



RESEARCH ARTICLE

Farmers' attitude analysis on beneficiaries of field and horticultural crops under the farmer first program (FFP) in Khordha district of Odisha

Monikarani Pradhan¹, Sarbani Das², Bibhuti Prasad Mohapatra¹, Abhiram Dash³ & Khitish Kumar Sarangi⁴

¹Department of Agricultural Extension Education, Odisha University of Agriculture and Technology, Bhubaneswar 751 003, Odisha, India

²Directorate of Extension Education, Odisha University of Agriculture and Technology, Bhubaneswar 751 003, Odisha, India

³Department of Agricultural Statistics, Odisha University of Agriculture and Technology, Bhubaneswar 751 003, Odisha, India

⁴Department of Agricultural Economics, Odisha University of Agriculture and Technology, Bhubaneswar 751 003, Odisha, India

*Correspondence email - monikapradhan132@gmail.com

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Abstract

This study investigates the attitudes of 148 beneficiaries (77 crop-based, 71 horticulture-based) of the farmer FIRST programme (FFP) in Khordha district, Odisha, using a validated Likert-scale instrument and ex-post facto design. Results showed that 55.8 % of crop-based and 66.2 % of horticulture-based farmers held favourable attitudes toward the programme, with 25.97 % and 14.09 % respectively having a highly favourable outlook. Weighted Mean Scores for core dimensions highlight strong endorsement of participatory decision-making (WMS: 3.87 for crops, 4.14 for horticulture), improved productivity (WMS: 3.66 and 4.10) and programme relevance (WMS: 3.70 and 4.09), affirming FFPs' positive impact on farm confidence and researcher-farmer collaboration. However, notable concerns persist regarding equitable benefit sharing, affordability of technologies and inclusion-specifically, scores for farm women and landless inclusion (WMS: 3.57 crop, 3.68 horticulture) and low ratings for benefit distribution and communication (WMS: ~1.7 for both groups). Regression analysis identifies education, mass media use, annual income, cosmopolitanism and self-esteem as significant predictors influencing farmer attitudes, accounting for 61-69 % of attitude variation (Adjusted R² = 0.62-0.61). Practical implications include the need for targeted outreach to marginalised farmers, affordable technology solutions and inclusive extension strategies to maximise FFPs' impact. These results reinforce participatory extension as a driver of empowerment, innovation and sustainable agricultural development in diverse, transitioning rural contexts.

Keywords: attitude assessment; farmer first programme; inclusivity; participatory extension; sustainable agriculture

Introduction

Participatory approaches in agricultural extension have gained prominence for amplifying farmers' voices and enhancing the efficiency and adoption of new technologies (1). The FFP, initiated by ICAR in 2016, seeks to innovate extension methods by directly involving local farmers in technology selection, refinement and dissemination (2, 3). Khordha district-chosen for its urbanising landscape and agricultural diversity-offers a pertinent context for testing FFPs' efficacy among crop-based and horticulture-based beneficiaries. The objective of this research is to analyse and compare beneficiaries' attitudes towards the programme, factors influencing these attitudes and implications for future extension strategising.

A study of Jodhpur farmers' knowledge and attitudes toward FFPs' crop-based modules, interviewing 107 respondents. Most had medium knowledge, with strong awareness of high-yielding varieties and spacing. Farmers held positive attitudes, valuing extension contact. Occupation, education, landholding, income and social participation enhanced attitudes, while age had a negative effect, indicating

programme and socio-economic influences (4). Another study in Punjab observed that, where FFP was implemented through continuous farmer-scientist interfaces, training and group meetings. The programme not only improved natural resource management and income but also changed farmers' perspectives towards modern agricultural practices. The behavioural training and farmer-to-farmer extension models developed under FFP further strengthened positive attitudes among stakeholders, leading to wider adoption of innovative practices (5). The relationship between farmers' knowledge and attitudes regarding biosecurity measures and their impact on human health. The study found strong correlations between knowledge and attitudes ($r=0.65$). This indicates that improving knowledge and fostering positive attitudes are essential for adopting biosecurity measures (6). The knowledge gap of farmers generally had a positive attitude toward biologicals, associating them with healthier food production, increased crop yield and improved income. However, more than half (54 %) did not recommend biologicals as safer alternatives to conventional inputs and 61 % disagreed that biologicals are risk-free (7).

