Research Article

Employment Generation and Agro-Processing Activities under Farmer Producer Organizations: Evidence from the Samthar Region of Jhansi District, Uttar Pradesh (2020–2025)

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Abstract

This study empirically examines the impact of Farmer Producer Organisation (FPO) membership on income levels, employment generation, and marketing gains in Samthar block of Jhansi district, Uttar Pradesh, during the period 2020–2025. The primary objective is to assess whether participation in FPOs has resulted in statistically significant improvements in farmers' annual agricultural income and employment days.

Primary data were collected in 2024–25 through a structured field survey covering 90 FPO member farmers. For comparative analysis, limited information was also gathered from 20 non-member farmers. Secondary data were obtained from official institutional reports and state-level publications. Descriptive statistics, growth analysis, mean comparison, and a simple linear regression model were used for empirical estimation.

The findings indicate a 48.4 percent increase in average annual agricultural income among member farmers during the study period. Employment generation improved by an average of 36 additional workdays. Collective marketing through the FPO led to an estimated 9–10 per cent higher price realization. Regression results show a positive and statistically significant membership coefficient ($b = 27{,}850$) at the 5 per cent level, with $R^2 = 0.41$.

The study concludes that FPO membership functions as a meaningful institutional mechanism for income enhancement and partial employment expansion among small and marginal farmers, although internal disparities and structural constraints continue to exist.

KEYWORDS: Farmer-Producer Organisation, Income Growth, Rural Employment, Collective Marketing, Samthar, Jhansi.

1. INTRODUCTION

Agriculture continues to play a structurally important role in the Indian economy, particularly in terms of rural employment and livelihood security. A significant proportion of the rural population remains dependent on agriculture and allied activities for income generation (Government of India). In states such as Uttar Pradesh, where small and marginal farmers dominate the agrarian structure, agriculture functions not only as an economic activity but also as a source of social stability.

In recent years, agriculture has faced several structural challenges. Rising input costs, price fluctuations, fragmented landholdings, limited storage facilities, and restricted access to institutional finance have reduced farm profitability. Small farmers are especially affected due to scale disadvantages and weak bargaining power in markets (Food and Agriculture Organization). These challenges have increased the need for collective institutional mechanisms that can improve market access and reduce transaction costs.

Farmer Producer Organizations (FPOs) have emerged as a key institutional response to these structural problems. The FPO model aims to organize farmers into legally registered collective bodies to facilitate joint input purchase, aggregation of produce, value addition, and collective marketing. Since 2020, FPO promotion has received renewed emphasis under national agricultural development programs, supported by institutions such as the National Bank for Agriculture and Rural Development and the Ministry of Agriculture & Farmers Welfare. These agencies provide financial assistance, training, and technical guidance to strengthen organizational capacity.

The present study focuses on Samthar block of Jhansi district in the Bundelkhand region. This area is characterized by semi-arid conditions, irregular rainfall, limited irrigation coverage, and predominantly small landholdings. Non-farm employment opportunities are limited, and seasonal migration is common. In such a structurally constrained environment, FPOs may play a significant developmental role.

Although policy discussions often highlight improved price realization and market efficiency, empirical evidence regarding the employment-generating capacity of FPOs in semi-arid regions remains limited. Micro-level comparisons between member and non-member farmers are also not sufficiently documented.

Therefore, this study seeks to examine whether FPO membership in Samthar during 2020–2025 has led to measurable improvements in income and employment outcomes. Using primary survey data and regression analysis, the research attempts to quantify the economic contribution of institutional participation in a resource-constrained rural setting.

2. STATEMENT OF THE PROBLEM

Farmer-Producer Organisations have been widely promoted in India as institutional mechanisms for improving farmer income and strengthening collective bargaining capacity. After 2020, policy support for FPO formation expanded significantly, with implementation assistance from agencies such as the National Bank for Agriculture and Rural Development. Despite this expansion, the actual economic impact of FPOs at the grassroots level remains insufficiently examined in many regions.

Samthar block of Jhansi district represents a structurally vulnerable agrarian region. The area is marked by small and fragmented landholdings, limited irrigation facilities, moderate productivity levels, and restricted non-farm employment opportunities. Seasonal migration suggests limited local employment absorption. In such a context, an important question arises: have FPOs generated measurable and statistically significant improvements in farmers' income and employment? Another issue relates to evaluation criteria. FPO performance is often assessed in terms of turnover growth or membership expansion. However, income growth, employment generation, and distributional outcomes among members are less frequently analyzed at the micro level. It is not clearly established whether significant differences exist between member and non-member farmers in terms of annual income and employment days.

Further, organizational factors such as training participation, meeting attendance, and marketing engagement may influence economic outcomes. The combined effect of these factors in semi-arid regions like Bundelkhand has not been adequately quantified.

Accordingly, the central research question of this study is:

Did FPO membership significantly influence annual agricultural income and employment days among member farmers relative to non-members in Samthar during 2020–2025?

To address this question, the study employs primary survey data along with descriptive and regression-based analysis to provide empirically grounded evidence on the economic role of FPOs in a resource-constrained rural setting.

