

What Determines Farmers' Participation in the Farmer-Producer Organizations: Empirical Evidence from India

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ABSTRACT

Farmer-Producer Organizations (FPOs) are seen as an effective way to mobilize small and marginal farmers and overcome the problems associated with small holdings. The success of FPOs is constrained by various individual, social, environmental, and organizational factors, among which low level of farmers' participation is important. An increasing number of FPOs in the country suggests that more small farmers join FPOs, but little evidence is available regarding their participation in the activities of FPOs and their determinants. We examined these aspects empirically, by interviewing 200 members of FPOs from Telangana and Andhra Pradesh states of India, considering both member-related and organizational factors. Ordinal logit regression results showed that individual-related factors like education, access to formal credit, and training attended had a significant positive relationship with the participation of farmers in the overall activities of the FPOs. Farmers' participation was also affected by technical and organizational rationalities that are to be addressed by the FPOs. Heterogeneity in determinants of participation in different activities like meetings, financial matters, and decision-making was observed. The study suggests that both member characteristics and FPO characteristics need to be taken into account to ensure the high participation of farmers in FPO activities.

Keywords: Determinants, Level of participation, Ordinal Logit Regression, Small and marginal farmers.

INTRODUCTION

Small and marginal farmers account for 86.08% of the total holdings in India (GoI, 2019). The small-holder-led economy is obstructed by low quantities of marketable surplus, low bargaining power, lack of market access, scarcity of capital, market imperfections, and poor infrastructure and communications (Barham and Chitemi, 2009; Teshome *et al.*, 2009). Mobilizing the farmers into Farmer-Producer Organizations (FPOs) is one of the most effective strategies to overcome these constraints. NABARD (2015) defined Farmer-Producer Organizations (FPOs) as one type of producer organization where the members are farmers and they are the shareholders in

the organization. FPOs can be registered under the Cooperative Society Act or Indian Companies Act or Indian Trust Act, or Society Registration Act. Those registered under Indian Companies Act becoming popular among farmers, with more than 20,000 FPOs in the country. They help in the collective procurement of inputs, providing market access to different channels, increasing bargaining power, decreasing middlemen, and thus enhancing members' income (Herck, 2014; Abokyi, 2013; Mishra *et al.*, 2004; Latynskiy and Thomas, 2016; Nikam and Singh, 2016; Gurung and Choubey, 2021). Therefore, the government is giving special emphasis on the formation of FPOs through different programs and schemes.

Despite various documented and empirical

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benefits of FPOs, their potential is marred by various organizational challenges: low participation of farmers is prominent among them. This, in turn, affects the viability and sustainability of the business model of FPOs and, ultimately, the success of the FPOs in the country (Business Standard, 2020; Kumar *et al.*, 2021). Though few studies have analyzed the farmers' participation in FPOs, it is only from a member's point of view, neglecting FPOs-related factors that fail to provide a complete picture. As much emphasis is given to establishing FPOs in developing countries like India and the participation of farmers has a bearing on the success and sustenance of FPOs, the study of important determinants of the farmers' participation in FPOs activities would help in promoting a better policy environment to enhance the participation.

Against this backdrop, this study analyzed the farmer's participation in the activities of the FPOs by taking into account member-related and FPO-related factors, in Telangana and Andhra Pradesh state of India, using the Ordinal Logistic Regression method.

MATERIALS AND METHODS

Study framework

The study framework is illustrated in Figure 1. Farmers' participation in the study referred to the extent of involvement of member farmers in FPOs activities like financial matters, training, meetings, and decision making of the FPOs. The study is conducted on the farmers who have already joined the organization (already members). Farmers' participation in FPO activities is affected by push factors (individual related) and pull factors (FPO related). As literature related to the participation of farmers in FPO's activities is scarce, a review related to determinants of joining is also included here. In a few studies, participation is referred to as joining the organizations. Personal factors such as age and sex, in addition to their

human capital i.e. education level and farm experience, may affect farmers' participation in the FPOs. Younger farmers were more likely to participate in the FPO's activities (Singh and Vatta, 2019; Mwambi *et al.*, 2020; Wang *et al.*, 2019; Bernard and Spielman, 2009; Tolno *et al.*, 2015; Chagwiza *et al.*, 2016; Hosamani, 2019). Male farmers are likely to participate more in FPO activities because of the dominance of the patriarchal system and heading households by them (Wang *et al.*, 2019). The education level may affect decisions to participate in FPOs, because highly educated farmers were more likely to be aware of the potential benefits of the FPOs (Dung, 2020; Singh and Vatta, 2019; Wang *et al.*, 2019; Bernard and Spielman, 2009; Tolno *et al.*, 2015; Chagwiza *et al.*, 2016; Hosamani, 2019). Wang *et al.* (2019) indicated that the probability of farmers' participation in the FPOs increases with farm experience.