Material and Methods

Attitude was operationally defined as a disposition or feeling of respondents towards the farmer FIRST programme. It is the degree to which the respondents were favourably or unfavourably oriented towards the farmer FIRST programme.

Construction of attitude scale (Likert method of scale construction)

Collection of statements

A set of 49 statements about attitudes toward the farmer FIRST Programme was developed by reviewing relevant literature, findings and through discussions with members of the advisory committee and input from scientists and co-PIs working in the field. This ensured comprehensive coverage of the programmes' features and dimensions.

Editing of statements

The collected statements were edited to ensure clarity and relevance. Statements were written to convey both positive and negative attitudes and all irrelevant components were removed. After editing, 31 statements were retained, each clearly covering various aspects of the farmer FIRST programme.

Treatment of statements using the Likert method

The statements were treated according to the Likert method for scale construction. Responses for positively worded statements were scored as follows: strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). For negatively worded statements, the scoring was reversed to maintain consistency.

Selection of final statements

Item analysis was conducted to select the final statements for the Likert scale. The frequency distribution of scores was examined and 25 % of the highest and lowest scoring responses were used as criterion groups. The t-value for each statement was calculated and 15 statements with a t-value equal to or greater than 1.75 were selected for the final attitude scale.

Reliability of the test

The reliability of the scale was assessed using the split-half method. The scale was administered to 32 non-sampled respondents and the reliability coefficient was calculated using the Spearman-Brown formula, resulting in a value of 0.74.

Validity of the test

Empirical (intrinsic) validity was determined by taking the square root of the reliability coefficient. The validity estimate of the measurement scale was found to be 0.86, indicating a high level of validity for the attitude scale.

Study area

The study was conducted in four adopted villages—Brahmapura, Brahmapurapatana, Govindpur and Gopalpur—located in the Begunia block of Khordha district, Odisha. These villages were selected owing to their status as sites where the Farmer FIRST Programme implemented its crop-based module interventions like varietal substitution in rice (Pratikshya/Swarna sub-1) to facilitate green gram in rice fallow, scientific production and value addition of short grained aromatic rice, round the year fodder production for cross-bred milch cow etc. and horticulture based module interventions like production technology of vegetable crops (pumpkin, cucumber, bitter gourd, cabbage, cauliflower), intercropping of vegetables in cashew plantation,

production of vegetable crops in poly net house, crop diversification with tuber crops {yam (Odisha elite), elephant foot yam (Gajendra), sweet potato (ST-14)}, seed production of promising open varieties of vegetables by the farmers (brinjal and okra in the first year) and production technology for tissue culture banana (main and ratoon crop). These villages represent key locations where targeted demonstrations, training and participatory research activities were carried out under the programme, providing an ideal setting for evaluating farmers' attitudes towards FFP.

Research Design ex-post facto research design was adopted to assess the attitude of crop-based and horticulture-based beneficiaries towards FFP. This design was suitable as no manipulation of the independent variables (programme participation) could be done and an attitudinal study could be assessed.

Sampling technique and sample size

In this study, crop based FFP beneficiaries are defined as those farmers who have participated in the farmer FIRST programme interventions, receiving training, technical support and access to improved technologies including varietal substitution in rice (Pratikshya/Swarna sub-1) to facilitate green gram in rice fallow, scientific production and value addition of short grained aromatic rice, round the year fodder production for cross-bred milch cow whereas horticulture based FFP beneficiaries are farmers from the same villages who have participated in the FFP interventions, receiving training, technical support and access to improved technologies including production technology of vegetable crops (pumpkin, cucumber, bitter gourd, cabbage, cauliflower), intercropping of vegetables in cashew plantation, production of vegetable crops in poly net house, crop diversification with tuber crops {yam (Odisha elite), elephant foot yam (Gajendra), sweet potato (ST-14)}, seed production of promising open varieties of vegetables by the farmers (brinjal and okra in the first year) and production technology for tissue culture banana (main and ratoon crop). Purposive sampling was used to select the respondents. The total sample comprises 148 respondents, calculated using the Yamane formula with 77 crop-based FFP beneficiaries and 71 horticulture-based FFP beneficiaries. The formula was applied to determine the total sample size for both groups (8).