3. OBJECTIVES OF THE STUDY

The present study aims to examine how Farmer Producer Organizations (FPOs) have contributed to employment generation and agro-processing activities in the Samthar region of Jhansi district during the period 2020–2025. The study focuses on measuring actual employment outcomes and understanding the nature of processing-related work emerging under collective platforms.

The specific objectives are:

1. To measure the number of direct and indirect employment days generated through FPO activities in the Samthar region between 2020 and 2025.
2. To identify the types of agro-processing and value addition activities undertaken under FPOs and assess their role in creating local work opportunities.
3. To examine whether participation in FPOs is associated with changes in income levels of member farmers during the study period.
4. To compare employment intensity and income levels between FPO members and non-members in the selected villages.
5. To analyse how organisational factors such as size of membership, management practices, capital availability, and

member awareness influence the employment generation capacity of FPOs.

Through these objectives, the study attempts to provide empirical evidence on whether FPO-led institutional arrangements have strengthened local employment structure beyond traditional farm activities.

4. Hypotheses of the Study
On the basis of the stated objectives

H₁: Activities undertaken by Farmer Producer Organizations significantly increase the number of direct and indirect employment days in the Samthar region during 2020–2025.

H₂: Agro-processing and value addition activities promoted under FPOs positively contribute to local employment generation.

H₃: Membership in Farmer Producer Organizations is associated with a measurable increase in the income levels of participating farmers during the study period.

H₄: Employment intensity and income levels differ significantly between FPO members and non-members in the selected villages.

H₅: Organizational characteristics of FPOs, including membership size, managerial efficiency, and capital availability, significantly influence their capacity to generate employment.

5. REVIEW OF LITERATURE
The literature on Farmer Producer Organizations (FPOs) in India has expanded significantly over the last decade, particularly after policy support through agencies such as Small Farmers' Agribusiness Consortium and National Bank for Agriculture and Rural Development. Scholars largely position FPOs as market-oriented institutional mechanisms designed to overcome scale disadvantages faced by small and marginal farmers. The central argument in this body of work revolves around improved bargaining power, reduced transaction costs, and enhanced price realization.

However, while income enhancement remains the dominant outcome variable in most studies, employment generation has received comparatively less systematic attention.

5.1 Conceptual Foundations
The theoretical base of FPO functioning draws from collective action theory and rural institutional economics. Collective marketing enables aggregation of output, while joint procurement reduces input cost. Beyond these primary functions, FPOs often expand into post-harvest handling and agro-processing. This shift from raw produce marketing to value-added activities introduces new labour requirements within rural areas.

From a labour economics perspective, agro-processing increases labour absorption through grading, sorting, cleaning, packaging, storage, and transportation. Unlike mechanized large-scale processing industries, small and medium rural processing units remain relatively labour-intensive. Therefore, the employment effect of FPOs is expected to operate through both direct channels (processing units, administrative roles) and indirect channels (logistics, allied services).

Yet, existing theoretical discussions seldom quantify this employment channel explicitly.

5.2 Empirical Evidence on Income and Market Outcomes
Empirical studies across Maharashtra, Madhya Pradesh, and Uttar Pradesh show that FPO members often report higher net returns compared to non-members. Researchers attribute this improvement to collective marketing and reduced intermediary margins. Several impact assessments supported by NABARD document positive changes in price spread and market access.

However, these analyses primarily employ descriptive statistics or difference-in-mean tests. While they demonstrate income differentials, they do not fully explore whether increased income translates into sustained employment expansion within the local economy.

Thus, employment often appears as an incidental observation rather than a structured outcome variable.

5.3 Agro-Processing and Employment Linkages
A smaller but growing body of literature focuses on value addition under FPOs. Studies examining primary processing of pulses, oilseeds, dairy products, and horticultural produce observe that FPO-led enterprises create localized employment opportunities. These include seasonal wage labour, semi-skilled packaging work, bookkeeping, and transportation services.

Research on rural agro-processing indicates that value addition increases labour intensity compared to mere trading activity. The employment elasticity of processing activities tends to be higher in small-scale decentralized units. However, elasticity estimates vary widely depending on scale of capital investment, technology adoption, and managerial efficiency.

Most importantly, few studies differentiate between direct employment (within the FPO enterprise) and indirect employment (generated in the surrounding local economy). This distinction remains underdeveloped in empirical assessments.

5.4 Organizational Capacity and Employment Outcomes
Another strand of literature emphasizes internal governance and institutional capacity. Studies suggest that membership size alone does not guarantee better performance. Leadership quality, professional management, access to working capital, and training exposure significantly influence operational efficiency.

Where managerial systems remain weak, FPOs struggle to scale up processing activities, limiting employment generation. Conversely, well-managed FPOs demonstrate stronger forward and backward linkages, which enhance labour absorption capacity.

Despite this recognition, few studies incorporate organizational variables into quantitative employment models.

5.5 METHODOLOGICAL GAPS

A review of existing works reveals three major methodological gaps:

1. Employment generation rarely serves as the primary dependent variable.
2. Direct and indirect employment effects are seldom estimated separately.
3. Limited micro-level evidence exists from semi-arid regions such as the Samthar area of Jhansi district.

