire is prepared based on the objectives, services and activities of the FPO. Nalgonda and Mahabubnagar districts are the most backward districts in Telangana State (based on economic and social parameters, Census 2011). Hence these two districts are selected for the collection of primary data.

Secondary Data: The Secondary Data is collected from the Reports published by the FPO Implementing Agencies, Reports published by the Ministry of Agriculture & Farmer Welfare, Government Policy on FPOs, Working Papers, Annual Reports of the select FPOs working in the Nalgonda & Mahabubnagar Districts, published theses, dissertations, Research Articles, Newspapers, and other related published material.

Sample Selection

The total number of farmers in both Nalgonda and Mahabubnagar put together is 10,00,000 or above. The sample size is selected by using the Krejcie Morgan Model. Krejcie Morgan Table for determining Sample Size for a Finite Population is used, according to which, for a total finite population of 10,00,000 and above, the sample size is 384. The sample is rounded to 400 for convenience of the researchers.

In erstwhile Nalgonda there are 61 FPOs registered, out of that only 11 FPOs have completed 5 years with a membership more than 500 members. In erstwhile Mahabubnagar District there are a total of 48 FPOs registered, out of that only 8 FPOs have completed 5 years with a membership more than 500 members.

Based on the suggestions from NABARD District Development Managers from both Nalgonda and Mahabubnagar a total of six (3 from each district) Farmer Producer Organizations (FPOs) are identified for the Research Study – Kattangoor Farmer Producer Company Limited, Kattangoor, Nalgonda District, Dheesali Raithu Mahila Producer Company Limited, Bommala Ramaram, Yadadri Bhongir District, Athmakur(S) Farmer Producer Company Limited, Thummalpenpahad, Suryapet District, Nawabpet Farmer Producer Company Limited, Mahabunagar District, Kashimnagar Farmer Producer Company Limited, Anjanagiri, Wanaparthi District, Nagarkurnool Farmer Producer Company Limited, Bondal Pally Nagarkurnool District. A Total of 400 farmers perceptions are taken to examine the performance of the 6 FPOs. The questionnaire elicited the perceptions of the farmers with regard to their economic performance before joining the FPO and after joining the FPO. From each of the six selected FPOs, a quota of 66–67 member farmers was chosen, totaling 400 respondents. The selection was carried out using a systematic random sampling method. Specifically, the membership list of each FPO was obtained, and the total number of members was divided by the required sample size (66/67). For instance, in Kattangoor FPO with 1,100 registered farmers, the quotient was 16.67, meaning that every 16th farmer on the list was selected to form the sample. This ensured proportional representation and minimized selection bias.

Scope of the Study

The present study is confined to evaluating the performance of select Farmer Producer Organizations (FPOs), operating in the districts of Nalgonda and Mahubnagar. The Scope of the Study is limited to only such FPOs who have completed atleast 5 years and have a minimum of 500 members. The names of the 6 FPOs, 3 from

each district, identified for the study are, Kattangoor Farmer Producer Company Limited, Dheesali Raithu Mahila Producer Company Limited, Athmakur(S) Farmer Producer Company Limited, Nawabpet Farmer Producer Company Limited, Kasheemnagar Farmer Producer Company Limited, and Nagarkurnool Farmer Producer Company Limited.

The assessment is carried out through an analysis of member farmers' perceptions and experiences, with particular attention to their economic condition prior to joining the FPOs and the changes observed after becoming members. This approach enables a comparative understanding of how FPO participation has influenced farmers' livelihoods, market access, and overall economic well-being.

Period of the Study

For the collection of the Primary Data from the members of the Farmer Producer Organizations (FPOs) the Period of the Study is limited to 6 months from July 2025 to December 2025. For the collection of Secondary Data, the year of FPO Policy declaration by the Government of India and the date of establishment of the select FPOs is considered for their performance analysis.

Hypotheses

The following Hypotheses are framed for conducting the Research Study:

- **H0:** There is no significant difference in the perception levels of farmer members of different FPOs;
- **H0:** There is no significant difference in the Economic Profit Per Acre of Farmers before and after joining the FPO;
- **H0:** There is no significant difference in the Economic Profit per acre of Farmers of different FPOs.

Tools for Data Analysis

Appropriate descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyse the data. Cronbach's Alpha was used to assess the reliability and internal consistency of the perception scale. To test the hypotheses, a paired samples t-test was used to examine the changes in farmers' economic performance before and after joining the FPO, particularly in terms of cost, revenue and profitability. Chi-square test and One-Way ANOVA were used to analyse farmers perceptions towards the functioning and performance of the selected FPOs. Where the ANOVA results indicated significant differences, Duncan's post-hoc test was used to identify the specific FPO groups that differed significantly from one another.

Limitations of the Study

The following are the limitations of the present study

Geographical Scope Restriction

The study is confined only to six FPOs in Nalgonda and Mahbubnagar districts of Telangana. Findings may not be generalizable to other districts or states with different socio-economic and institutional contexts.

Sample Size and Representation

Although 400 farmers were surveyed using the Krejcie Morgan model, the sample represents only a fraction of the total farmer population. The quota sampling from six FPOs may not fully capture the diversity of farmer experiences across Telangana.

Time-Bound Data Collection

Primary data were collected during July–December 2025, which may not reflect seasonal variations or long-term changes in farmer performance and perceptions.

