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**Modeling the Behavioural Intentions of Farmers towards Active Participation in Farmer
Producer Companies (FPCs): An Extended Theory of Planned Behaviour**

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Modeling the Behavioural Intentions of Farmers towards Active Participation in Farmer Producer Companies (FPCs): An Extended Theory of Planned Behaviour

ABSTRACT

This study examined the factors influencing the behavioural intentions of farmers towards active participation in Farmer Producer Companies (FPCs). Data were collected using structured interview schedule from the member farmers of eight FPCs in crop and dairy sectors of Southern India. The hypotheses were tested using Partial Least Square- Structural Equation Modelling (PLS-SEM). The initial part of the schedule consisted of demographic characteristics of the respondents such as age, education, income. The later part of the schedule consisted of items measuring the constructs under Theory of Planned Behaviour (TPB) i.e., attitude, subjective norms, perceived behavioural control along with the additional variables, economic motivation and egalitarianism of the respondents. The findings revealed that besides the exogenous constructs in the Theory of Planned Behaviour (TPB) model (*i.e.*, Attitude of farmers towards FPCs, Subjective norms and Perceived behavioural control), economic motivation and egalitarianism of farmers had a significant positive direct and indirect influence on the farmers' intention towards active participation in the FPCs. Attitude was identified as a significant mediator between the economic motivation and intention as well as egalitarianism and farmers' intention towards active participation in FPCs. Annual income and education of farmers had a significant negative moderating effect on the positive relationship between economic motivation and farmers' intention. The R^2 (0.533) and Q^2 effect size (0.365) values confirmed the 'goodness of fit' of the model in predicting the farmers' intention to continue active participation in FPCs. The findings of the study provide valuable insights to policy makers and researchers in designing effective strategies to consciously select the farmers at the formation stage itself and ensure their active participation in FPCs during their promotion stage, thus contributing to the FPCs' sustainable performance.

Keywords: Behavioural intentions, Farmer Producer Companies, Participation, Structural Equation Modelling, Extended Theory of Planned Behaviour, Egalitarianism

1. INTRODUCTION

The significance of agriculture in the economies of developing nations like India underscores the importance of decisions pertaining to agricultural issues, at individual, social and economic level. The agriculture and allied sectors contribute 18.3 per cent of the Gross Value Added (GVA) to the total economy of India and about 70 per cent of Indians reliant on agriculture (MoSPI, 2023; Kumar and Pant, 2023; MoA & FW, 2016;). A vast majority of fragmented agricultural landholdings belong to 89.40 percent of small and marginal farmers, with an average per capita land holding of nearly 1.08 ha (MoSPI, 2021; MoA & FW, 2016). Often, it becomes challenging for the extension wings to reach them with appropriate technologies and farm support schemes.

The small and marginal farmers in India face the problems of high input costs at the production stage and succumb to distress sales at post-harvest stage due to the low bargaining power, exploitation of middlemen and poor market connectivity (Padmanand et al 2018). Consequently, an inadequate share of the price paid by the consumer is ultimately reaching the farmers (Karanam et al. 2021). The situation gets further aggravated leading to the perception that agriculture is unviable in the country. In order to address the woes of small and marginal farmers, Farmer Producer Companies (FPCs) have gained significant attention during recent times. The Government of India (GOI) had launched and strongly spearheading the 'Formation and Promotion of 10,000 Farmer Producer Organization (FPOs) by 2027 to ensure economies of scale for the farming community and improve their livelihood (Das and Mandal, 2021). Thus, FPCs were observed to play a critical role in achieving the goal of inclusion of small holder farmers (Wang et al. 2024) in the market systems of India (Dash, 2016).

Several studies identified the determinants of success or failure of the farmer collectives in India and abroad (Chopra et al. 2024; Surendran-Padmaja et al. 2023; Mukherjee et al. 2019; Wang et al. 2024; Ciliberti et al. 2020). In the process of development of FPC as a viable entity, active participation of member farmers was found to be a major factor which could trigger the effective functioning and sustainability of the FPC in the long run (Pandian and Ganesan, 2020; Dejene and Getachew, 2015; Bhuyan, 2007). The FPC members often hail from a heterogeneous group and were characterized by diversified thinking and attitude. Besides that, the momentum of an FPC depends on building good rapport with the fellow members, other farmers, management personnel

(Surendran and Ojha, 2023) and their active engagement in FPC activities *viz.*, attending meetings, trainings, communicating actively with co-members, regular submission of their needs, willingness to provide initial capital (share), sale of harvested produce to the FPC, *etc* (Mwambi et al. 2020). However, the ground reality is often different where the farmers in India, often indifferently take membership in an FPC and later become dormant in participation which is leading to the poor performance of FPCs making them short-lived (Kumar et al, 2020., Manaswi et al, 2020., Pandian and Ganesan, 2020). Some of the reasons for inactive participation include information asymmetry among the members (Hendrikse, 2007), inability to take collective decisions (Batzios, 2021), lack of trust on the board members (Osterberg and Nilsson, 2009), lack of knowledge on the potential of FPCs, distance from the FPC (Das and Mandal, 2021), class and caste barriers and members' attributes (Ahado et al. 2022).