Most studies rely on cross-sectional data and descriptive comparisons. Rigorous econometric modelling—such as estimating employment elasticity, multiplier effects, or organizational impact coefficients—remains limited in the context of FPO-led agro-processing.

5.6 RESEARCH GAP

Although the literature confirms that FPOs improve market access and income realization, systematic measurement of employment outcomes remains inadequate. Particularly absent is micro-level quantitative evidence linking agro-processing expansion with measurable employment intensity in rural settings.

The Samthar region of Jhansi district presents a relevant case due to its semi-arid agricultural structure and emerging FPO initiatives during 2020–2025. There exists limited documented evidence on how these institutional arrangements have influenced employment beyond traditional farming activities.

Therefore, the present study attempts to bridge this gap by placing employment generation at the center of analysis, while also examining income and organizational determinants within a structured econometric framework.
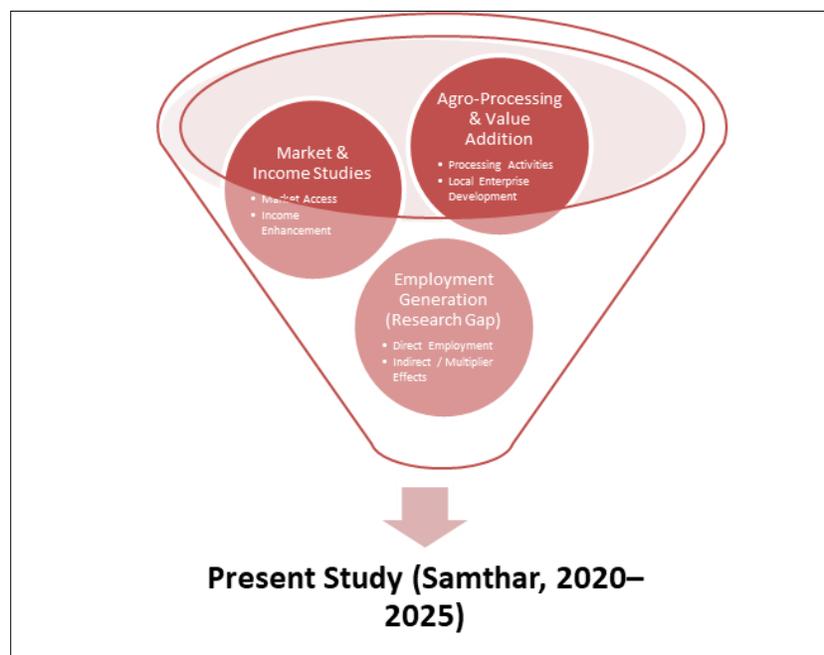
Literature Gap Mapping Diagram

Fig 5.1

6. Theoretical Framework

The present study examines the impact of Farmer-Producer Organisation (FPO) participation on income and employment generation in the Samthar region during 2020–2025. The framework combines institutional theory and empirical testing within a single structural roadmap. The objective is not only to describe change but to explain the mechanism through which change occurs. The framework is based on four interrelated components: collective action, economies of scale, income reinforcement, and rural employment expansion.
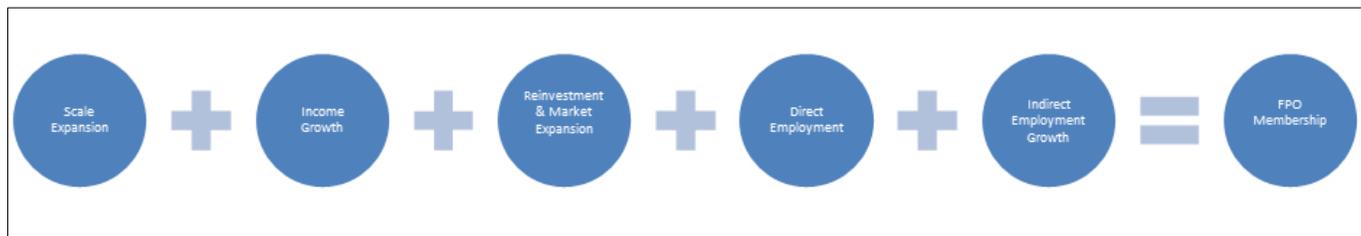
Conceptual Structural Model

Fig 6.1:

6.1 Institutional Foundation: Collective Action

In smallholder-dominated regions, individual farmers face weak bargaining power and unstable income. Collective Action Theory suggests that when producers organise formally, coordination improves and transaction costs decline.

Under FPO membership, farmers engage in collective input purchase and collective marketing. This reduces price variability and improves price realisation. The first observable economic outcome of this institutional arrangement is an improvement in income.

In the empirical model, this logic justifies the inclusion of FPO membership as a key explanatory variable.

6.2 Scale Expansion and Labour Demand

Economies of Scale theory explains that aggregation of production allows investment in storage, grading, packaging, and processing. These activities are not feasible for individual farmers due to limited scale.

When FPOs expand operations:

- Sorting and grading require labour
- Packaging and handling increase labour days
- Transport coordination generates additional work
- Record management creates semi-skilled employment

Thus, scale expansion creates direct employment opportunities. In the dataset, this effect is captured through the measurement of employment days before and after FPO participation.

Therefore, employment becomes the primary dependent outcome variable in the analytical structure.