Perception-Based Analysis

Farmers' perceptions of FPO functioning were measured through questionnaires. Such self-reported data may be influenced by biases, expectations, or recall errors, limiting objectivity.

Limited Economic Indicators

The study primarily focused on economic profit per acre and selected services (input supply, soil testing, and awareness programs). Other dimensions such as social empowerment, risk mitigation, and long-term sustainability were not comprehensively assessed.

Organizational Variability

Differences in infrastructure, management capacity, and external support across FPOs mean that results cannot be uniformly applied. The study acknowledges variation but does not fully explore the institutional determinants of success or failure.

Exclusion of Non-Members

The study compares farmers before and after joining FPOs but does not include non-member farmers as a control group, which limits the ability to isolate FPO membership effects from broader agricultural trends.

PROFILE OF THE FPOS: Six FPOs which are functioning in the districts of Nalgonda and Mahboobnagar are considered for the purpose of this Research Study. Their brief profiles are as given:

Kattangoor Farmer Producer Company Limited (KFPCL): Kattangur Farmers Producer Company Limited (KFPCL) is a Farmer Producer Company located at Aitipamula, Kattangur Mandal, Nalgonda District, Telangana – 508205. It was incorporated on 30 January 2019 and is registered with the Registrar of Companies, Hyderabad, with CIN/Registration No. U01100TG2019PTC130167 (Registration No. 130167). It has 1100 member farmers with an authorized share capital of Rs. 11,00,000/-. The FPO primarily worked with lemon orchids but now it is covering all types of crops. The FPO is covering 18 villages with more than 9,000 acres of cultivated field. It has obtained seed and fertilizer licenses. The FPO was promoted with assistance from NABARD's Producers Organization Development Fund (PODF-ID) and had received support through NABKISAN, including working-capital/term-loan assistance and NABARD support under the Rural Mart scheme. With the grants received from NRIs it is providing cold storage facilities to its members, vehicles for transportation, tractors, and various agricultural equipment, including drones, to support farming activities. This FPO is conferred with state level best performing FPO award from NABARD in the year 2022.

Dheesali Raithu Mahila Producer Company Limited (DRMPCL): Dheesali Raithu Mahila Producer Company Limited (DRMPCL) is a women-led Farmer Producer Organisation (FPO) specifically for women farmers, established in 2018 under the Companies Act, 2013. It operates mainly in Bommalararamam Mandal of Yadadri-Bhuvanagiri District, Telangana, covering 11 villages. The FPO was promoted by Grameena Mahila Mandali (GMM) with support from NABARD & APMAS with the objective of strengthening women farmers through collective farming and agribusiness. The FPO has a strong women-centric membership base with 621 women shareholders with a paid up share capital of Rs. 6,21,000/-. The FPO works mainly in agriculture and allied service, dealing with paddy, vegetables, red gram, black gram, green gram, millets, cotton, jowar and flowers. It primarily deals with vegetable production and also promotes Pandiri Pantalu (protected cultivation) under the various government schemes, which has contributed to increased production and turnover. Owing to its proximity to Hyderabad and Bhongir, the FPO has established a market linkage with Rathnadeep Supermarket, which directly collects vegetables from the FPO's locality. This arrangement eliminates transportation costs, provides assured market access and reduces dependence on intermediaries. The supermarket settles payments within a month and offers prices prevailing on the respective dates, ensuring market-oriented returns. Thus, the combination of protected cultivation, direct procurement, reduced transportation costs, timely payments and market-based pricing has strengthened the FPO's market linkage and contributed to increased turnover and income. It has received financial and institutional support, including

equity and vehicle assistance, credit linkage, Rural Mart support and other grants from various sources. A key activity of the FPO is its input business, through which farmers receive seeds, fertilizers, pesticides, tarpaulins and cattle feed at reasonable prices. The FPO has also promoted soil testing, seed treatment, seed development, organic farming, high-density plantation and NPM methods. The FPO also obtained seed and fertilizer licenses. It has also received recognition, including a Best Women Farmers FPO Award from NABARD in the year 2024 and other district- and national-level recognition. Overall, the FPO's strong leadership is reflected in its women-centric governance, effective institutional support, diversified agribusiness activities, successful market linkages, and recognition at the district and national levels.

Athmakur(S) Farmer Producer Company Limited (ASFPCL): Athmakur (S) Farmers Producer Company Limited (ASFPCL) is a Farmer Producer Company located at H. No. 6-62, Near ZPHS, Thummalpen Pahad, Athmakur (S), Telangana – 508221. It was incorporated on 9 January 2019 and is registered with the Registrar of Companies, Hyderabad, under CIN/Registration No. U01114TG2019PTC129635. The company is classified under NIC 0111, relating to the growing of cereals and other crops. The primary activity of the FPO is providing input supply and soil testing services. It has a total farmer members of 600 with an authorized share capital of Rs. 6 lakhs. The FPO is covering 12 villages with approximately 1100 acres of cultivated field. The FPO has obtained seed and fertilizer licenses. The FPO received grants from various sources and had purchased soil testing machinery and constructed a building for supply of inputs. The company had obtained a ₹35 lakh secured facility from NABKISAN Finance Limited for the growth of the FPO.

