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Effectiveness of PM-FME scheme on small food processing enterprises in Andhra Pradesh: A study on ragi (*Eleusine coracana*) processing units

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Abstract

The present study examined the effectiveness of the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PM-FME) Scheme on small ragi (*Eleusine coracana* (L.) Gaertn) processing units in Andhra Pradesh. The specific objectives were to analyze the socio-economic profile of unit owners, assess awareness and utilization of scheme benefits, evaluate the financial and technical support received, measure the impact on production, income, profitability and technology adoption, and identify the major constraints faced by these enterprises. Primary data were collected from 100 ragi processing unit owners through structured interviews and field surveys conducted in selected districts of Andhra Pradesh. The findings revealed that most respondents possessed moderate educational levels, which positively influenced the adoption of improved processing practices, hygiene standards and awareness of government support programs. Beneficiary units reported increased production capacity, better product quality, higher processing efficiency, improved market competitiveness, greater income and enhanced profitability after availing scheme assistance. Financial support in the form of subsidies, credit linkage and machinery assistance contributed significantly to enterprise development. However, major constraints included delays in fund disbursement, inadequate technical training, weak marketing infrastructure, high input costs and limited knowledge of scheme procedures. The study suggests improving access to institutional finance, organizing regular training programs, strengthening market linkages, simplifying procedural requirements and developing common processing and storage facilities to enhance scheme effectiveness and support sustainable enterprise growth in Andhra Pradesh.

Keywords: Andhra Pradesh, financial support, PM-FME scheme, profitability, ragi processing units, technology adoption

Introduction

Ragi (*Eleusine coracana*), commonly known as finger millet, is an important nutri-cereal crop widely cultivated in rainfed and semi-arid regions of India. It is valued for its high calcium, dietary fibre, iron and essential amino acids, and is increasingly preferred in health-oriented diets. In Andhra Pradesh, ragi is processed into flour, malt, snacks and other value-added products, creating opportunities for rural employment and agro-based entrepreneurship. Studies have reported increasing demand for millet-based foods and the growing importance of small processing enterprises in value addition and income generation (FAO 2021; Ministry of Food Processing Industries 2022).

Despite its potential, many small ragi processing units face problems such as inadequate finance, outdated machinery, poor packaging, weak market linkages, low technical knowledge and limited awareness of government support programmes. These constraints reduce productivity, profitability and competitiveness. To address such issues, the Government of India launched the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PM-FME) Scheme to provide credit-linked subsidy, skill development, branding, common infrastructure and market support to micro food enterprises (Ministry of Food Processing Industries 2020).

However, limited empirical evidence is available on the effectiveness of PM-FME support for ragi or finger millet processing units in Andhra Pradesh. Therefore, the present study was undertaken to analyse the objectives of socio-economic profile of unit owners, assess awareness and utilisation of PM-FME benefits, evaluate financial and technical support

received, measure its impact on production, income, profitability and technology adoption, and identify major constraints and challenges faced by entrepreneurs.

The study was guided by the hypothesis that PM-FME beneficiary units perform better in terms of production efficiency, income and enterprise development than non-beneficiary units. The findings may help improve policy implementation and promote sustainable growth of millet-based micro enterprises in Andhra Pradesh.

Materials and Methods

The present study was conducted to evaluate the effectiveness of the PM-FME scheme on ragi processing units in Andhra Pradesh during the agricultural years 2024-2026. The study covered two major ragi-producing districts, namely Anantapur and Kurnool, selected purposively based on the intensity of finger millet (*Eleusine coracana* L.)

cultivation, presence of small and medium-scale processing units, and implementation of PM-FME scheme interventions.

A multi-stage stratified random sampling design was adopted. A total of 120 ragi processing units were selected randomly from official lists obtained from District Industries Centres and PM-FME implementation agencies. Data were collected from owners/managers of processing units using a pre-tested structured interview schedule. Information was collected on socio-economic characteristics, scheme awareness, production levels, cost of processing, income, marketing channels, and constraints.

Sampling Design: The study followed a multi-stage sampling procedure consisting of district selection, mandal selection, village selection, and final selection of ragi processing units and stakeholders.

Table 1: Sampling Design of the Study

Stage	Selection Unit	Basis of Selection
Stage I	Districts (Anantapur, Kurnool)	Purposive (ragi concentration & PM-FME presence)
Stage II	Mandals (2 per district)	Higher concentration of ragi processing
Stage III	Villages / Localities	Random selection
Stage IV	Ragi Processing Units (120)	Random selection from official lists
Stage V	Stakeholders (support actors)	Purposive selection

The study was conducted in Anantapur and Kurnool districts of Andhra Pradesh, selected due to their high ragi cultivation and presence of small and medium-scale processing units under the PM-FME scheme. From each district, two mandals (Roddam, Hindupur in Anantapur; Adoni, Yemmiganur in Kurnool) were selected to represent variation in production scale, market access, and scheme awareness.