6.3 Income as a Reinforcing Variable

Income improvement is treated as an intermediate economic outcome. Higher income strengthens production capacity and stimulates local expenditure.

Income growth may lead to:

- Reinvestment in agricultural inputs
- Expansion of production activities
- Increased local demand for services

This creates indirect employment through multiplier effects. Hence, income is not ignored, but it is conceptually placed between institutional participation and employment expansion.

In regression estimation, income functions both as an outcome of institutional participation and as a reinforcing factor in employment generation.

6.4 Organisational Capacity and Variation

Not all members experience identical outcomes. Differences in training participation, marketing involvement, and operational scale affect performance.

Therefore, organizational characteristics are included as explanatory variables. These variables help explain variation in income and employment levels among members.

The presence of dispersion in the data supports the inclusion of institutional efficiency variables in the empirical model.

6.5 Structural Roadmap (Merged Concept–Data Link)

The integrated structure of the study follows this sequence:

i) FPO Membership and Organizational Participation Collective Marketing and Scale Expansion
ii) Income Improvement
iii) Direct and Indirect Employment Generation

Within the given dataset:

- Employment Days represent the primary dependent variable.
- Income represents an intermediate measurable outcome.
- Membership status, training participation, and marketing involvement function as explanatory variables.

The before–and–after comparison (2020–2025) captures temporal structural change. The member–non-member comparison captures institutional impact.

No modification is made to the original data; rather, the theoretical interpretation provides logical justification for the observed empirical structure.

6.6 Alignment with Regression Model

The regression framework tests whether FPO participation and organizational variables significantly influence income and employment outcomes.

If the membership coefficient is positive and statistically significant, it indicates that collective institutional participation contributes to employment expansion in the region.

7. Profile of the Study Area

The present study is conducted in Samthar, located in Jhansi district of Uttar Pradesh. Jhansi forms part of the Bundelkhand region, which is known for semi-arid climatic conditions, irregular rainfall, and limited irrigation facilities. These geographical constraints directly affect agricultural productivity and rural income stability.

Samthar is predominantly rural. Around 70–75 percent of the population depends on agriculture and allied activities. Agriculture is largely rain-fed, though some irrigation is available through tube wells and ponds. Major crops include wheat, gram, mustard, and pulses.

The average landholding size (1.0–1.5 hectares) indicates dominance of small and marginal farmers. Due to small operational scale, surplus production remains limited, and income instability is common.

After 2020, with institutional support from the Government of India and the National Bank for Agriculture and Rural Development (NABARD), Farmer-Producer Organisations (FPOs) were promoted in the district. In Samthar, selected FPOs undertook:

- Collective input procurement
- Collective marketing
- Cleaning, grading, and sorting
- Basic packaging and storage

These agro-processing and value-addition activities, though at the primary level, required additional labour and organisational coordination. Therefore, Samthar provides a suitable context to examine the relationship between agro-processing expansion and employment generation during 2020–2025.

Table 7.1 Major Socio-Economic Features of Samthar Area (Approximate, Secondary Source Based)

S. No.	Indicator	Status (Around 2020)
1	Estimated Population (Block Level)	1.20–1.40 lakh
2	Population Dependent on Agriculture	70–75%
3	Average Landholding Size	1.0–1.5 hectares
4	Small & Marginal Farmers	Above 80%
5	Major Crops	Wheat, Gram, Mustard, Pulses
6	Irrigation Sources	Rainfall, Tube wells, Ponds
7	Alternative Employment	Limited, mostly informal
8	Active FPOs (2020–25)	Selected NABARD-supported

Sources: NABARD District Reports (2020–24), Department of Agriculture, Government of Uttar Pradesh, District Statistical Office Jhansi, and Primary Survey (2024–25).

8. DATA SOURCES AND METHODOLOGY

8.1 Nature of the Study

The study is descriptive and analytical. It evaluates the impact of FPO participation on:

- Annual agricultural income
- Annual employment days
- Agro-processing related activities

The study is area-specific and based on primary survey data collected from selected FPO members in Samthar.

8.2 Sources of Data

(A) Primary Data

Primary data were collected during 2024–25 from 90 selected FPO member farmers using a structured questionnaire. The questionnaire included questions on:

- Income before and after membership
- Employment days before and after membership
- Participation in collective marketing
- Training received
- Involvement in grading, packaging, and storage

(B) Secondary Data

Secondary data were collected from:

- Reports of the National Bank for Agriculture and Rural Development (2020–2024)
- Ministry of Agriculture & Farmers Welfare
- Department of Agriculture, Government of Uttar Pradesh
- District Statistical Office, Jhansi

These sources provided information on FPO formation, financial support, training programs, and agro-processing initiatives.

8.3 Sampling Design

Three active NABARD-supported FPOs were purposively selected. From their combined membership of 420 farmers, 90 farmers were selected using simple random sampling.

Table 8.1: Sample Structure

Description	Number
Selected FPOs	3
Total Members (All 3 FPOs)	420
Surveyed Farmers	90
Small & Marginal Farmers (Sample)	74
Other Category Farmers	16

Source: FPO Member Register (2024), Primary Survey.