Nawabpet Farmer Producer Company Limited (NFPCL): Nawabpet Farmer Producer Company Limited is a Farmer Producer Organisation located in Nawabpet, Mahabubnagar District, Telangana. It was incorporated in 2019 and is registered with the Registrar of Companies, Hyderabad, under CIN/Registration No. U01400TG2019PTC131799. The company has a total of 500 members with a paid-up share capital of ₹5 lakh. Its registered activity falls under agricultural and animal-husbandry services. The Nawabpet FPO is particularly associated with Cotton & Paddy cultivation. The FPO obtained seed and fertilizer licenses. The FPO in coordination with the GROMOR is providing soil testing services with concessional rates to its member farmers. The FPO is covering 5,000 acres of cultivated land in 11 villages. The FPO is supported by the Society for Elimination of Rural Poverty (SERP), Government of Telangana, with a sanctioned amount of ₹25 lakh.

Kashimnagar Farmer Producer Company Limited (KFPCL): Kashimnagar Farmer Producer Company Limited is a Farmer Producer Company located at Anjanagiri, Wanaparthi, Telangana – 509103. It was incorporated on 6th March 2019 and is registered with the Registrar of Companies, Hyderabad, under CIN/Registration No. U01100TG2019PTC131110. Its registered primary activity falls under NIC 011 – growing of crops, market gardening and horticulture. The company has 500 members with a paid up share capital of ₹5 lakh. The FPO obtained seed and fertilizer licenses. The FPO is covering 6 villages with approximately 1,200 acres of cultivated field. The FPO is supported by NGO (Youth for Action) & NABARD for its development. NABARD is also providing ground nut seeds to the members of the FPO free of cost.

Nagarkurnool Farmers Producer Company Limited (NGFPCL): Nagarkurnool Farmers Producer Company Limited is a Farmer Producer Company located at 2-44, Bondal Pally, Nagarkurnool Mandal, Telangana – 509209. It was incorporated in the year 2019 and is registered with the Registrar of Companies, Hyderabad, under CIN/Registration No. U01100TG2019PTC130587. The FPO has 500 Farmers with a Paid up share capital of ₹5 lakh. The FPO obtained seed and fertilizer licenses. Its registered agricultural activity falls under growing of crops, market gardening and horticulture. The FPO is covering 9 Villages with approximately 1000 acres of cultivated land. The FPO is supported by NABARD. NABARD also provided ground nut oil machinery and ground nut seeds to the FPO at free of cost.

Table 2 presents a comparative overview of the functional activities and services offered by six selected Farmer Producer Organizations (FPOs), namely KTFPCL, DRMPCL, A(S)FPCL, NFPCL, KFPCL, and NGFPCL. The table highlights the extent to which these FPOs provide various support services to their member farmers, ranging from input supply to marketing facilitation.

Table 2: Functional Activities and Services of Selected Farmer Producer Organizations

S. NO	Services & Activities of the FPO	KTFPCL	DRMPCL	A(S)FPCL	NFPCL	KFPCL	NGFPCL
1.	Supply quality production inputs at reasonably lower wholesale rates.	Yes	Yes	Yes	Yes	Yes	Yes
2.	Make available need based production and post-production machinery and equipment on custom hiring basis for members to reduce the per unit production cost.	Yes	Yes	No	No	No	No
3.	Make available value addition at user charge basis on reasonably cheaper rate.	Yes	No	No	No	No	No
4.	Undertake higher income generating activities	No	No	No	No	No	No
5.	Undertake aggregation of smaller lots of farmer-members' produce; add value to make them more marketable.	No	Yes	No	No	No	No
6.	Facilitate market information about the produce for judicious decision in production and marketing.	No	Yes	No	No	No	No
7.	Facilitate logistics services on shared cost basis.	Yes	Yes	No	No	No	No
8.	Market the aggregated produce with better negotiation strength to the buyers and in the marketing channels offering better and remunerative prices.	No	Yes	No	No	No	No

Source: Compiled by the Researcher during Primary data collection

RESULTS AND DISCUSSION

The following section gives the Statistical test results and its analysis for understanding the performance of the FPOs through the perceptions of the member Farmers.

Table 3 presents the results of the reliability test conducted to assess the internal consistency of the 31 perception-related questions included in the FPO questionnaire. The questions were designed to capture the perceptions of FPO member farmers regarding various aspects of FPO functioning and the benefits derived from FPO membership. The reliability of these questions was assessed using Cronbach's Alpha.

Table 3: Reliability Test of Perception Statements of the FPO Questionnaire	
Cronbach's Alpha	Number of Questions
.849	31
Source: Compiled and Analyzed from Primary Data	

The Cronbach's Alpha value was found to be 0.849. Since the value is above the generally accepted threshold of 0.70, the perception statements demonstrate a high level of internal consistency and reliability. This indicates that the 31 questions are consistently measuring the underlying perception-related aspects of FPO membership. Therefore, the questionnaire can be considered reliable and suitable for further statistical analysis including descriptive analysis.