$$\text{Yamane Formula} = n = \frac{n}{1 + Ne^2} \quad (\text{Eqn. 1})$$

Where, n=Sample size, N=Population size, e=Margin of error (0.05)

The study employed purposive sampling to specifically target Farmer FIRST Programme beneficiaries, which may limit the generalizability of findings. The Yamane formula was used to estimate sample size, but its application is more appropriate for simple random sampling. The purposive approach was necessary to ensure inclusion of relevant FFP participants, but this may affect the representativeness of the sample.

Data collection tools

Data were collected through a structured and pre-tested interview schedule.

Statistical analysis

The collected data were coded and analysed using SPSS Version 26. Descriptive statistics (frequency, percentage, mean and standard deviation, WMS, ranking) and inferential statistics correlation and regression were applied to evaluate the attitude of respondents towards FFP.

Results and Discussion

Favourable attitudes and strengths

A majority of both crop-based (55.8 %) and horticulture-based (66.2 %) beneficiaries expressed favourable attitudes toward the farmer FIRST programme, with a notable proportion (25.97 % crop-based, 14.09 % horticulture-based) reporting highly favourable attitudes (Table 1-4, Fig. 1-3). This indicates strong acceptance and perceived value of the programme among participants, especially in the horticulture sector (9, 10, 11).

Weighted Mean Scores (WMS) for core dimensions highlight the programmes' strengths: participatory decision-making (WMS: 3.87 crop, 4.14 horticulture), improved productivity (WMS: 3.66 crop, 4.10 horticulture) and programme relevance (WMS: 3.70 crop, 4.09 horticulture) (Table 1-2 and Fig. 2). These high scores reflect that farmers appreciate the collaborative approach, the tangible benefits in productivity and the alignment of programme interventions with local needs. The consistently higher WMS for horticulture-based beneficiaries suggests that the programmes' impact is more pronounced in this sector, possibly due to the nature of horticultural interventions and their direct link to market-oriented outcomes (12, 13).

Table 3. Categorisation of the attitude of crop-based FFP beneficiaries towards FFP

| Categories | Frequency | % |
|-----------------------------|-----------|--------|
| Unfavorable (<37.82) | 14 | 18.182 |
| Favourable (37.82-55.132) | 43 | 55.844 |
| Highly favourable (>55.132) | 20 | 25.974 |
| Mean = 46.480, SD = 8.652 | | |

Table 4. Categorisation of the attitude of horticulture-based FFP beneficiaries towards FFP

| Categories | Frequency | % |
|-----------------------------|-----------|--------|
| Unfavorable (<42.027) | 14 | 19.718 |
| Favourable (42.02-58.36) | 47 | 66.197 |
| Highly favourable (>58.367) | 10 | 14.085 |
| Mean = 50.197, SD = 8.17 | | |

The statistically significant differences in attitude scores between crop-based and horticulture-based beneficiaries, along with the high WMS for participatory decision-making and productivity, underscore the programmes' effectiveness in fostering farmer engagement and improving agricultural outcomes (Table 1-2 and Fig. 3-4). These findings highlight the importance of participatory extension approaches in enhancing farmer confidence and collaboration and suggest that such strategies are particularly effective in horticulture-based interventions. The results reinforce the value of tailored, inclusive extension strategies in maximising the impact of agricultural development programmes.