The economic factors of farm operations include landholding, percent of irrigated area, nonfarm income, and formal credit accessibility. Land operated and percent of the irrigated area positively influence their level of participation in the FPOs (Dung, 2020; Bernard and Spielman, 2009; Tolno *et al.*, 2015; Chagwiza *et al.*, 2015; Hosamani, 2019; Das and Mandal, 2021). Tolno *et al.* (2015) and Hosamani (2019) found that nonfarm income significantly and positively affected the participation of members in the FPOs. It is justifiable for people to participate in FPOs activities if they had access to credit (Dung, 2020; Tolno *et al.*, 2015; Bernard and Spielman, 2009).

Social factors include family size, membership in village organization, access to extension and mass media contacts, and training. Family size accounts for the supply of family labor and may have a significant impact on participation in the FPOs if it provides labor efficiently (Chagwiza *et al.*, 2016; Tolno *et al.*, 2015; Hosamani, 2019). Membership in village organizations, access to information through extension agency contact, mass media, and training were the essential factors in motivating farmers to

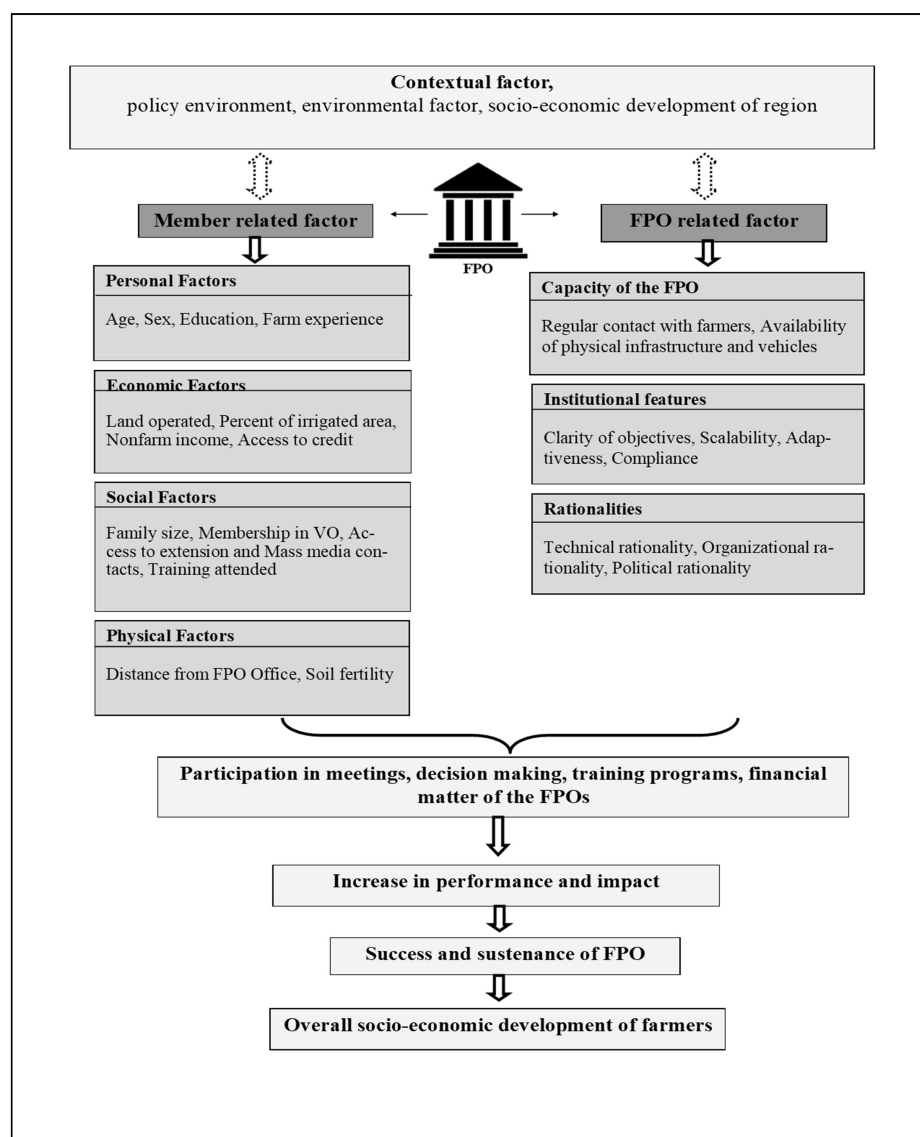


Figure 1. Framework showing factors influencing participation in the FPO activities. (Source: authors).

participate in the FPOs (Dung, 2020; Tolno *et al.*, 2015). Few physical factors such as distance from the FPOs office and soil fertility status were expected to show a significant effect on the participation of the members in the FPOs, as less distance aids in convenience and soil fertility affects the crops yield.