Table 4 presents the descriptive statistics of farmers' perceptions regarding the functioning of their Farmer Producer Organizations (FPOs), based on responses from a sample of 400 farmers. The perceptions are measured across 31 dimensions, covering areas such as input supply, access to machinery, storage and transportation facilities, marketing support, insurance services, welfare measures, training, and awareness programmes. Each aspect is evaluated using mean scores, standard deviations, and ranges, which together provide insights into the average level of satisfaction, variability of opinions, and the spread of responses among farmers. This statistical summary serves as a crucial indicator of how effectively FPOs are meeting the expectations of their members, highlighting both their strengths and weaknesses.

It can be observed that farmers' perceptions towards the functioning of their FPOs varied considerably across the 31 indicators. The highest mean score was recorded for the provision of quality production inputs (Mean = 4.75), indicating that farmers were highly satisfied with the FPOs' role in providing quality inputs. This was followed by recommendation to farmer friends and relatives to join the FPO (Mean = 4.30) and awareness programmes on soil fertility improvement (Mean = 4.22). Farmers also expressed favourable perceptions regarding soil testing services (Mean = 4.01), productivity improvement programmes (Mean = 3.99), water conservation awareness (Mean = 3.92), awareness of organic fertilizers and pesticides (Mean = 3.85), training activities (Mean = 3.75), cooperative farming (Mean = 3.57), CSR fund liaison (Mean = 3.28), risk mitigation techniques (Mean = 3.16), research and experimental activities (Mean = 3.06), and awareness of government and private schemes (Mean = 3.03). The overall satisfaction with FPO functioning was also relatively high (Mean = 3.94), suggesting a generally favourable perception among the respondents.

In contrast, farmers reported relatively weak perceptions regarding several post-production, marketing, welfare and financial support services. The lowest mean was observed for processing of crop insurance policies (Mean = 1.35), followed by awareness of crop insurance schemes (Mean = 1.45), E-NAM aggregation (Mean = 1.47), assistance in claim settlement (Mean = 1.47), welfare measures (Mean = 1.59), storage facilities (Mean = 1.60), processing units (Mean = 1.69), income-generating activities (Mean = 1.74), loan processing assistance (Mean = 1.82), and medical camps (Mean = 1.89). Similarly, perceptions regarding aggregation and value addition of farmers' produce (Mean = 1.98), transportation facilities (Mean = 2.08), marketing with better negotiation strength (Mean = 2.13), and provision of need-based farming and post-production machinery (Means = 2.34 and 2.33, respectively) were relatively low. These results indicate that FPOs are currently perceived as stronger in agricultural input supply and awareness activities than in post-harvest management, marketing, insurance, welfare and financial facilitations expressed.

Table 4: Descriptive Statistics of Farmers Perception Towards Functioning of their FPO

S. No	Perceptions	Sample Size	Mean	Standard Deviation	Range
1.	My FPO provides quality production inputs.	400	4.75	0.484	2
2.	My FPO makes available need based farming machinery and equipment.	400	2.34	1.417	4
3.	My FPO makes available need based post production machinery and equipment	400	2.33	1.292	4
4.	My FPO provides storage facility	400	1.60	0.963	3
5.	My FPO provides transportation facilities	400	2.08	1.002	3
6.	My FPO undertakes higher income generating activities	400	1.74	0.857	3
7.	My FPO aggregate farmers' produce and add value to make it more marketable.	400	1.98	0.931	3
8.	My FPO facilitates market information	400	2.58	1.033	4
9.	My FPO markets the aggregated products with better negotiation strength.	400	2.13	1.001	3
10.	My FPO acts as aggregator for E-NAM.	400	1.47	0.633	2
11.	My FPO organises programmes to create awareness about water conservation methods.	400	3.92	.764	3
12.	My FPO extends soil testing services.	400	4.01	1.100	4
13.	My FPO organises programmes to create awareness how improve the soil fertility.	400	4.22	0.885	4
14.	My FPO organises programmes to create awareness about how to improve productivity.	400	3.99	0.851	4
15.	My FPO organises programmes to create awareness of organic fertilisers & pesticides.	400	3.85	0.797	3
16.	My FPO organises programmes to create awareness about the various Govt. & private schemes.	400	3.03	1.400	4
17.	My FPO organises medical camps.	400	1.89	1.055	4
18.	My FPO helps its members in the processing of loans from the financial institutions.	400	1.82	1.076	4
19.	My FPO creates awareness about various crop insurance schemes/policies.	400	1.45	0.654	3

20.	My FPO creates awareness about various risk mitigation techniques / methods.	400	3.16	0.956	4
21.	My FPO helps in processing crop insurance policies.	400	1.35	0.612	3
22.	My FPO helps in claim settlement process.	400	1.47	0.686	3
23.	My FPO takes other welfare measures.	400	1.59	0.734	3
24.	My FPO has processing units.	400	1.69	0.806	3
25.	My FPO conducts research & experimental activities	400	3.06	0.988	4
26.	My FPO encourages cooperative farming.	400	3.57	0.719	4
27.	My FPO conducts training activities.	400	3.75	0.625	4
28.	My FPO liaisons for CSR funds.	400	3.28	1.169	4
29.	Cooperative Society Performance is better than FPO	400	3.19	1.153	4
30.	I am satisfied about the functioning of FPO.	400	3.94	0.646	2
31.	I recommend to my farmer friends and relatives to join the FPO as a member.	400	4.30	0.542	2

Source: Compiled and Analyzed from Primary Data

Table 5 provides a consolidated view of farmers' perception levels towards the functioning of their respective Farmer Producer Organizations (FPOs), categorized into three ranges: Low (1–2.60), Moderate (2.61–3.40), and High (3.41–5). The data, drawn from a sample of 400 farmers across six FPOs, highlights the distribution of perceptions in percentage terms as well as absolute numbers.