Socio-economic predictors of attitude

Correlation and regression analyses reveal that education, operational land holding, cosmopolitanism, annual income, economic motivation and self-esteem are significantly and positively associated with favourable attitudes towards FFP participation (Table 5-8). These results highlight the critical role

Table 1. Attitude of crop-based FFP beneficiaries towards FFP(n=71)

| Sl. No | Statements | WMS | Rank |
|--------|---|-------|------|
| 1 | The benefits of the programme are not equally distributed among all farmers. | 1.675 | XIII |
| 2 | Farm women and landless people are also included as beneficiaries under this programme. | 3.571 | IX |
| 3 | The programme often introduces technologies that are too costly to adopt | 1.714 | XII |
| 4 | I regularly receive useful information and support from programme staff. | 3.506 | XI |
| 5 | The programme effectively involves local peoples' knowledge in refining and adopting technologies. | 3.688 | IV |
| 6 | The Farmer FIRST Programme favours large farmers over smallholders | 1.325 | XV |
| 7 | I feel more confident using the new farming technologies introduced by the programme. | 3.610 | VI |
| 8 | The programme promotes farmers-to-farmers knowledge sharing | 3.597 | VII |
| 9 | There is proper follow-up after the initial training or support. | 3.584 | VIII |
| 10 | The programme ensures active participation of farmers and farmer and groups in plan development. | 3.870 | I |
| 11 | The programme has strengthened the bond between researchers and farmers | 3.714 | II |
| 12 | Communication with programme staff is irregular or ineffective. | 1.676 | XIV |
| 13 | The Farmer FIRST Programme has improved my agricultural productivity | 3.662 | V |
| 14 | I feel more involved in decision-making about the technologies used on my farm because of this programme. | 3.571 | IX |
| 15 | The programme addresses the actual needs of farmers like me. | 3.701 | III |

Table 2. Attitude of horticulture-based FFP beneficiaries towards FFP(n=71)

| S. No | Statements | WMS | Rank |
|-------|---|-------|------|
| 1 | The benefits of the programme are not equally distributed among all farmers. | 1.789 | XII |
| 2 | Farm women and landless people are also included as beneficiaries under this programme. | 3.676 | XI |
| 3 | The programme often introduces technologies that are too costly to adopt | 1.718 | XIII |
| 4 | I regularly receive useful information and support from programme staff. | 3.859 | X |
| 5 | The programme effectively involves local peoples' knowledge in refining and adopting technologies. | 3.958 | VII |
| 6 | The Farmer FIRST Programme favours large farmers over smallholders | 1.324 | XV |
| 7 | I feel more confident using the new farming technologies introduced by the programme. | 3.958 | VII |
| 8 | The programme promotes farmers-to-farmers knowledge sharing | 3.958 | VII |
| 9 | There is proper follow-up after the initial training or support. | 3.972 | VI |
| 10 | The programme ensures active participation of farmers and farmer and groups in plan development. | 4.014 | IV |
| 11 | The programme has strengthened the bond between researchers and farmers | 3.986 | V |
| 12 | Communication with programme staff is irregular or ineffective. | 1.662 | XIV |
| 13 | The Farmer FIRST Programme has improved my agricultural productivity | 4.099 | II |
| 14 | I feel more involved in decision-making about the technologies used on my farm because of this programme. | 4.141 | I |
| 15 | The programme addresses the actual needs of farmers like me. | 4.085 | III |

Table 5. Relationship of socio-economic variables with attitude of crop-based FFP beneficiaries towards FFP (n=77)

| S. No | Independent variables | Correlation coefficient |
|-----------------|--------------------------|-------------------------|
| X ₁ | Age | .071 |
| X ₂ | Education | .440** |
| X ₃ | Operational land holding | .291* |
| X ₄ | Family size | -.180 |
| X ₅ | Farming experience | .135 |
| X ₆ | Mass media utilisation | .075 |
| X ₇ | Cosmopolitaness | .416** |
| X ₈ | Annual income | .325** |
| X ₉ | Annual expenditure | .136 |
| X ₁₀ | Economic motivation | .349** |
| X ₁₁ | Risk orientation | .020 |
| X ₁₂ | Self esteem | .287* |
| X ₁₃ | Self confidence | -.023 |