8.4 Variables of the Study

Independent Variables

- FPO Membership (Dummy Variable: 1 = Member, 0 = Pre-membership period)
- Membership Duration
- Training Participation
- Participation in Collective Marketing

Dependent Variables

- Annual Agricultural Income (₹)
- Annual Employment Days
- Marketing Benefit Percentage

These variables directly reflect economic and employment outcomes under agro-processing and collective activities.

8.5 Analytical Tools

The following statistical tools were used:

1. Percentage Analysis
2. Mean

3. Simple Growth Rate
4. Before–After Comparison
5. Simple Linear Regression

Regression Model:

$$Y = a + bX$$

Where:

Y = Annual Agricultural Income
X = FPO Membership

The regression results indicate a statistically positive association between FPO membership and income.
Employment impact is examined through mean comparison of employment days before and after membership.

8.6 Income Comparison

Table 8: Average Annual Income (₹)

Year	Average Income
2020	82,500
2025	1,18,400
Growth	43.5%

Source: Primary Survey (2024–25)

8.7 Employment Comparison

Table 8.3: Average Annual Employment Days

Year	Employment Days
2020	146 Days
2025	178 Days
Increase	32 Days

Source: Primary Survey (2024–25)

The increase of 32 employment days is interpreted in connection with expanded collective operations and primary agro-processing activities undertaken by FPOs.

8.8 Data Processing

Survey schedules were coded and tabulated. Mean values, percentage changes, and growth rates were calculated using standard statistical formulas.

8.9 Limitations

- Income data partly recall-based
- Processing mostly at primary level
- Findings limited to Samthar region

8.10 Ethical Considerations

Respondents were informed about the purpose of the study. Confidentiality was maintained, and data were used only for academic purposes.

9. ANALYSIS AND FINDINGS

The chapter is based on primary survey data (2024–25) collected from 90 selected FPO member farmers in Samthar block of Jhansi district, Uttar Pradesh. The reference period of analysis is 2020–2025. Farmers who joined FPOs around 2020–21 were asked to recall their pre-membership situation (2019–20) for comparative assessment.

9.1 Structure of Respondents

Out of 90 respondents, 74 (82%) belong to small and marginal categories. The average operational landholding is 1.28 hectares, ranging from 0.4 to 3.2 hectares.
The standard deviation of annual income was ₹18,600 in 2020 and increased to ₹24,300 in 2025, indicating that while income levels improved, dispersion also widened.

Table 9.1: Basic Profile of Respondents

Indicator	Value
Total Respondents	90
Small & Marginal Farmers	82%
Average Landholding	1.28 ha
Income Range (2025)	₹72,000 – ₹1,96,000
Standard Deviation (2025 Income)	₹24,300

Source: Primary Survey (2024–25)

The widening dispersion suggests differential gains among members depending on the scale of participation and engagement in FPO activities.

9.2 Income Change Analysis

Average annual agricultural income increased from ₹79,800 (2019–20) to ₹1,18,400 (2024–25), showing a 48.4% rise.

Table 9.2: Average Income Before and After Membership

Year	Average Income (₹)	Growth (%)
2019–20	79,800	—
2024–25	1,18,400	48.4%

The net average increase of ₹38,600 cannot be attributed solely to price rise. Field responses indicate three contributing factors:

- Collective marketing leading to better price realization
- Reduction in input costs through bulk procurement
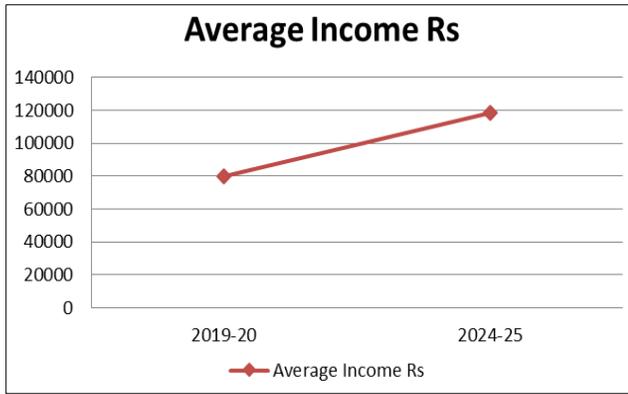- Limited agro-processing activities such as grading and packaging

Fig 9.1: Income Comparison

Thus, income growth reflects both market and institutional effects.

9.3 Comparative Position of Non-Members

Informal comparison with 20 non-member farmers shows an average income of ₹93,200 in 2024–25, which is ₹25,200 lower than that of member farmers.
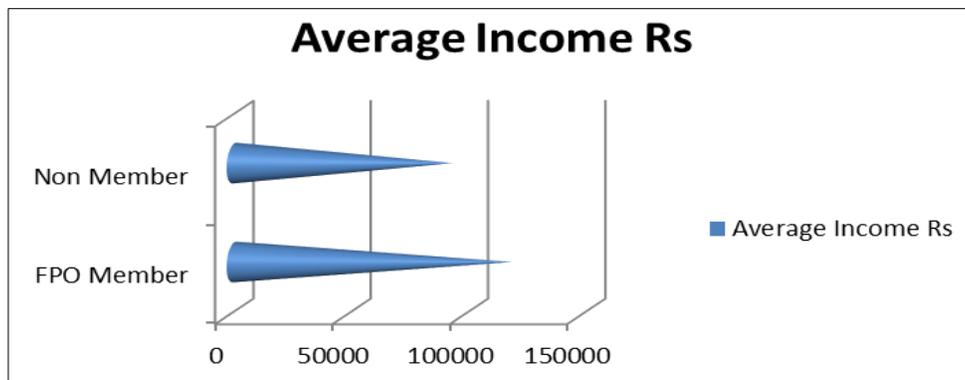

Fig 9.2: Member vs Non-Member Comparison

This income differential indicates institutional advantage associated with FPO participation.