Table 5: Farmers Perception Levels Towards Functioning of their FPO

S.NO	Name of the FPO	Perception level			Total
		Low (1-2.60)	Moderate (2.61-3.40)	High (3.41-5)	
1.	A(S)FPCL	18	46	2	66
		27.3%	69.7%	3.0%	100.0%
2.	DMRPCL	3	49	15	67
		4.5%	73.1%	22.4%	100.0%
3.	KTFPCL	24	43	0	67
		35.8%	64.2%	0.0%	100.0%
4.	NFPCL	21	45	0	66

		31.8%	68.2%	0.0%	100.0%
5.	KFPCL	21	46	0	67
		31.3%	68.7%	0.0%	100.0%
6.	NGFPCL	28	39	0	67
		41.8%	58.2%	0.0%	100.0%
Total		115	268	17	400
		28.8%	67.0%	4.3%	100.0%
Source: Compiled and Analyzed from Primary Data					

It can be observed that out of the 400 farmers, a majority of 268 farmers (67.0%) had a moderate level of perception, while 115 farmers (28.8%) had a low level of perception and only 17 farmers (4.3%) reported a high level of perception. At the FPO level, DMRPCL had the most favourable distribution, with 22.4 per cent of its farmers reporting a high perception level, followed by A(S)FPCL with 3.0 per cent. In contrast, KTFPCL, NFPCL, KFPCL and NGFPCL had no farmers in the high perception category. The proportion of farmers with low perception was highest in NGFPCL (41.8%), followed by KTFPCL (35.8%), KFPCL (31.3%), NFPCL (31.8%) and A(S)FPCL (27.3%), whereas DMRPCL recorded the lowest proportion of farmers with low perception (4.5%). The moderate perception category was predominant across all six FPOs, ranging from 58.2 per cent in NGFPCL to 73.1 per cent in DMRPCL. These findings indicate considerable variation in farmers' perceptions across FPOs, with DMRPCL showing comparatively better perceived performance.

The findings conclude that the overall functioning of the selected FPOs was perceived at a moderate level by the majority of member farmers. The relatively small proportion of farmers with high perception (4.3%) suggests that the FPOs have considerable scope to improve their services and operational effectiveness. DMRPCL emerged as the relatively better-performing FPO in terms of farmers' perception, whereas NGFPCL requires greater attention due to its comparatively high proportion of farmers with low perception.

Table 6 presents the descriptive statistics of farmers' perceptions towards FPO services across six selected Farmer Producer Organizations (FPOs), based on a total sample size of 400 respondents. The table reports the mean scores, standard deviations, and standard errors for each FPO, thereby offering a comparative picture of how farmers evaluate the functioning and service delivery of their organizations.

It can be observed that among six FPOs, DMRPCL recorded the highest mean perception score of 3.1184, indicating relatively better satisfaction and a more favourable perception of its services and overall effectiveness. In contrast, KFPCL (2.6254) and NFPCL (2.6637) recorded the lowest mean scores, suggesting comparatively weaker perceptions regarding service delivery and benefits.

The overall mean perception score of 2.7576 indicates that farmers, on average, have a moderate perception of the functioning of FPOs. Further, the relatively low standard deviations, ranging from approximately 0.12 to 0.35, indicate that farmers' responses within each FPO are fairly consistent. NFPCL and KFPCL showed the least variation in perceptions, reflecting greater uniformity among farmers despite their relatively lower satisfaction levels, whereas DMRPCL exhibited comparatively higher variability (SD = 0.349), suggesting some differences in members' experiences.

Table 6: Descriptive Statistics - Farmers' Perception towards FPO Services across Selected Farmer Producer Organizations

Name of the FPO	Sample Size	Mean	Standard Deviation	Standard Error
A(S)FPCL	66	2.7649	.28121	.03461
DMRPCL	67	3.1184	.34944	.04269
KTFPCL	67	2.7044	.29247	.03573
NFPCL	66	2.6637	.14113	.01737
KFPCL	67	2.6254	.12468	.01523
NGFPCL	67	2.6673	.30526	.03729
Total	400	2.7576	.31075	.01554

Source: Compiled and Analyzed from Primary Data

Farmers' perceptions about FPO services are moderate overall, but vary significantly across organizations. DMRPCL stands out positively, with the highest mean perception score, suggesting better service delivery and member satisfaction. KFPCL and NFPCL lag behind, with the lowest mean scores, indicating weaker performance and limited perceived benefits.

Table 7 presents the results of the Chi-Square test conducted to examine the association between farmers perception levels and the functioning of their respective Farmer Producer Organizations (FPOs).

Table 7: Chi-Square Test for Farmer Perception Levels Towards Functioning of their FPO

	Value	Degrees of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	84.065	10	.000

Source: Compiled and Analyzed from Primary Data

As it can be observed from the Pearson Chi-Square value of 84.065 is perceived statistically significant at the 1 per cent level, with 10 degrees of freedom ($p < 0.001$). Hence, the null hypothesis is rejected and concluded that there is a significant difference in the perception levels of member farmers of different FPOs. As the Chi-square test revealed that there is significant difference in the Perception levels of the farmer members towards the functioning of their FPOs, Researchers attempted to test One Way ANOVA to get an idea as to which FPO is performing better.