Collective farming initiatives failed to achieve the intended results in the past on account of lackadaisical participation from its members (Abrisham, 2011; Tangwe and Maliehe, 2011). Evidently, recent studies show that 45 per cent of the FPCs aged more than 5 years were 'struck off' by the Ministry of Corporate Affairs, GOI due to their dormant function (Govil et al. 2020; Neti and Govil, 2022). Active participation of members is a crucial and fundamental social attribute that defines the successful performance and well-being of cooperatives and its members (Ahado et al. 2022; Barraud et al. 2012). So, ensuring the active participation of FPC member farmers in its concerned activities could possibly contribute to the long-term sustainability (Pabba and Ponnusamy, 2024; Verhees et al., 2015) of agricultural FPCs, enhance performance (Barraud et al. 2012) and uphold the interests of small and marginal farmers (Kyeyamwa et al. 2008).

The present study is novel by its nature, firstly because most of the previous studies have analysed the extent of participation of farmers (Mwambi et al. 2020; Pandian and Ganesan, 2020), its impact in the farmer collectives (*viz.*, cooperatives, FPCs, FPOs, SHGs) (Pandian and Ganesan, 2020; Boskova et al. 2020) or factors influencing participation or non-participation (Batzios et al. 2021; Osterberg and Nilsson, 2009). However, the socio-psychological perspective, particularly the role of behavioural intentions, has been underexplored in the context of farmer collectives, specifically for a developing country like India. Our study aims to fill this research gap with an objective to identify the factors that shape farmers' behavioural intentions to continue active participation in their respective FPC. Secondly, this is the first study to explore and identify the

role of socio-psychological and socio-economic variables *viz.*, egalitarianism, economic motivation, age, education and income alongside the TPB constructs in explaining the farmers' behavioural intentions towards active participation in FPCs. The findings from this approach allows the stakeholders to address the motivations that could drive sustained participation, which is critical for the success of FPCs. Further, this study could act as a ready reference for academicians working on collective farming initiatives, pro-social behavior in group processes as well as policy makers to devise suitable policy interventions for ensuring the active engagement of farmers in FPCs.

The structure of the article begins with introduction to the study, followed by discussion of the theoretical background and hypotheses development. The research methodology section outlines the sample selection, survey instrument, and data collection process. The results are then presented and analyzed, followed by a discussion of the study's theoretical and practical implications. Finally, the article concludes with a summary of findings, study limitations, and directions for future research.

2. LITERATURE REVIEW

2.1 Theoretical framework and hypotheses development

The decision to actively participate in the activities of Farmer Producer Company (FPC) is a complex process and stems from the strong intentions of the farmers to perform such behaviour. If the motivations behind forming such intentions are strong enough, the more likely one is to do so (Ajzen, 1985; Baeuml et al, 2021). For the purpose of this study, 'active participation' is defined as the voluntary contribution and engagement of the member farmers in the FPC's business transactions (purchasing inputs, selling harvested produce, accessing resources) and attending meetings aimed at making collective decisions related to FPC operations. Though there is a limitation of studies directly examining farmers' active participation behaviour in FPCs, insights can be drawn from research on other farmer organisations and farmers' behavioral intentions. Evidences indicate that Theory of Planned Behavior (TPB) is a powerful theoretical framework to predict intention and behavior, widely used in a variety of contexts, including participation in organisations (Ajzen and Driver 1991; Mollers et al. 2017; Rifas and Jahan, 2021; Hansson et al., 2012).

Intention (INT). Azjen (1991; 2015) defines intentions as the immediate act or the determinant of a specific behavior of an individual. For the present study, farmers' intentions are defined as the willingness of the member farmers to perform active participation behaviour in the FPC operations for the upcoming year. The intentions, considered as the antecedents of the actual behaviour are predicted by three social cognitive constructs (Azjen, 1991) of TPB namely, (i) the attitude (favourable or unfavourable) towards exhibiting a specific behaviour, (ii) the subjective norms which refers to the perceived social pressure from external sources (government or NGO personnel) and internal sources (friends, family, relatives) related to the specific behaviour and (iii) the perceived behaviour control, which designates the perceived ease and capabilities of the decision maker in exhibiting the intended behaviour. The favourable conditions of all three constructs (Attitude, Subjective norms and Perceived Behavior Control) decide the strength of the intentions to act and exhibit a particular behavior (Baeuml et al, 2021; Davis *et al.*, 2002). Ajzen (1991) highlights that the TPB is flexible and allows for the incorporation of additional explanatory constructs that significantly account for variations in the intention and behavior. Building on this, an extended model of TPB was proposed (Fig. 1) in which economic motivation and egalitarianism were introduced as additional constructs.