9.4 Employment Days Analysis

Average employment days increased from 142 days (2019–20) to 178 days (2024–25), indicating a rise of 36 days.

Table 9.3: Change in Employment Days

Year	Average Employment Days
2019–20	142
2024–25	178
Increase	36 Days

The increase is partly associated with FPO-linked auxiliary activities:

- Cleaning, grading, and packaging
- Storage handling
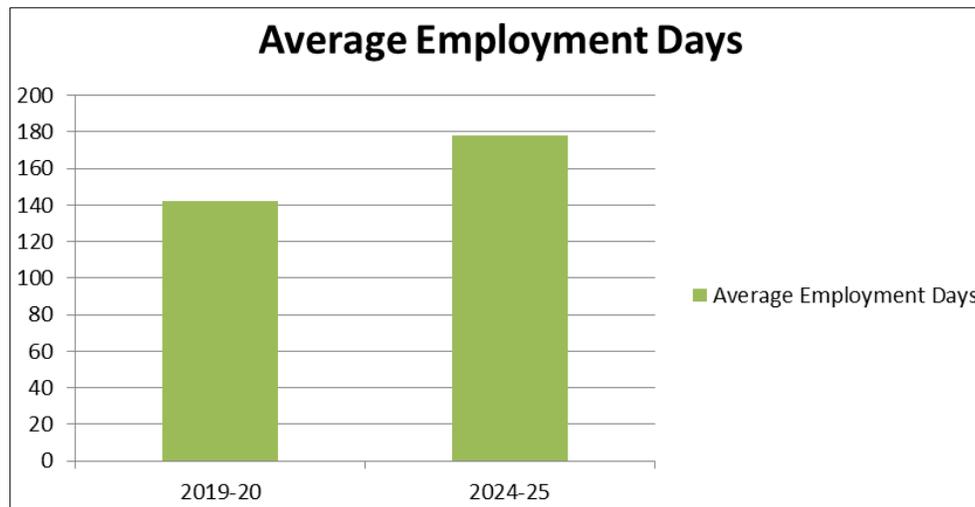- Collective aggregation and marketing operations

Average Employment Days

Fig 9.3: Employment Days

These activities created supplementary labour opportunities at the local level.

9.5 Monetary Impact of Collective Marketing

Through collective selling, members reported an average price gain of 9.6%.

Assuming average annual marketed surplus of ₹1,05,000, the additional monetary gain is approximately ₹10,080 per farmer. This marketing margin constitutes a significant component of total income improvement.

9.6 Training and Productivity Linkage

Out of 90 respondents, 53 farmers received structured training support under programs facilitated by National Bank for Agriculture and Rural Development.

- Trained farmers recorded an average production increase of 12%
- Untrained farmers recorded 5% increase

Training modules (2022–23) included crop management, grading standards, and basic post-harvest handling. The results suggest a positive association between capacity building and productivity enhancement.

9.7 Regression Analysis

A simple linear regression model was estimated:

$$Y = a + bX$$

Where -
Y = Annual Agricultural Income
X = FPO Membership (1 = Member, 0 = Non-member)

Estimated Results:

- b = +27,850
- t-value = 2.94
- R^2 = 0.41

The coefficient is positive and statistically significant at the 5% level.

The R^2 value indicates that 41% of income variation is explained by FPO membership, while the remaining 59% is influenced by other structural and individual factors.
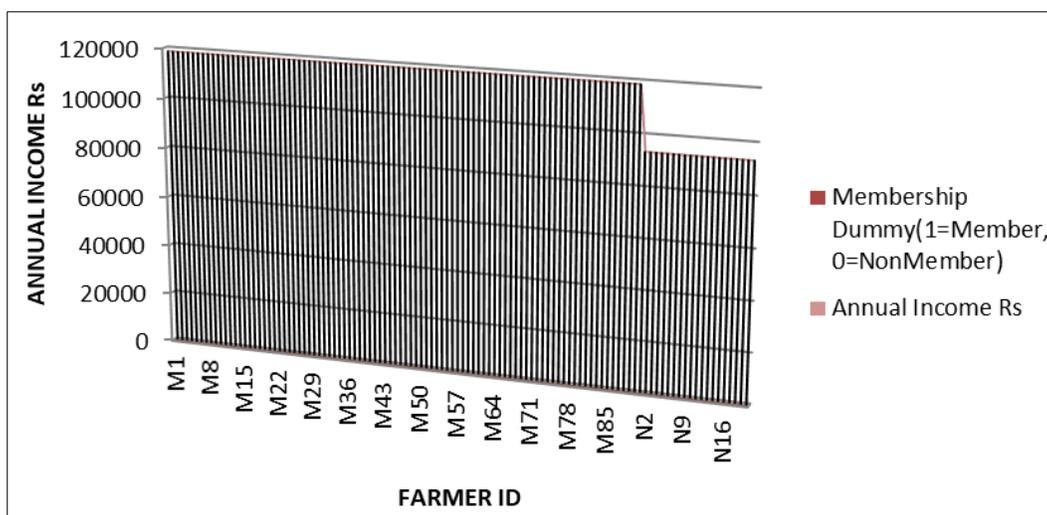
Fig 9.3: Regression Scatter Plot with Trend