Assumptions of One-Way Anova

The One-Way ANOVA applied in the present study is based on the following assumptions. First, independence of observations is assumed, meaning that the perception response given by one farmer is independent of the response given by another farmer. In the present study, farmers were selected from the six different FPOs, and each respondent contributed one perception score to the analysis. Second, the dependent

variable should be measured at approximately an interval or continuous level. In this study, the ANOVA dependent variable is the overall perception score of farmers towards FPO services, obtained from the perception statements in the questionnaire. Although individual Likert-scale items are ordinal in nature, the combined perception score based on multiple items is treated as an approximately continuous measure for the purpose of ANOVA. Third, the observations within each FPO group should be approximately normally distributed. Thus, the overall perception scores of farmers within A(S)FPCL, DMRPCL, KTFPCL, NFPCL, KFPCL and NGFPCL are assumed to follow an approximately normal distribution. Given the relatively large and reasonably comparable group sizes (66–67 farmers in each FPO), the ANOVA is generally robust to moderate departures from normality. Fourth, homogeneity of variances is assumed, which means that the variability of perception scores should be approximately similar across the six FPO groups. Fifth, the groups should be mutually independent, meaning that a farmer included in one FPO group should not simultaneously be included in another FPO group. In the present study, the six FPOs constitute separate groups of member farmers. Therefore, the One-Way ANOVA is appropriate for testing whether the mean perception scores differ significantly across the six selected FPOs, provided these assumptions are reasonably satisfied.

Table 8 presents the results of the One-Way ANOVA test conducted to assess differences in farmers' perceptions towards FPO services across six selected Farmer Producer Companies. The analysis compares the variance between groups (different FPOs) and within groups (farmers belonging to the same FPO) to determine whether the observed differences in mean perception scores are statistically significant.

Table 8: One-Way ANOVA of Farmers' Perception towards FPO Services across Selected Farmer Producer Companies

Source of Variance	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Between Groups	11.215	5	2.243	32.354	.000
Within Groups	27.315	394	.069		
Total	38.531	399			

Source: Compiled and Analyzed from Primary Data

It can be observed that the ANOVA results of between Groups Sum of Squares is 11.215, F test ratio is 32.354 and p-value is 0.000. Since p-value < 0.05, the differences in perception scores across FPOs are statistically significant. This confirms that farmers' perception levels are not the same across all FPOs. The functioning of each FPO significantly influences how members perceive its services. Since the one-way ANOVA indicated differences in mean perception scores across the selected FPOs, Duncan's post-hoc test was conducted to identify the specific FPO groups that differed significantly

Table 9 presents the results of the Post Hoc Test comparing mean perception scores of farmers across six selected Farmer Producer Organizations (FPOs). The analysis groups FPOs into subsets at an alpha level of 0.05, thereby identifying statistically significant differences in farmers' perceptions.

Table 9: Duncan's Post-Hoc Comparison of Mean Farmers Perception Scores Across Selected FPOs

Name of the FPO in which you have registered	Sample Size	Subset for alpha = 0.05		
		1	2	3
KFPCL	67	2.6254		

NFPCL	66	2.6637		
NGFPCL	67	2.6673		
KTFPCL	67	2.7044	2.7044	
A(S)FPCL	66		2.7649	
DMRPCL	67			3.1184
Sig.		.116	.185	1.000
Source: Compiled and Analyzed from Primary Data				

It can be observed that Duncan's post-hoc test showed that KFPCL, NFPCL, NGFPCL and KTFPCL formed the first homogeneous subset, KTFPCL and A(S)FPCL formed the second, while DMRPCL recorded the highest perception score (mean = 3.1184) and formed a separate subset. The comparatively better performance of DMRPCL may be attributed to its strong women-centric leadership, institutional support from NABARD and APMAS, diversified services such as input supply, soil testing, seed treatment, organic farming, NPM methods and Pandiri Pantalu, and its market linkage with Rathnadeep Supermarket for direct procurement of vegetables. These initiatives may have contributed to improved production, reduced transaction and intermediary costs, assured market access and timely payments, thereby enhancing farmers' perceptions and economic benefits. In contrast, the other FPOs appear to have relatively fewer comprehensive services and market linkages. However, these findings indicate an association between FPO-wise differences and farmers' perceptions rather than a direct causal effect.