“**” and “***” represents significance at 5 % and 1 % level, respectively

Table 6. Multiple regression analysis of socio-economic variables with attitude of crop-based FFP beneficiaries (n=77)

| S. No | Independent variables | FFP beneficiaries | | | | Residuals |
|-----------------|--------------------------|------------------------|----------------|-----------|---------|-----------|
| | | Unstandardized β | Standard error | 't' Value | p-value | |
| X ₁ | Age | -1.965 | 1.858 | -1.057 | 0.293 | 0.14 |
| X ₂ | Education | 2.06* | .761 | 2.715 | 0.008 | 0.12 |
| X ₃ | Operational land holding | 1.401 | 1.411 | .993 | 0.323 | 0.15 |
| X ₄ | Occupation | -0.709 | 1.047 | -.677 | 0.500 | 0.13 |
| X ₅ | Farming experience | 2.093 | 1.603 | 1.306 | 0.194 | 0.14 |
| X ₆ | Mass media utilisation | 3.172* | 1.394 | 2.27 | 0.026 | 0.15 |
| X ₇ | Cosmopolitaness | 5.057* | 2.267 | 2.231 | 0.028 | 0.10 |
| X ₈ | Annual income | 6.412* | 2.867 | 2.236 | 0.028 | 0.14 |
| X ₉ | Annual expenditure | 0.639 | 1.604 | .399 | 0.691 | 0.16 |
| X ₁₀ | Economic motivation | -1.257 | 2.870 | -.438 | 0.662 | 0.17 |
| X ₁₁ | Risk orientation | 1.222 | 3.068 | .398 | 0.691 | 0.18 |
| X ₁₂ | Self esteem | 4.005* | 1.419 | 2.824 | 0.006 | 0.11 |
| X ₁₃ | Self confidence | -2.033 | 1.498 | -1.357 | 0.177 | 0.13 |

R² value=0.6392, Adjusted R² value=0.6134

“**” and “***” represents significance at 5 % and 1 % level, respectively

Table 7. Relationship of socio-economic variables with attitude of horticulture-based FFP beneficiaries towards FFP (n=71)

| S. No | Independent variables | Correlation coefficient |
|-----------------|--------------------------|-------------------------|
| X ₁ | Age | -.219 |
| X ₂ | Education | 0.311** |
| X ₃ | Operational land holding | -.062 |
| X ₄ | Family size | .048 |
| X ₅ | Farming experience | 0.239* |
| X ₆ | Mass media utilisation | 0.454** |
| X ₇ | Cosmopolitaness | -.150 |
| X ₈ | Annual income | 0.365** |
| X ₉ | Annual Expenditure | -.018 |
| X ₁₀ | Economic motivation | .069 |
| X ₁₁ | Risk Orientation | .134 |
| X ₁₂ | Self esteem | 0.298* |
| X ₁₃ | Self confidence | -.049 |

“**” and “***” represents significance at 5 % and 1 % level, respectively

Table 8. Multiple regression analysis of socio-economic variables with attitude of horticulture-based FFP beneficiaries (n=71)

| S. No | Independent variables | FFP beneficiaries | | | | Residuals |
|-----------------|--------------------------|------------------------|----------------|-----------|---------|-----------|
| | | Unstandardized β | Standard Error | 't' Value | p-value | |
| X ₁ | Age | -3.414 | 2.565 | -1.331 | 0.186 | 0.15 |
| X ₂ | Education | 3.127* | 1.340 | 2.333 | 0.022 | 0.13 |
| X ₃ | Operational land holding | 3.998 | 2.164 | 1.847 | 0.067 | 0.14 |
| X ₄ | Family size | -.530 | 1.434 | -.370 | 0.712 | 0.16 |
| X ₅ | Farming experience | 1.831 | 2.364 | .774 | 0.441 | 0.17 |
| X ₆ | Mass media utilisation | 4.37* | 1.934 | 2.26 | 0.026 | 0.16 |
| X ₇ | Cosmopolitaness | 1.624 | 3.054 | .532 | 0.596 | 0.18 |
| X ₈ | Annual income | 4.542** | 1.637 | 2.775 | 0.007 | 0.12 |
| X ₉ | Annual expenditure | 2.435 | 2.202 | 1.106 | 0.271 | 0.19 |
| X ₁₀ | Economic motivation | -6.739 | 10.325 | -.653 | 0.515 | 0.20 |
| X ₁₁ | Risk orientation | 7.396 | 9.925 | .745 | 0.458 | 0.21 |
| X ₁₂ | Self esteem | 1.950** | 0.753 | 2.59 | 0.011 | 0.10 |
| X ₁₃ | Self confidence | -2.187 | 2.907 | -.752 | 0.454 | 0.14 |