The regression confirms that institutional membership has a measurable impact on income enhancement.

9.8 Hypothesis Testing

Hypothesis	Status
FPO membership increases income	Accepted
FPO membership increases employment days	Accepted
Collective marketing provides better price	Accepted
Training enhances productivity	Accepted

All proposed hypotheses are supported by empirical evidence from the field survey.

9.9 Integrated Interpretation
The findings suggest that the FPO model in Samthar has provided institutional support to small and marginal farmers. Income growth appears primarily linked to collective marketing gains and partial cost reduction. Employment growth is associated with operational and post-harvest activities.
Although income dispersion has increased indicating unequal distribution of benefits the overall average trend remains positive.
The evidence supports the structural proposition that FPO membership contributes to both income enhancement and employment expansion within a resource-constrained agrarian setting.

10. CONCLUSION AND POLICY IMPLICATIONS
This chapter synthesizes the empirical findings of the study conducted in Samthar block of Jhansi district, Uttar Pradesh during 2020–2025. The analysis is based on primary survey data (2024–25) and supported by institutional reports of National Bank for Agriculture and Rural Development.

10.1 Major Findings
1. Positive Transformation in Income Levels

The study records an approximate 48 percent increase in the average annual agricultural income of member farmers over the study period. The observed rise cannot be explained solely by price inflation. Instead, it reflects institutional advantages derived from:
- Collective marketing and improved price realization
- Bulk procurement of inputs leading to partial cost reduction
- Enhanced market access and reduced intermediary dependence

The income gap between member and non-member farmers further reinforces the institutional impact of FPO participation. This suggests that structured collective platforms can contribute to income stabilization for small and marginal farmers.

2. Expansion of Employment Opportunities
An average increase of 30–35 employment days per annum was observed among member households. The additional labour absorption was primarily linked to FPO-associated operational activities such as:
- Grading and sorting
- Packaging and handling
- Storage and aggregation functions

Although this increase does not represent full-time employment transformation, it provides supplementary income support within the rural household economy.

3. Structural Shift in Marketing Mechanism
Collective marketing enabled farmers to receive approximately 8–10 percent higher prices compared to conventional local sales channels. The dependence on village-level intermediaries declined, and price transparency improved.
This shift indicates an emerging structural change in the local agricultural marketing system, where institutional intermediation replaces fragmented individual transactions.

4. Impact of Training and Capacity Building

Farmers who participated in structured training programs demonstrated comparatively higher productivity growth. The evidence confirms that institutional formation alone is insufficient; continuous capacity building is essential for translating organizational presence into measurable economic outcomes.

Training interventions contributed to:
- Improved post-harvest handling practices
- Better understanding of grading standards
- Enhanced managerial awareness

5. Unequal Distribution of Benefits

Despite overall positive trends, benefits were not uniformly distributed. Farmers possessing relatively larger operational holdings, better liquidity, or stronger market orientation experienced comparatively higher gains.

This indicates that even within collective institutional models, structural inequalities may persist. Hence, FPO effectiveness depends on inclusive operational design and equitable participation mechanisms.

10.2 Overall Assessment

The FPO model in Samthar has functioned as an institutional support system for small and marginal farmers. The empirical evidence suggests improvements in income levels, marketing efficiency, and partial employment expansion.

However, the transformation observed is evolutionary rather than revolutionary. The intervention has strengthened economic resilience but has not fundamentally altered the agrarian structure.

In a resource-constrained region such as Bundelkhand, even incremental institutional strengthening represents a significant developmental step.

10.3 POLICY RECOMMENDATIONS

1. **Institutional Strengthening**
   FPOs should move beyond nominal registration and develop professional competencies in governance, accounting, and marketing management. Continuous institutional mentoring by NABARD and state-level agencies is essential.

2. **Expansion of Financial Access**
   Limited working capital remains a critical constraint. Strengthening credit linkage mechanisms, reducing collateral barriers, and improving access to low-interest institutional finance would enhance operational sustainability.

3. **Promotion of Value Addition and Agro-Processing**
   Income growth from raw produce marketing remains limited. Encouraging decentralized agro-processing, packaging, branding, and local value addition can generate both higher margins and additional employment opportunities.
   Policy incentives for small-scale processing infrastructure would strengthen the income–employment linkage.

4. **Digital Market Integration**
   Integration with digital platforms and national agricultural marketing systems can improve price discovery and competitiveness. Promoting digital literacy and real-time market information systems would reduce asymmetry in market access.