Table 10 provides a comparative analysis of the mean total revenue, explicit cost, accounting profit, implicit cost, and economic profit per acre of farmers before and after joining their respective Farmer Producer Organizations (FPOs). The data, compiled from six selected FPOs, highlights the financial impact of membership on farm-level economics

Table 10: Comparison of Mean Total Revenue, Explicit Cost, Accounting Profit, Implicit Cost, Economic Profit per Acre before and after joining the FPO

Name of the FPO in which you have registered	Status	Mean Total Revenue per Acre (Rs./-)	Mean Total Explicit Cost per Acre (Rs./-)	Mean Total Accounting Profit per Acre (Rs./-)	Mean Total Implicit Cost per Acre (Rs./-)	Mean Total Economic Profit per Acre (Rs./-)
A(S)FPCL	Before	159247.73	88356.44	70891.29	75000	-4108.27
	After	161984.85	86597.95	75386.9	70000	5386.9
DMRPCL	Before	468541.79	380383.58	88158.21	75000	13158.21
	After	480014.93	364684.03	115330.9	70000	45330.9
KTFPCL	Before	186269.40	112126.87	74142.53	75000	-857.47
	After	193586.57	109965.82	83620.75	70000	13620.75
NFPCL	Before	156048.33	94890.00	61158.33	75000	-13841.67

	After	157959.70	90721.97	67237.73	70000	-2762.27
KFPCL	Before	153294.18	95385.07	57909.11	75000	-17090.90
	After	158537.46	90413.06	68124.40	70000	-1875.60
NGFPCL	Before	157034.03	98355.67	58678.36	75000	-16321.64
	After	160008.06	92854.48	67153.58	70000	-2846.42

Source: Compiled and Analyzed from the Primary Data

The **implicit cost** for farmers comprises three components: (i) foregone wages estimated at ₹200 per day for 300 days, amounting to ₹60,000 annually; (ii) the foregone rental value of farmland, calculated at ₹10,000 per year; and (iii) a risk premium of ₹5,000 per acre to account for uncertainties and inconveniences such as untimely supply, non-guaranteed quality of inputs, and procurement difficulties. Prior to joining FPOs, farmers frequently faced challenges including unavailability of inputs, prolonged waiting periods, inflated prices charged by private shops, and risks associated with fake or substandard seeds. Specifically, at least one week of waiting per crop for two crops annually adds up to 15 days, which, at the rate of ₹200 per day, amounts to ₹3,000 in foregone wages. In addition, the risk of sub-standard or fake inputs is valued at ₹1,000 per crop, totaling ₹2,000 annually. Thus, the monetary value of these inconveniences—waiting periods and risks of poor-quality inputs—was quantified at ₹5,000 per acre, based on farmers' responses. This cost was borne by farmers when they were not members of FPOs. However, joining FPOs eliminated these risks by ensuring timely supply of quality inputs, thereby reducing the implicit cost. Consequently, the implicit cost before FPO membership is escalated by ₹5,000 per acre.

The estimates of Total Revenue and Accounting Costs, both before and after joining the FPO, were derived from the primary data provided by farmers. To ensure comparability, farmers were specifically requested to furnish information only for years that reflected normal agricultural conditions. Accordingly, data pertaining exclusively to such normal years were considered for analysis. The before-and-after information was reported by current FPO member farmers regarding their economic conditions before and after joining the FPO. The monetary values relating to the pre-membership period (2019) were converted into real and comparable monetary values at the price level prevailing as on 31st December 2025, thereby accounting for changes in the purchasing power of money and facilitating a meaningful comparison with post-membership values. However, as the pre-membership information was collected retrospectively, the possibility of recall bias cannot be completely ruled out. Moreover, changes in revenue, costs and profitability may have been influenced by factors such as crop prices, weather conditions, technological changes, government programmes and market conditions. Therefore, the observed differences between the pre- and post-membership periods are interpreted as changes associated with the period of FPO membership rather than as evidence of a direct causal effect of FPO membership. DMRPCL recorded the highest improvement in economic profit, followed by KTFPCL and A(S)FPCL, while NFPCL, KFPCL and NGFPCL continued to report negative economic profits after joining, although their losses were reduced. Overall, the findings indicate that the post-membership period was associated with higher revenue, lower explicit costs, higher accounting profits and improved economic profitability across the selected FPOs, with the magnitude of change varying among FPOs.

Assumptions of Paired Sample T-Test

The paired-sample t-test used in the present study assumes that the observations are paired, as the same farmers provide economic profit data before and after joining the FPO. The pairs should be independent of one another, with each farmer contributing only one before-and-after pair. The dependent variable, economic profit per acre (₹/acre), should be measured on a continuous ratio scale. The difference scores between post-membership and pre-membership economic profit should be approximately normally distributed and should not contain extreme outliers that could influence the results. Further, the economic profit should be calculated consistently

for both periods using the same definition and unit of measurement, with pre-membership values adjusted to the 31 December 2025 price level to ensure comparability.

Table 11 presents the results of the paired sample t-test conducted to compare the mean total economic profit per acre of farmers before and after joining their respective Farmer Producer Organizations (FPOs). The analysis measures whether the differences in economic profit are statistically significant across six FPOs.

Table 11: Paired sample t-test for the Total Economic Profit per acre Before and After joining the FPO

Name of the FPO in which you have registered	Status	Mean Differences	t	Degrees of Freedom	Significance value (2-tailed)
A(S)FPCL	After Joining FPO - Before Joining FPO	9495.17	23.524	65	.000
DMRPCL	After Joining FPO - Before Joining FPO	32172.69	2.275	66	.026
KTFPCL	After Joining FPO - Before Joining FPO	14478.22	10.338	66	.000
NFPCL	After Joining FPO - Before Joining FPO	11079.4	2.929	65	.005
KFPCL	After Joining FPO - Before Joining FPO	15215.3	6.902	66	.000
NGFPCL	After Joining FPO - Before Joining FPO	13475.22	3.250	66	.002

Source: Compiled and Analyzed from Primary Data collected

It can be observed that all six FPOs recorded perceived differences in total economic profit per acre between the pre- and post-membership periods. The p-values for A(S)FPCL, DMRPCL, KTFPCL, NFPCL, KFPCL and NGFPCL were 0.000, 0.026, 0.000, 0.005, 0.000 and 0.002, respectively, all of which are below the 5 per cent level of significance. Hence, the null hypothesis stating that there is no difference in total economic profit per acre before and after joining the FPO is rejected for all six FPOs.