R² value= 0.695, Adjusted R² value=0.622

“**” and “***” represents significance at 5 % and 1 % level, respectively

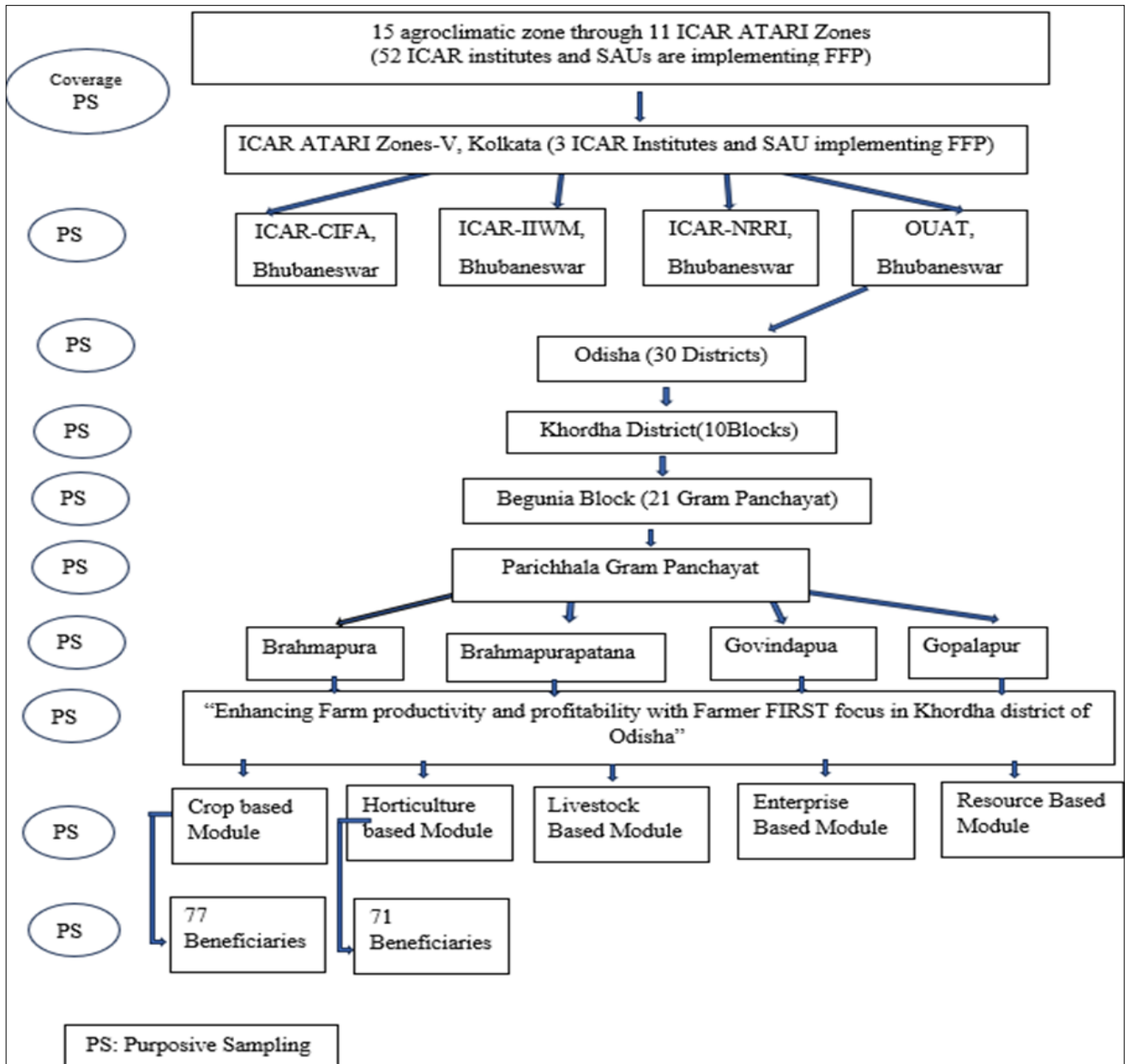


Fig. 1. Flowchart depicting the sampling procedure for crop-based and horticulture-based beneficiaries in the farmer first programme, Khordha district, Odisha.