A total of 120 ragi processing units were randomly selected from official District Industries Centre records and PM-FME beneficiary lists. The units were classified into small (<10 tonnes), medium (10-25 tonnes), large (25-50 tonnes), and very large (>50 tonnes) categories to facilitate comparative analysis.

In addition, key stakeholders including PM-FME officers/cluster coordinators, traders/wholesalers, and retailers/local buyers were included to assess scheme implementation and market linkages.

The study is based on both primary and secondary data. Primary data were collected through structured interviews from processing unit owners covering socio-economic characteristics, production, income, scheme awareness, adoption, and constraints. Secondary data were obtained from government reports, PM-FME guidelines, District Industries Centres, agriculture departments, and published literature. The study period covered the agricultural years 2024-2026.

Analytical Techniques Employed

The following statistical tools were used:

1. Percentage Analysis

Formula

$$\text{Percentage} = f/N \times 100$$

Where

- f = number of respondents in a category

- N = total sample size (120 units)

How it was calculated

Percentage was used to measure:

- Level of PM-FME awareness
- Adoption of scheme benefits
- Distribution of unit categories (small/medium/large)
- Marketing channel usage

Each response category (for example “aware” or “not aware”) was divided by total respondents (120) and multiplied by 100 to obtain percentage distribution.

2. Arithmetic Mean (Average Calculation)

Formula

$$\bar{X} = \sum X_i / n$$

Where

- X_i = individual observation (e.g., cost, income, production)
- n = number of observations

How it was calculated

Used to compute:

- Average processing cost per unit
- Average income from ragi products
- Average production capacity

Example variables included:

- Fixed cost (machinery, building)
- Variable cost (raw material, labour, transport)
- Output quantity (kg/tonnes)
- Selling price per kg

All values from 120 units were summed and divided by 120 to obtain mean values.

3. Weighted Mean (Perception / Likert Scale Analysis)**Formula**

$$\bar{X}_w = \frac{\sum (w_i X_i)}{\sum w_i}$$

Where

- w_i = weight assigned to response (1 to 5 scale)
- f_i = frequency of responses
- Σf_i = total respondents

Weights used

- Strongly Disagree = 1
- Disagree = 2
- Neutral = 3
- Agree = 4
- Strongly Agree = 5

How it was calculated

Used to measure:

- Satisfaction with PM-FME subsidy
- Usefulness of training/technical support
- Effectiveness of marketing support

Each response was multiplied by its weight, summed, and divided by total respondents.

4. Chi-Square Test (Association Analysis)**Formula**

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Where

- O_i = observed frequency
- E_i = expected frequency

How it was calculated

Used to test relationship between:

- Unit size and scheme adoption
- Education level and awareness
- Training participation and productivity

Calculation steps

1. Observed values (actual responses) were tabulated
2. Expected values were calculated as:
 $E_i = (\text{Row total} \times \text{Column total}) / \text{Grand total}$
3. Difference between observed and expected values was squared
4. Divided by expected values
5. Summed across all categories to obtain χ^2 value

5. Cost and Return Analysis

Used to evaluate economic performance of ragi processing units.

(i) Total Cost (TC)

$TC = \text{Fixed Cost} + \text{Variable Cost}$

Factors included

- Fixed cost: machinery, building depreciation

- Variable cost: raw ragi, labour, electricity, packaging, transport

(ii) Gross Income (GI)

$GI = \text{Output} \times \text{Selling Price}$

Factors included

- Quantity of ragi flour/products sold
- Market price per kg or tonne

(iii) Net Profit (NP)

$NP = \text{Gross Income} - \text{Total Cost}$

(iv) Benefit-Cost Ratio (BCR)

$BCR = GI/TC$

Interpretation

- $BCR > 1 \rightarrow$ profitable unit
- $BCR = 1 \rightarrow$ break-even
- $BCR < 1 \rightarrow$ loss

6. Garrett Ranking Technique (Constraint Analysis)**Formula**

$$P_{ij} = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where

- R_{ij} = rank given by i th respondent
- N_j = number of constraints ranked

How it was calculated

Used to rank constraints such as:

- Lack of credit
- High raw material cost
- Poor market access
- Inadequate training

Steps

1. Respondents ranked constraints (1 = most important)
2. Ranks were converted into percent positions
3. Garrett score table was used to convert values into scores
4. Mean score was calculated for each constraint
5. Final ranking was based on highest mean score

7. Variables and Factors Considered

The study considers several independent variables such as the age of the entrepreneur, education level, experience in processing, unit size, and access to the PM-FME scheme, which may influence the performance of the enterprises. The dependent variables include production output, income, profitability, and the level of scheme utilization, as these outcomes reflect the effectiveness and impact of the scheme on small food processing units.