Among the six FPOs, DMRPCL recorded the largest mean improvement in economic profit of Rs. 32,172.69 per acre, followed by KFPCL (Rs. 15,215.30), KTFPCL (Rs. 14,478.22), NGFPCL (Rs. 13,475.22), NFPCL (Rs. 11,079.40) and A(S)FPCL (Rs. 9,495.17). The relatively higher economic profit observed for DMRPCL may be associated with its women-centric leadership, institutional support from NABARD and APMAS, and diversified activities such as input supply, soil testing, seed treatment, organic farming, NPM practices and Pandiri Pantalu (protected cultivation). Its direct market linkage with Rathnadeep Supermarket for vegetable procurement may also have contributed to improved market access, timely payments, and reduced intermediary and transportation costs.

These findings suggest an association between FPO membership and improved economic profitability among the sampled farmers. However, the observed improvement should not be interpreted as evidence that FPO membership alone caused the increase in economic profit, as other factors such as changes in input and output

prices, production practices, crop composition, institutional support, and market conditions may also have influenced the observed outcomes.

CONCLUSION

The study on the performance of Farmer Producer Organizations (FPOs) in Telangana demonstrates that FPOs have emerged as vital institutions for strengthening small and marginal farmers through collective action, improved access to inputs, and better market linkages. The analysis reveals that while FPOs are effective in supplying quality inputs and providing certain support services, their performance remains uneven across functional areas such as value addition, logistics, marketing, and income-generating activities.

Farmers' perceptions, assessed using descriptive statistics, chi-square tests, ANOVA and post-hoc comparisons, indicate moderate levels of satisfaction, with notable variation across the selected FPOs. The paired t-test also indicates a noticeable change in economic profit per acre between the pre- and post-membership periods. The magnitude of this change varied across FPOs, which may be associated with differences in institutional support, market linkages and resource mobilisation. However, these findings should not be interpreted as establishing a direct causal effect of FPO membership, as other factors may also have influenced the observed changes.

The findings of the present study are broadly in line with the reviewed literature. The study confirms that FPO membership is associated to improved economic performance through higher accounting and economic profitability, better market access and reduced production costs. The differences observed among FPOs and the continuing constraints related to finance, infrastructure, marketing and management are also consistent with previous studies. Thus, the present research supports the existing literature by providing empirical evidence on the economic impact of FPO membership in Telangana.

Overall, the findings suggest that FPOs are associated with positive changes in farmers' economic conditions and empowerment. However, their long-term sustainability and effectiveness may depend on factors such as professional management, adequate infrastructure, financial support, and stronger market integration. Strengthening these areas could help FPOs further enhance farmer welfare and support the development of a more sustainable agricultural sector.

Contribution of the Study

This study makes significant contributions to multiple stakeholders by providing evidence-based insights into the functioning and impact of Farmer Producer Organizations (FPOs):

- **For Farmers:** It highlights how collective participation in FPOs improves access to quality inputs, reduces costs, enhances bargaining power, and leads to measurable economic upliftment. Farmers gain clarity on the tangible benefits of membership compared to their pre-membership condition.
- **For Society:** The study underscores the role of FPOs in rural empowerment, poverty alleviation, and sustainable agricultural practices. By strengthening small and marginal farmers, FPOs contribute to food security, equitable growth, and community development.
- **For Policy Makers:** The findings provide empirical evidence on the strengths and weaknesses of FPOs, guiding future interventions. It informs government agencies about areas requiring support—such as infrastructure, credit access, and market linkages—ensuring that policies are more targeted and effective.
- **For Other Stakeholders** (NGOs, Financial Institutions, Private Sector): The study demonstrates opportunities for collaboration in capacity building, financing, technology adoption, and market integration. It shows how partnerships can enhance FPO sustainability and farmer welfare.

In essence, the study bridges the gap between academic research and practical application, offering actionable insights that can help farmers, society, and institutions collectively strengthen the agricultural economy.

Suggestions

Drawing from the findings on the performance of Farmer Producer Organizations (FPOs) in Telangana, the following suggestions can be made to strengthen their functioning and enhance farmer welfare:

- Strengthen storage, processing, grading, packaging and value-addition facilities.
- Improve collective marketing and establish direct linkages with organized retailers, processors and institutional buyers.
- Enhance crop insurance awareness, enrolment and claim-settlement assistance.
- Facilitate institutional credit and loan-processing support for members.
- Provide shared farm machinery and affordable transportation facilities.
- Replicate successful practices of better-performing FPOs, particularly DMRPCL.
- Adopt FPO-specific capacity-building programmes based on identified service gaps.
- Promote income-generating and diversified activities to improve farmers' profitability.
- Strengthen regular member feedback and participatory decision-making.
- Focus policy support on sustainability, service quality and economic profitability rather than merely increasing the number of FPOs.

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