The capacity of the FPOs includes regular contact of the staff with the farmers,

availability of physical infrastructure, and vehicles in the FPOs. Based on fivefold typology and new institutional economics principles (Pagan, 2003), institutional features such as clarity of objectives, scalability, adaptiveness, and compliance were expected to show a significant relationship with participation. Based on the management theory of organizational design, and governance (Ackroyd, 2002; Groth, 1999; Nystrom and Starbuck, 1981)



the rationalities such as technical, organizational, and political rationality that need to be addressed by the effective institution to ensure participation were identified. Institutional features and rationalities have an impact on performance (North, 1990). Hence, we assume that there must be a relationship between institutional features and rationalities with farmers' participation.

Study area

The study was conducted in Telangana and Andhra Pradesh states of India, located in the southern part of the country. Telangana has the fourth-largest number of FPOs (460, which is 6.5% of the country's total) and similarly, Andhra Pradesh has 399 FPOs, which is about 5.6% of the country's FPOs (GoI, 2022). Figure 2 shows the study area and sampling.

Sampling and Data Collection

Khammam and Nalgonda districts of Telangana and Krishna and West Godavari districts of Andhra Pradesh were randomly selected for this study. From each selected district, a list of all FPOs was obtained and five FPOs were selected randomly with three inclusion criteria. Firstly, the FPO is working for more than 3 years, secondly, the FPO having more than 300 members and, thirdly, the FPO providing more than one type of service: knowledge services, economic and advisory services, input

supply services, processing services, financial services, training and capacity building services, networking services, procurement, and packaging services. At the FPO level, a list of all members was obtained from the officials and ten respondents were selected randomly from each FPO. Details of the sampling are presented in Table 1. Primary data were collected from members and officials of FPOs by using a structured questionnaire to generate quantitative data on selected member-related and FPO-related factors during April-May 2022.

Variable Selection

The dependent and independent variables used in the study are described in Table 2. Participation of farmers in different activities of the FPOs was a dependent variable, elicited by asking members about their involvement in FPO's activity at three levels of participation (LP): LP1-(No participation), LP2-(Sometimes participation), and LP3-(High participation). This was done by providing statements regarding their level of participation in meetings, decision-making, training programs and financial matter. Independent variables (personal, economic, social, physical, institutional, and rationalities) are mentioned in the conceptual figure 1 and Table 2 were obtained through a review of the literature and expert opinions.

Table 1. Distribution of sample size. ^a

State	Districts	Number of selected FPOs	Selected respondents
Telangana	Khammam	05	50
	Nalgonda	05	50
Andhra Pradesh	Krishna	05	50
	West Godavari	05	50
Total		20	200

^a Source: Authors' survey with households, 2022.

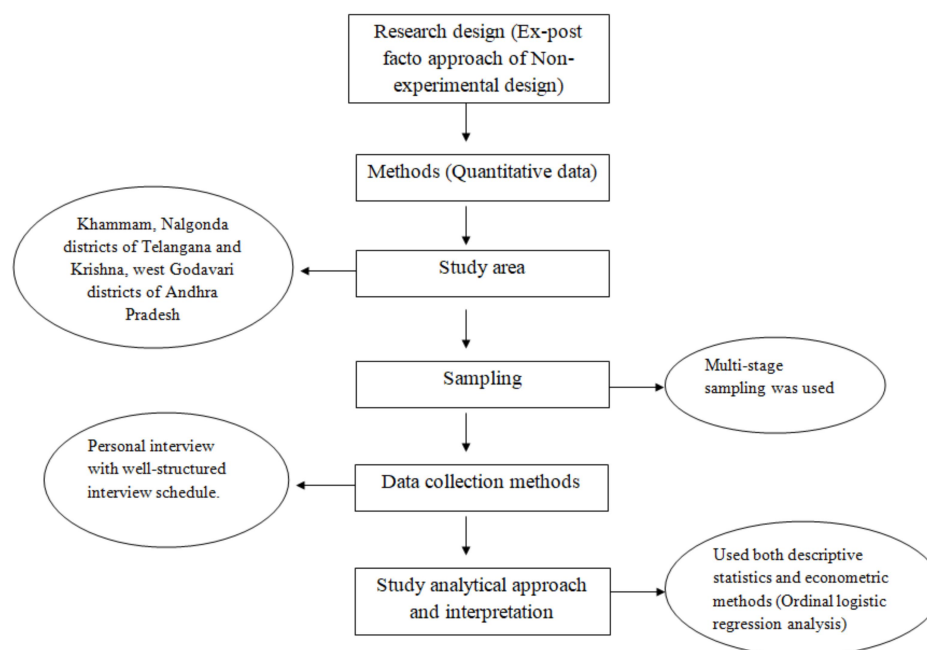


Figure 2. Flowchart of the key components of the research design and procedures. Source: Authors' analysis.