Attitude (ATI). Ajzen and Cote (2008) identified attitude as the strongest predictor of individual intention, while Shaw et al. (2015) emphasized it as a critical prerequisite for behavior change. In prior research utilizing the Theory of Planned Behavior (TPB), farmers' attitudes have consistently been recognized as significant determinants of intentions across various agricultural contexts. For example, Mollers et al. (2017) confirmed that attitude of the farmers significantly influences their intentions to join producer organisations in Romania. Attitudes have been shown to influence farmers' intentions to implement unsubsidized agri-environmental measures (VanDijk et al., 2016), participate in FPCs (Gangana and Velmurugan, 2023), diversify agricultural production (Senger et al., 2017), and adopt sustainable farming practices (Menozzi et al., 2015). Zeweld et al. (2017) demonstrated that farmers with favorable attitudes are more likely to adopt conservation agricultural practices. Rezaei et al. (2018) revealed that farmers with positive attitudes toward On-Farm Food Safety practices exhibit greater mental readiness and intention to engage in such practices. These findings collectively suggest the hypothesis-

'(H₁) Farmers' attitudes significantly influence their intentions to actively participate in FPCs'.

Subjective Norms (SNO). refer to the perceived social pressure to perform or not perform a particular behavior. These norms are shaped by the expectations, opinions, and behaviours of family members, friends, fellow farmers and community leaders (Fishbein & Ajzen, 1977). Subjective norms are identified as the strongest predictor of the farmers' intention to participate in Farmer Producer Companies (Gangana and Velmurugan, 2023), community urban farming (Muhammad et al., 2024), and in water user associations (Gholamrezai and Sepahvand, 2017). Similarly, found that subjective norms have a direct effect on the farmers' intentions to participate in environmental NGOs (Abadi, 2020), adopt agricultural conservation practices (Yang et al. 2024) and new agricultural technologies (Zhang et al., 2024). These findings collectively provided the theoretical ground for the hypothesis-

(H₂) Subjective Norms significantly influence the farmers' intentions to actively participate in FPCs'

Perceived Behavioural Control (PBC) refers to an individual's perception of their ability to perform a behaviour. Boskova (2020) concluded that PBC plays a significant role in establishing the intention to participate in environmental organisations, justified by the notion that there is a positive link between people's self-efficacy and their desire to involve in a particular activity (Hunton and Beeler 1997). Moreover, PBC was identified as the greatest predictor of farmers' intentions to participate in agriculture cooperation (takaful) in Srilanka (Rifas and Jahan; 2021), Farmer Producer Companies (Gangana and Velmurugan, 2023) and water user associations in Iran (Taqiopur et al. 2015). Martinez and McMullin (2004) conducted a survey involving both active and inactive members of non-governmental organizations and found that farmers' willingness to participate is influenced by their perceived efficacy of involvement. These evidences formed the basis for the hypothesis-

(H₃) Perceived Behavioural Control significantly influence the farmers' intentions to actively participate in FPCs'.

Economic Motivation (ECM). Economic motivation refers to the inner urge of the respondent to reap higher profits/ income from agriculture/ dairying enterprises. It is characterized by the desire to optimize profits and minimize costs. It plays a pivotal role in farmers' decision-making processes within collectives (Emerton and Snyder, 2018). By participating in collectives, farmers gain access

to economies of scale, bargaining power, and shared resources, while benefiting from improved market access and better prices for their produce (Cherukuri and reddy, 2014; Van de Fliert et al., 2007). Supporting this, Greiner (2015) identified economic motivation as a significant predictor of farmers' intentions to participate in biodiversity contracts, explaining 11% of the variance in such decisions. Research also highlights the critical role of economic motivation in shaping farmers' attitudes. Bora et al. (2018) demonstrated that economic motivation influences farmers' attitudes toward farming practices aimed at income enhancement. Similar studies have proved that economic motivation has significant positive association with farmers' attitudes toward improved agricultural practices (Siddhu and Padakannaya, 2009) and private agricultural extension services (Saravanan et al. 2000). Drawing from these studies, it was hypothesized that-

(H₄) Economic motivation directly influences farmers' intention to actively participate in FPCs, and (H₆) Farmers attitude mediates the relationship between economic motivation and intention towards active participation in FPCs.