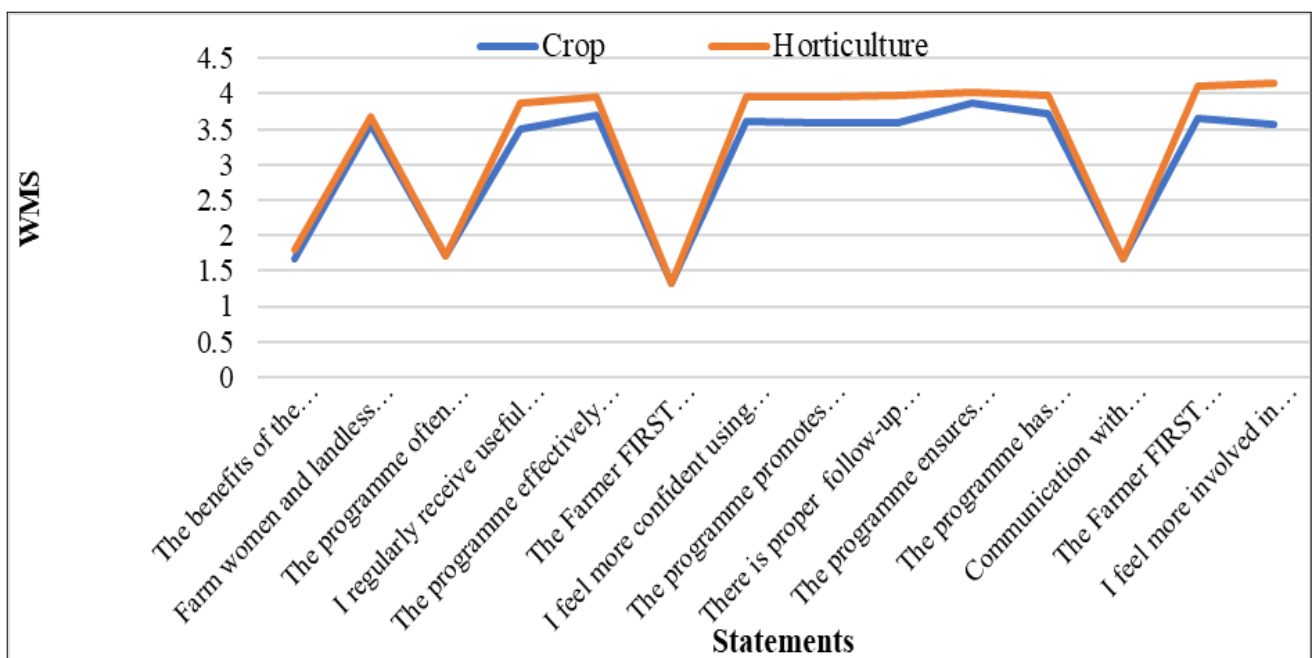


Fig. 2. Attitude score of crops-based and horticulture-based module FFP beneficiaries towards FFP.