Analytical Method

As the dependent variable (level of participation categories) was an ordinal categorical variable, and the independent variable comprised not only continuous variables but also categorical variables, we used the Ordered Logit regression model (OLOGIT) to find the factors that influence their level of participation and the analysis process was achieved by Stata 15.0. The ordered logistic model (Cameron and Trivedi, 2005) is specified below:

$$\Pr(Y_i > j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1 + [\exp(\alpha_j + X_i\beta_j)]} \quad j = 1 - 3$$

Where, Y_i = the dependent variable reflecting the 3 categories of level of participation (LP1, LP2, and LP3) by sampled farmers

$Y_i = 1$; Farmers who had no Participation (LP1)

$Y_i = 2$; Farmers who reported sometimes Participation (LP2)

$Y_i = 3$; Farmers who had high Participation (LP3)

α_j = The intercept term, β_j vector of the parameter to be estimated, and X_i denotes independent variables as mentioned in Table 2.

The marginal effect is an informative way to summarize how a change in the level of participation is related to a change in any covariate. The marginal effect of an explanatory variable X on the probability of making choice 3 (i.e., being the farmer having high participation), is evaluated at a mean of X .

RESULTS AND DISCUSSION

Description of Variables Used in the Study

Table 2 summarizes and presents the selected characteristics of the respondents of pooled sample and FPOs characteristics. The

**Table 2.** Variables considered to study the determinants of farmers' participation in the FPOs.^a

S.N.	Variables	Description and measurement	Mean values
Dependent variable			
1	Farmers' overall participation	Farmer's overall participation in the activities conducted by the FPO including meetings, decision making, training, and financial matter.	LP1-0.04 LP2-0.42 LP3-0.55
2	Participation in the meetings	Farmer's level of participation in meetings conducted by the FPO.	LP1-0.07 LP2-0.36 LP3-0.57
3	Involvement in decision making	Farmer's level of involvement in the decision making process related to the procurement of inputs, marketing, and taking up any new activity.	LP1-0.18 LP2-0.46 LP3-0.37
4	Participation in the training programs	Farmer's level of participation in training programs/awareness programs/ exposure visits.	LP1-0.09 LP2-0.42 LP3-0.50
5	Involvement in the financial matter	Farmer's level of involvement in the activities such as benefits allocation, maintenance cost, the appointment of CEO/consultant, etc.	LP1-0.35 LP2-0.38 LP3-0.28
Independent variable			
A) Member related variables			
1	Age	Chronological age of the members (in years)	44.55
2	Sex	If the member is female then 1, 0 otherwise.	0.195
3	Education level	Number of years of formal education	8.31
4	Land operated	Land owned by the members (in acres)	6.13
5	Irrigated area	Percentage of land having irrigation availability	89.24
6	Soil fertility status	Quality of soil in term of fertility; Average= 1, Fertile= 2, Highly fertile= 3	0.33
7	Family size	Number of family members in the household	3.8
8	Nonfarm income	Whether members have any source of non-farm income, if yes then 1, 0 otherwise	0.255
9	Farm experience	Number of years engaged in farming	18.53
10	Access to formal credit	Whether members have obtained loans from formal sources, if yes then 1, 0 otherwise	0.565
11	Membership in village Organization	Whether members are a member of any village organization like a self-help group, farmers interest group, farmers club, village panchayat, or cooperative society; if yes then 1, 0 otherwise	0.575
12	Access to FPO	Distance from FPO office to member house, in meters	7462.55
13	Extension agency contact	Whether members access information from public institutions and officials then 1, 0 otherwise	0.685
14	Training attended	Whether member attended any training related to agriculture, if yes then 1, 0 otherwise	0.90
15	Access to Mass media for agriculture-related information	Whether the farmer accessed agriculture information from television, radio, farm publications, social media, etc. if yes then 1, 0 otherwise	0.705

^a LP1: No Participation; LP2: Sometimes Participation; LP3: High Participation. For item 18-24 in column 1, related statements were given to respondents and their response was obtained on a five-point Likert scale. SA-Strongly Agree, A- Agree, U- Undecided, DA- Disagree, SDA-Strongly Disagree. The value of the median is given for items 18 to 24 in the last column.

Table2 continued...

Continued of Table 2. Variables considered to study the determinants of farmers' participation in the FPOs.^a

S. N.	Variables	Description and measurement	Mean values
B) FPO-related variables			
16	Regular contact with farmers	Whether FPO personnel contact farmers at regular intervals, if yes then 1, 0 otherwise	0.70
17	Availability of physical infrastructure and vehicles	Availability of infrastructure like cold storage, training hall, etc. Very high (5)/High (4)/Moderate (3)/Low (2)/Very low (1)	0.47
18	Clarity of objectives	Objectives are known to the farmers, FPOs plan regularly, and there are no deviations from the FPO objectives.	4
19	Scalability	Membership, commodities, land cover, and the range of activities undertaken by FPO are optimum.	3
20	Adaptiveness	The scale of operation of FPO, and MOU changes with the external environment.	3
21	Compliance	Rules and regulations are followed by the FPOs, compliance with agreements of Promoting Institution (PI) and federation, and provisions of company/cooperative act.	4
22	Technical rationality	Requirements include adaptivity to the technology, adequacy of machinery and equipment, staff availability, market intelligence, sound location of FPOs, and optimum production.	3
23	Organizational rationality	The participation rate of farmers in elections, and General Body Meetings (GBM). Frequency of organizing meetings and competency of the directors.	4
24	Political rationality	Adequate representation of youth, women, and politically able leaders and their perception of fairness and justice	4