8. Measurement Standards

- All economic variables expressed in INR (₹)
- Production in kg/tonnes
- Time in years/months
- All statistical procedures followed SI units and standard econometric practices (IUPAC guidelines)

Results and Discussion

The present chapter presents the results and discussion of the study on the effectiveness of the PM-FME scheme on ragi processing units in Andhra Pradesh. Data were collected from 120 ragi processing units across Anantapur and Kurnool districts. The results are organized based on socio-economic profile, scheme awareness, utilization, impact, and constraints.

Table 2: Socio-Economic Profile of Respondents

Variable	Category	Number	Percentage (%)
Age	Below 30	20	16.67
Age	31-50	70	58.33
Age	Above 50	30	25.00
Education	Illiterate	18	15.00
Education	Primary	35	29.17
Education	Secondary	45	37.50
Education	College/Technical	22	18.33
Occupation	Processing only	50	41.67
Occupation	Processing + Agriculture	30	25.00
Occupation	Processing + Business	25	20.83
Occupation	Processing + Service	15	12.50
Unit Size	Small	40	33.33
Unit Size	Medium	45	37.50
Unit Size	Large	25	20.83
Unit Size	Very Large	10	8.34

Interpretation: Most respondents are middle-aged,

Table 5: Impact of PM-FME Scheme on Production and Income

Unit Type	Production Before (Tonnes)	Production After (Tonnes)	% Change	Income Before (₹)	Income After (₹)	% Change
Small	8	10	25.0	2,00,000	2,50,000	25.0
Medium	18	23	27.78	5,00,000	6,50,000	30.0
Large	30	38	26.67	10,00,000	12,50,000	25.0
Very Large	55	68	23.64	20,00,000	25,00,000	25.0

Interpretation: All categories show improvement in production and income, confirming the positive impact of PM-FME interventions

Table 6: Constraints Faced by Ragi Processing Units

Constraints	Number	Percentage (%)	Rank
Lack of market linkages	100	83.33	I
High machinery cost	90	75.0	II
Delay in financial assistance	80	66.67	III
Limited technical support	70	58.33	IV
Competition from large firms	65	54.17	V
Lack of branding support	60	50.0	VI
Low awareness of scheme	50	41.67	VII

Interpretation: Market linkage is the most critical constraint, followed by high capital cost and delayed financial assistance.

Conclusion

The findings of the study indicate that government support to small food processing enterprises has contributed to improved production efficiency, income generation, and adoption of modern processing practices in ragi processing units. The intervention has strengthened rural entrepreneurship and enhanced the overall value chain of millet-based products in the region. However, the extent of benefits varies depending on access to resources, awareness, and timely support. Further improvements in market access, skill development, and infrastructure are necessary to

moderately educated, and operate small to medium-scale units, indicating the dominance of micro and small enterprises in ragi processing.

Table 3: Family Composition of Respondents

Component	Average Members	Percentage (%)
Male members	2.8	43.08
Female members	2.2	33.85
Children/Assistants	1.5	23.07
Total Family Size	6.5	100

Interpretation: Family labour plays a major role in reducing labour cost and supporting small-scale processing activities.

Table 4: Awareness and Utilization of PM-FME Scheme

Indicator	Category	Number	Percentage (%)
Awareness Level	Fully aware	60	50.0
	Partially aware	40	33.33
	Unaware	20	16.67
Financial Assistance	Beneficiaries	75	62.5
Technical Training	Beneficiaries	65	54.17
Marketing Support	Beneficiaries	40	33.33
Technology Adoption	Beneficiaries	55	45.83

Interpretation: Awareness is moderate. Financial assistance is the most accessed component, while marketing support is comparatively low.

achieve sustained growth. The results highlight the potential of such initiatives in promoting agricultural processing, though careful implementation is essential for wider impact.

Authorship Contribution Statement

Gondla Rachel Rani conceptualized the study, carried out field survey, collected and analyzed data, and prepared the manuscript. Ashish Samarpit Noel supervised the research work, guided the study design, and critically reviewed and edited the manuscript. Akshita Masih assisted in data analysis, interpretation of results, and manuscript preparation.

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