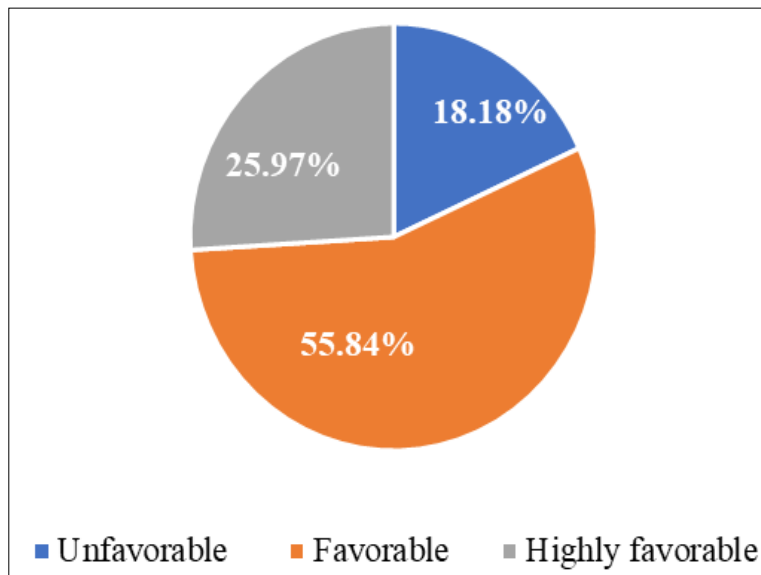


Fig. 3. Attitude score of crops based on FFP beneficiaries towards FFP.

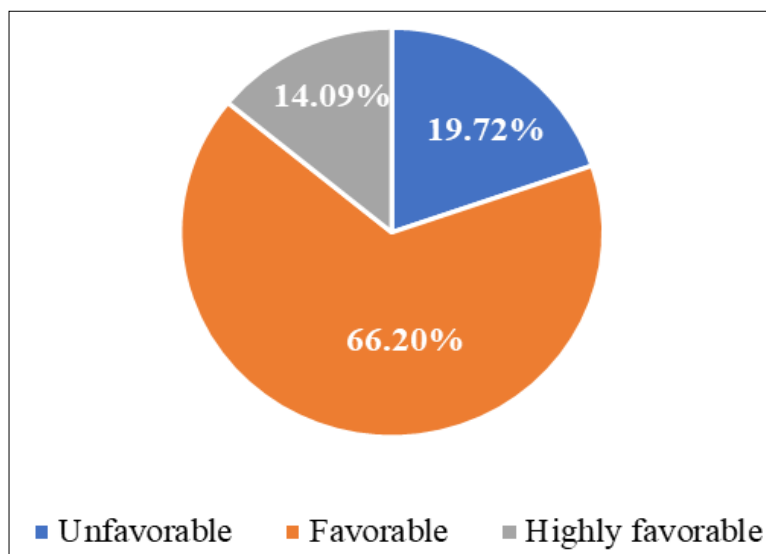


Fig. 4. Attitude score of horticulture-based FFP beneficiaries towards FFP.

of education, exposure to varied media and information sources, economic well-being, broad social interaction and personal esteem in shaping attitudes towards participatory extension initiatives like FFP. Beneficiaries with these attributes are more receptive to new ideas, technologies and collaborative approaches (14, 15, 16).

The positive attitudes observed among beneficiaries align with the diffusion of innovations theory, where early adopters and opinion leaders play a crucial role in programme acceptance. The Theory of planned behaviour further explains how attitudes, subjective norms and perceived behavioural control influence farmers' willingness to participate in and benefit from participatory extension programmes.

Conclusion

The study shows that both crop-based and horticulture-based beneficiaries of the FFP in Khordha district express predominantly favourable attitudes towards the program. Key strengths identified include participatory decision-making, productivity improvement and program relevance. However, concerns remain about equity in benefit distribution, technology

affordability and communication effectiveness. Socio-economic factors such as education, mass media utilisation, annual income, cosmopolitanism and self-esteem significantly influence attitudes. Regression analysis confirms these factors as strong predictors, explaining a majority of attitude variation. These findings highlight the importance of empowerment, information access and economic stability in enabling positive engagement with participatory extension efforts. To maximise impact, targeted communication and inclusive strategies are essential, especially for marginalised and lower-income farmers. Overall, the FFP demonstrates effectiveness as a participatory extension model, with room to address gaps for greater inclusivity and sustained success.

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Authors' contributions

SD and MP conceptualised the research work. BPM contributed to the development of research methodology, data validation and manuscript refinement. AD supported the statistical analysis, interpretation of findings and visualisation of results. KKS was responsible for drafting the manuscript and ensuring coherence in the discussion. All authors actively participated in reviewing, editing and approving the final manuscript.

Compliance with ethical standards

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

Ethical issues: None

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