^a LP1: No Participation; LP2: Sometimes Participation; LP3: High Participation. For item 18-24 in column 1, related statements were given to respondents and their response was obtained on a five-point Likert scale. SA-Strongly Agree, A- Agree, U- Undecided, DA- Disagree, SDA-Strongly Disagree. The value of the median is given for items 18 to 24 in the last column.

average age for the pooled data was 44.55 years. Around 80.5% of the pooled data were male respondents and 19.5% were female respondents. On average, the respondents were having 18.53 years of experience in farming and 8.31 years of formal education. The family size was 3.8 members. The average distance from the FPO office to the house was 7462.55 meters. Nearly half (56.5%) had access to formal credit. Around 90% of the respondents had attended any formal training related to agriculture. Around 57.5% of respondents were members of village organizations. The majority of the respondents (68.5%) had access to extension agencies and mass media (70.5%). Only 25.5% of the respondents had non-farm sources of income. On average, the respondents' operated land holding was 6.13 acres. The average percentage of the

irrigated area was 89.24%. Only 33% of the members possessed highly fertile soil. The average normalized scores for regular contact with farmers and availability of physical infrastructure and vehicles were 0.70 and 0.47, respectively. The median scores for the institutional features such as clarity of objectives, scalability, adaptiveness, and compliance were 4, 3, 3, and 4, respectively. The median scores for rationalities such as technical, organizational, and political rationality were 3, 4, and 4, respectively.

Determinants of Farmers' Overall Participation in FPO Activities

Ordinal Logit coefficients and the marginal effect of each of these variables on



farmers' participation are given in Table 3. Education level had a positive significant relationship with farmers' overall participation. A 1% increase in education level increased the probability of farmers' participation by 2.2%. It could be justified that the more the level of education of the farmers, the more chances to understand and calculate the benefits of FPOs, which leads to increased participation in the FPOs. These research findings are in line with Dung (2020), Singh and Vatta, (2019), Wang *et al.* (2019), Hosamani (2019), Gurung and Choubey (2023), etc. There was a 16.5 and 36.3% increase in the probability of farmers' participation with a 1% increase in access to formal credit and training attended,

respectively. It can be inferred that the greater access to formal sources of credit (banks and Self Help Group (SHG)) is reflected in the greater participation of farmers in FPO activities. Similar findings were also obtained by Dung (2020, Tolno *et al.* (2015), and Bernard and Spielman (2009). The respondents who attended any formal training related to agriculture were more likely to participate in the FPOs. The reason might be that the training programs organized by facilitating agencies might have exposed the FPO members to the need and importance of the FPOs. Further, the training also might allow interaction and knowledge sharing among the farmers, which in turn developed their behavior and

Table 3. Variables determining farmers' overall participation in the FPOs' activity. ^a

Variables	Ordinal Logit coefficient		Marginal effect	
	Coeff.	SE	(dy/dx)	SE
A) Member related variables				
Age	0.015	0.028	0.003	0.005
Sex	-0.643	0.508	-0.116	0.091
Farm experience	0.004	0.025	0.001	0.005
Education level	0.120***	0.043	0.022***	0.007
Family size	0.071	0.128	0.013	0.023
Access to FPO	0.000	0.000	0.000	0.000
Access to formal credit	0.912**	0.372	0.165**	0.064
Training attended	2.001***	0.596	0.363***	0.100
Membership in village Organization	0.324	0.377	0.059	0.068
Extension agency contact	0.220	0.391	0.040	0.071
Access to mass media	0.171	0.396	0.031	0.072
Nonfarm income	0.516	0.483	0.094	0.087
Land operated	-0.022	0.043	-0.004	0.008
Percent of irrigated area	0.003	0.010	0.000	0.002
Soil fertility status	0.270	0.290	0.049	0.052
B) FPO related variables				
Regular contact with farmers	-0.039	0.367	-0.007	0.067
Availability of physical infrastructure and vehicles	-0.290	0.192	-0.053	0.034
Clarity of objectives	0.327	0.316	0.059	0.057
Scalability	-0.183	0.254	-0.033	0.046
Adaptiveness	-0.053	0.178	-0.010	0.032
Compliance	0.546	0.440	0.099	0.079
Technical rationality	0.536**	0.271	0.097**	0.048
Organizational rationality	0.713*	0.375	0.129*	0.066
Political rationality	0.336	0.259	0.061	0.046

^a Notes: *** P< 0.01, ** P< 0.05, * P< 0.1. SE: Standard Error.

facilitate them to participate in the FPOs.

From FPO-related variables, technical and organizational rationality showed a positive and significant influence on the farmer's participation in the overall activities of the FPO. Those FPOs with adequate infrastructure, adaptive to technology, having sufficient staff, and at an appropriate distance from the members were attracting more participation from the members. FPOs with more participation rate of farmers in elections, General Body Meetings (GBM), frequency of organizing meetings, and competency of the directors ensure the members' participation and contribution in FPO's overall activities.