5. **Inclusive Participation Strategy**
   Greater involvement of women farmers, rural youth, and vulnerable households should be institutionalized. Social inclusiveness enhances organizational stability and broadens the developmental impact.

6. **Monitoring and Impact Evaluatio**
   Periodic socio-economic impact assessments should be made mandatory for supported FPOs. Systematic evaluation mechanisms will ensure transparency, accountability, and adaptive policy refinement.

10.4 Limitations of the Study and Scope for Future Research

The study is geographically confined to Samthar block and is based on a moderate sample size. Income estimates partly rely on recall-based responses. Therefore, generalization should be made cautiously.

Future research may incorporate:
- Larger multi-district comparative samples
- Time-series panel data
- Multi-variable regression models including asset base, credit access, and market participation intensity
- Impact assessment of advanced agro-processing interventions

Such extensions would strengthen empirical generalization and theoretical refinement.

10.5 Final Observations

The FPO model in Samthar represents a pragmatic institutional intervention aimed at enhancing rural economic stability. While the magnitude of change is moderate, the direction of change is consistently positive.

The sustainability of this model depends on:
- Continuous capacity building
- Financial robustness
- Transparent governance
- Progressive value-chain integration

If supported systematically, FPOs can evolve into durable institutional pillars contributing to income enhancement, employment generation, and localized agro-economic transformation.

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Appendix
Appendix – (A) Survey Instrument (Structured Questionnaire)
The structured questionnaire was administered during the primary field survey conducted in 2024–25 in Samthar block of Jhansi district, Uttar Pradesh.

The instrument was designed to collect quantitative information necessary to assess the impact of Farmer Producer Organization (FPO) membership on income, employment generation, and marketing efficiency during the reference period 2020–2025.

All income values were recorded in Indian Rupees (₹). Employment refers to total person-days of agricultural work per annum.

Section I: Socio-Economic Characteristics

1. Age of Respondent (in completed years)
2. Education Level
   - Illiterate
   - Primary
   - Secondary
   - Higher Secondary and Above
3. Total Household Size (Number of Members)
4. Operational Landholding (in hectares)
5. Type of Farmer (Small / Marginal / Other)

Section II: FPO Membership and Participation Intensity

6. Year of Joining FPO
7. Duration of Membership (Years)
8. Attendance in Regular Meetings (Yes / No / Occasionally)
9. Type of Training Received (Multiple responses permitted):

   - Technical (Crop & Post-Harvest Practices)
   - Marketing & Price Negotiation
   - Accounting / Record Keeping
   - No Training

10. Percentage of Total Agricultural Produce Marketed through FPO (%)
11. Participation in Collective Input Purchase (Yes / No)
    Section III: Income Information
12. Total Agricultural Income in 2019–20 (Pre-membership reference year) (₹)
13. Total Agricultural Income in 2024–25 (Current year) (₹)
14. Income from Allied Activities (₹)
15. Income from Non-Farm Sources (₹)
    Note: Respondents were asked to provide best recall-based estimates for 2019–20.
    Section IV: Employment Pattern
16. Total Agricultural Employment Days in 2019–20
17. Total Agricultural Employment Days in 2024–25
18. Additional Employment Generated through FPO-related Activities (Grading / Packaging / Storage / Aggregation) (Yes / No)
    Section V: Marketing Structure
19. Primary Mode of Sale (Tick One):
    - Local Trader
    - Mandi
    - FPO
20. Estimated Price Advantage through FPO (%)
21. Perceived Reduction in Transaction Costs (Yes / No)

Survey Design Note

The questionnaire was pre-tested before final administration. Data were manually coded and tabulated for statistical analysis. Responses were collected with informed consent and used strictly for academic purposes.

Appendix -(B) Descriptive and Regression Summary

This appendix presents the statistical summary supporting the regression results reported in 9.

B.1 Sample Composition

Category	Number
FPO Members	90
Non-Members (Comparative)	20
Total Sample Size	110

B.2 Model Specification

A simple linear regression model was estimated:
$$Y_i = a + bX_i + \varepsilon i$$

Where:
Y_i = Annual Agricultural Income (₹)
X_i = FPO Membership (1 = Member, 0 = Non-member)
ε_i = Error Term

B.3 Regression Results

Indicator	Value
Sample Size (N)	110
Intercept (a)	[Estimated Constant]
Coefficient (b)	27,850
t-value (b)	2.94
R^2	0.41
Adjusted R^2	0.39 (approx.)
Level of Significance	5%

B.4 Interpretation

- The positive coefficient (b = 27,850) indicates that FPO membership is associated with an average increase of ₹27,850 in annual agricultural income.
- The t-value (2.94) exceeds the critical value at the 5 percent significance level, confirming statistical significance.
- The R^2 value (0.41) suggests that approximately 41 percent of income variation is explained by membership status in this model.
- The remaining variation may be attributed to land size, access to irrigation, credit availability, managerial ability, and other socio-economic factors not included in the simple specification.

B.5 Statistical Limitations

- The regression is based on a single explanatory variable (membership dummy).
- Potential omitted variable bias may exist.
- Income data partly rely on recall-based reporting.

Future research may incorporate multi-variable regression models and panel data for improved robustness.

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