Determinants of Farmers' Participation in the Meetings Conducted by the FPOs

Education level had a positive significant relationship with farmers' participation in the meetings conducted by the FPOs. Distance from the FPO office had a significant negative relationship with farmers' participation in the meetings conducted by the FPOs. Similar findings were also obtained by Manaswi (2018). It can be inferred that farmers who have to travel long distances from their houses to avail of services were less likely to participate in the FPO meetings. Training attended, irrigated areas, and soil fertility

Table 4. Variables determining participation in the meetings conducted by the FPOs. ^a

Variables	Ordinal coefficient	Logit	Marginal effect	
	Coeff.	SE	(dy/dx)	SE
A) Member related variables				
Age	0.009	0.027	0.002	0.005
Sex	-0.365	0.518	-0.069	0.098
Farm experience	-0.007	0.024	-0.001	0.005
Education level	0.081**	0.040	0.015**	0.007
Family size	0.084	0.126	0.016	0.024
Access to FPO	-0.000*	0.000	-0.000*	0.000
Access to formal credit	0.26	0.364	0.049	0.069
Training attended	2.518***	0.571	0.478***	0.095
Membership in village Organization	-0.086	0.375	-0.016	0.071
Extension agency contact	0.403	0.375	0.077	0.071
Access to mass media	0.648	0.388	0.123	0.072
Nonfarm income	-0.441	0.462	-0.084	0.087
Land operated	0.005	0.042	0.001	0.008
Percent of irrigated area	0.023**	0.010	0.004**	0.002
Soil fertility status	0.760***	0.284	0.144***	0.051
B) FPO related variables				
Regular contact with farmers	-0.344	0.359	-0.065	0.068
Availability of physical infrastructure and vehicles	-0.247	0.175	-0.047	0.033
Clarity of objectives	0.157	0.295	0.030	0.056
Scalability	-0.239	0.243	-0.045	0.046
Adaptiveness	0.134	0.179	0.025	0.034
Compliance	0.738*	0.434	0.140*	0.081
Technical rationality	0.351	0.263	0.067	0.049
Organizational rationality	0.229	0.350	0.043	0.066
Political rationality	0.156	0.242	0.030	0.046

^a Notes: *** P< 0.01, ** P< 0.05, * P< 0.1. SE: Standard Error.



status had a positive significant relationship with farmers' participation in the meetings conducted by the FPOs. Any formal training in agriculture increased farmers' chances of attending the FPOs meetings. It was also observed that farmers with good soil fertility status and with the more irrigated area would attend training more than the farmers with a low resource base.

In FPO-related factors, it was seen that compliance had a positive significant relationship with farmers' participation in the meetings conducted by the FPOs (Table 4). One percent increase in a cumulative score for compliance increased the probability of farmers' participation in the meetings conducted by the FPOs by 14%. Hence,

more FPO members participate in the meetings when the organization is compliant with the rules and regulations.

Determinants of Farmers' Involvement in the Decision Making

As evident from Table 5, access to FPO and access to formal credit had a positive significant relationship with farmers' involvement in decision-making. Unlike for meetings and other activities, a positive sign of the distance indicated that distance did not matter for a farmer to involve in the decision making of the FPOs. It was observed that farmers who had more access

Table 5. Variables determining farmers' involvement in the decision making. ^a

Variables	Ordinal Logit coefficient		Marginal effect	
	Coeff.	SE	(dy/dx)	SE
A) Member-related variables				
Age	0.024	0.024	0.004	0.005
Sex	-0.564	0.468	-0.104	0.085
Farm Experience	-0.030	0.022	-0.006	0.004
Education level	0.040	0.038	0.007	0.007
Family size	0.103	0.115	0.019	0.021
Access to FPO	0.000**	0.000	0.000**	0.000
Access to formal credit	0.574*	0.336	0.105*	0.061
Training attended	0.480	0.491	0.088	0.090
Membership in village Organization	-0.172	0.344	-0.032	0.063
Extension agency contact	-0.244	0.358	-0.045	0.065
Access to Mass media	0.244	0.357	0.045	0.065
Nonfarm income	1.004***	0.414	0.184***	0.073
Land operated	0.029	0.039	0.005	0.007
Percent of irrigated area	-0.022***	0.009	-0.004***	0.002
Soil fertility status	-0.521*	0.266	-0.096*	0.048
B) FPO-related variables				
Regular contact with farmers	0.308	0.324	0.057	0.059
Availability of physical infrastructure and vehicles	-0.015	0.163	-0.003	0.030
Clarity of objectives	0.367	0.289	0.067	0.052
Scalability	0.027	0.233	0.005	0.043
Adaptiveness	0.045	0.165	0.008	0.030
Compliance	-0.247	0.378	-0.045	0.069
Technical rationality	0.141	0.249	0.026	0.046
Organizational rationality	0.092	0.313	0.017	0.057
Political rationality	-0.120	0.227	-0.022	0.042

^a Notes: *** P < 0.01, ** P < 0.05, * P < 0.1. SE: Standard Error.

Table 6. Variables determining farmers' participation in the training programs conducted by the FPOs. ^a

Variables	Ordinal Logit coefficient		Marginal effect	
	Coeff.	SE	(dy/dx)	SE
A) Member-related variables				
Age	0.017	0.026	0.003	0.005
Sex	-0.456	0.471	-0.092	0.094
Farm experience	-0.009	0.023	-0.002	0.005
Education level	0.066	0.039	0.013	0.008
Family size	-0.018	0.120	-0.004	0.024
Access to FPO	0.000	0.000	-0.000	0.000
Access to formal credit	0.433	0.346	0.088	0.069
Training attended	3.953***	0.686	0.800***	0.134
Membership in village Organization	-0.011	0.359	-0.002	0.073
Extension agency contact	0.503	0.360	0.102	0.072
Access to mass media	0.118	0.368	0.024	0.074
Nonfarm income	0.290	0.426	0.059	0.086
Land operated	-0.009	0.042	-0.002	0.008
Percent of irrigated area	0.003	0.010	0.001	0.002
Soil fertility status	0.333*	0.267	0.067*	0.053
B) FPO-related variables				
Regular contact with farmers	0.145	0.339	0.029	0.068
Availability of physical infrastructure and vehicles	0.124	0.166	0.025	0.034
Clarity of objectives	0.055	0.294	0.011	0.059
Scalability	0.096	0.236	0.019	0.048
Adaptiveness	-0.172	0.167	-0.035	0.033
Compliance	0.292	0.390	0.059	0.079
Technical rationality	0.187	0.247	0.038	0.050
Organizational rationality	0.111	0.325	0.023	0.066
Political rationality	0.207	0.236	0.042	0.048

^a Notes: *** P< 0.01, ** P< 0.05, * P< 0.1. SE: Standard Error.

to formal sources like banks, and SHG were more likely to involve in the decision making in the FPOs. Earlier studies (Dung, 2020; Tolno *et al.*, 2015; Bernard and Spielman, 2009, etc.) obtained similar findings. Contrary to the expectation, the percentage of the irrigated area and soil fertility status had a significant negative relationship with the farmers' participation in FPO meetings. Non-farm sources of income of farmers significantly and positively affected the farmers' participation in the decision making of FPOs (Tolno *et al.*, 2015; Hosamani, 2019). Thus, those farmers who had income sources other than agriculture tend to involve more in the FPOs' decision making process than those who were dependent on agriculture. Among

FPO-related variables, no variable significantly affected the farmers' participation in FPO's decision making. Thus, individual factors play an important role in participation in the decision making of FPOs than the FPO characteristics.

Determinants of Farmers' Participation in the Training Programs Conducted by the FPOs

Training attendance and soil fertility status had a positive significant relationship with farmers' participation in the training programs conducted by the FPOs. There was an 80.0 and 6.7% increase in the probability of farmers' participation in the training

**Table 7.** Variables determining farmers' involvement in the financial matter.

Variables	Ordinal Logit coefficient		Marginal effect	
	Coeff.	SE	(dy/dx)	SE
A) Member-related variables				
Age	-0.046	0.026	-0.008	0.004
Sex	-0.027	0.451	-0.004	0.074
Farm experience	0.078***	0.022	0.013***	0.004
Education level	0.055	0.037	0.009	0.006
Family size	0.011	0.116	0.002	0.019
Access to FPO	0.000	0.000	0.000	0.000
Access to formal credit	0.343	0.325	0.057	0.053
Training attended	-0.116	0.495	-0.019	0.082
Membership in village Organization	0.002	0.338	0.000	0.056
Extension agency contact	0.231	0.350	0.038	0.057
Access to mass media	-0.283	0.344	-0.047	0.056
Nonfarm income	-0.165	0.405	-0.027	0.067
Land operated	-0.033	0.037	-0.005	0.006
Percent of irrigated area	0.018***	0.009	0.003***	0.002
Soil fertility status	-0.163	0.256	-0.027	0.042
B) FPO-related variables				
Regular contact with farmers	0.435	0.317	0.072	0.052
Availability of physical infrastructure and vehicles	-0.258	0.159	-0.042	0.026
Clarity of objectives	0.168	0.276	0.028	0.045
Scalability	0.124	0.221	0.020	0.036
Adaptiveness	0.073	0.156	0.012	0.026
Compliance	0.090	0.375	0.015	0.062
Technical rationality	0.130	0.238	0.021	0.039
Organizational rationality	1.124***	0.326	0.185***	0.051
Political rationality	-0.024	0.220	-0.004	0.036

^a Notes: *** P< 0.01, ** P< 0.05, * P< 0.1. SE: Standard Error.

programs conducted by the FPOs with a one percent increase in training attended and soil fertility status. The respondents who attended any formal training related to agriculture were more likely to participate in the training programs conducted by the FPOs. Gaining awareness in the training programs conducted by different agencies related to agriculture, farmers were more likely to participate in the training programs conducted by FPOs. As most of the training at the FPO level are related to crop production, soil, and fertilizer management, those farmers with good fertility status tend to attend more training. Like decision making, for training programs, FPO related factors had a limited role in deciding farmer's participation.

Determinants of Farmers' Involvement in the Financial Matter

Farm experience, percentage of the irrigated area, and organizational rationality had a positive significant relationship with farmers' involvement in the financial matter. One percent increase in a cumulative score for farm experience and percentage of the irrigated area increased the probability of farmers' involvement in the financial matter by 1.3% and 0.3%, respectively. It can be justified that the farmers with a high level of farm experience and resource-rich farmers are contributing more to decisions related to financial matters. This finding is in

concordance with Wang *et al.* (2019). As organizational rationality showed a positive and significant relationship with the farmer's participation in the financial matter, it can be inferred that the competency of the board of directors and the frequency of organizing meetings affected the farmers' participation in the financial matter of the FPOs.

CONCLUSIONS

The study identified different member-related and FPOs related variables affecting their participation, taking leads from new institutional economic principles and organizational rationality. A heterogeneity was observed in the determinants of participation in different activities. Significant determinants of farmers' overall participation in the FPOs were education level, access to formal credit, and training attendance related to agriculture. Access to FPO, percentage of irrigated area, soil fertility status, non-farm income, and farm experience were the other important determinants of farmers' participation in different activities of the FPOs. In FPO characteristics, technical rationality and organizational rationality played a significant role in farmers' participation in the overall activities of FPO. In addition to this, compliance was reported as significantly determining farmers' participation in meetings of the FPOs. Thus, more variables from member characteristics affected the participation of farmers in FPO activities than the FPO characteristics. Further studies are suggested to explore the effect of FPOs characteristics on participation.

This study adds to the existing literature on factors responsible for farmers' participation in an organization, in general, and FPOs, in particular. From a policy perspective, the finding emphasizes the development of human capital, particularly by providing education and training related to agriculture to farmers. Increasing access to credit can serve as an incentive for

farmers to participate in FPOs. Access to FPO in terms of distance was an important determinant in participation in meetings; therefore, while establishing FPOs, care should be taken that it comprised members from the same or adjoining villages. Though the percentage of irrigated area and soil fertility status cannot be changed easily, these things need to be kept in mind by promoting institutions before the establishment of FPOs. Technical and organizational rationalities must be strongly addressed by the FPOs to ensure a high level of participation. Compliance at the organizational level can be strengthened to promote farmers' participation. Thus, both member characteristics and FPO characteristics need to be taken into account to ensure the high participation of farmers in FPO activities, which is crucial for the successful performance and impact of FPOs.

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آنچه که مشارکت کشاورزان را در سازمان های کشاورز و تولیدکننده تعیین می کند: شواهد تجربی از هند

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چکیده

سازمان های کشاورز و تولیدکننده (FPOs) به عنوان یک راه مؤثر برای بسیج کشاورزان کوچک و حاشیه ای و غلبه بر مشکلات مرتبط با مزارع کوچک تلقی می شوند. موفقیت FPO ها توسط عوامل مختلف فردی، اجتماعی، محیطی و سازمانی محدود می شود که در میان آنها سطح پایین مشارکت کشاورزان از اهمیت برخوردار است. افزایش تعداد FPO ها در کشور نشان می دهد که کشاورزان کوچک بیشتری به FPO ها می پیوندند، اما شواهد کمی در مورد مشارکت آنها در فعالیت های FPOs و عوامل تعیین کننده آنها در دسترس است. ما این جنبه ها را به صورت تجربی با مصاحبه با ۲۰۰ عضو FPO از ایالت های تلانگانا و آندرا پرادش هند، با در نظر گرفتن عوامل مرتبط با اعضا و سازمانی بررسی کردیم. نتایج رگرسیون لاجیت ترتیبی (Ordinal logit regression) نشان داد که عوامل مرتبط با فرد مانند تحصیلات، دسترسی به اعتبار رسمی و آموزش حضوری با مشارکت کشاورزان در فعالیت های کلی FPOs رابطه مثبت معناداری دارند. مشارکت کشاورزان نیز تحت تأثیر عقلانیت های فنی و سازمانی قرار گرفت که باید توسط FPO ها مورد توجه قرار گیرد. نیز، ناهمگونی در عوامل تعیین کننده مشارکت در فعالیت های مختلف مانند جلسات، مسائل مالی و تصمیم گیری مشاهده شد. این پژوهش نشان می دهد که هم ویژگی های اعضا و هم ویژگی های FPO باید در نظر گرفته شوند تا از مشارکت بالای کشاورزان در فعالیت های FPO اطمینان حاصل شود.