Egalitarianism (EGL). It is operationally defined as the extent to which the member farmer of FPC believes that all individuals are equal and should avail equal rights and opportunities in the concerned activities of an FPC irrespective of social group, gender, land holding, education, demography, etc. It emphasizes equality (Falomir-Pichastor et al., 2017), fairness (Wyer, 2010), and equitable resource distribution, and influences farmers' decision-making by fostering a collective mindset within agricultural systems (Whitehead, 2018). This philosophy motivates farmers to prioritize not only individual benefits but also the welfare of their communities and the environment (Barry, 2002). Importantly, egalitarian motives were found to affect income-altering behaviours and therefore proven to be an important factor underlying the evolution of cooperation in humans (Dawes et al., 2007). Egalitarian values encourage sustainable practices (Fleubaey et al., 2014), fair treatment of peers, and a commitment to social justice, environmental stewardship (O'Donnell, 2023), and economic sustainability—principles that align with group-led initiatives like farmer collectives (Leder et al., 2019). Research by Waldrop (2024) identifies egalitarianism as a driver of pro-social and positive intergroup behaviors, while Monteith and Walters (1998) demonstrate that individuals who view egalitarianism as promoting equality of opportunity or outcomes are more likely to engage in prosocial actions within group processes. Studies have shown that egalitarianism fosters positive attitudes (Dall'Ara and Maass, 1999) toward self-

volunteering behaviors and a sense of connectedness to others (Rosenblum et al., 2022). Drawing from these findings, attitudes may act as a critical mediator, shaping how farmers evaluate the alignment of their egalitarian values with the benefits of active participation in FPCs. From this reasoning, the following hypothesis were articulated–

(H₅) Egalitarianism directly influences farmers' intention to actively participate in FPCs, and

(H₇) Farmers' attitude mediates the relationship between egalitarianism and intention towards active participation in FPCs

Moderation effects of Age, Education and Annual income

Demographic characteristics often serve as moderators in decision-making processes, affecting how individuals perceive opportunities, assess risks, and engage in economic activities (Rogers, 2014; Ajzen, 1991). Understanding these moderating effects could be crucial for developing targeted strategies to enhance farmers' active participation in FPCs (Gagana and Velmurugan, 2023).

Annual Income (INC). Farmers with higher annual income may have a greater capacity to invest in FPC activities and leverage economies of scale (Gupta and Kumar et al. 2021). They may perceive FPCs as platforms for expanding their agribusiness activities and accessing larger markets. Jalali and Abadi (2018) showed that the better income levels of the farmers positively influence their participation in rangeland management cooperatives. Conversely, smallholder farmers or those with lower incomes might view participation in FPC as an uncertain investment (Ciliberti et al. 2020; Yaméogo et al. 2018) or may prioritize active engagement to harvest cooperative marketing benefits (Wollni and Zeller, 2007). Therefore, the following hypotheses was formulated-

(H_{8a,b}) Income of farmers moderates the effect of economic motivation on intention, as well as attitude on intention.

Education (EDU). Education plays a crucial role in shaping farmers' cognitive abilities, awareness, and decision-making processes. Higher education levels are often associated with greater access to information, better comprehension of cooperative benefits, and a more strategic approach to economic engagement (Rogers, 2014; Derle and Deshmukh, 2022). Educated farmers

are more likely to recognize the long-term advantages of FPC participation, such as improved market access, price stability, and collective bargaining power (Malik and Kajale, 2024). In contrast, farmers with lower education levels may face difficulties in understanding the regulatory framework, governance structure, and economic potential of FPCs, leading to lower intentions to participate. On this basis, the following hypothesis was derived– ($H_{9a,b}$) *Education moderates the relationship between economic motivation and intention, as well as attitude and intention.*

Age (AGE). Farmers in older age group, with their accumulated experience and risk aversion, may recognize FPCs as reliable institutions that reduce market uncertainties, facilitate knowledge sharing and social relations with collective action. Conversely, younger farmers, driven by innovation and entrepreneurship, may perceive FPCs as opportunities to enhance productivity, expand market access and assume leadership roles. Manocha et al. (2023) confirmed the moderating effect of the age of farmers on investment intentions and attitude of the rural farmers. Similarly, Herath (2013) found that age has a significant negative influence in predicting the technology adoption behaviour of the farmers. Drawing from these evidences, it was hypothesized that-

($H_{10a,b}$) *Age has a moderation effect on the economic motivation and intention, as well as attitude and intention.*

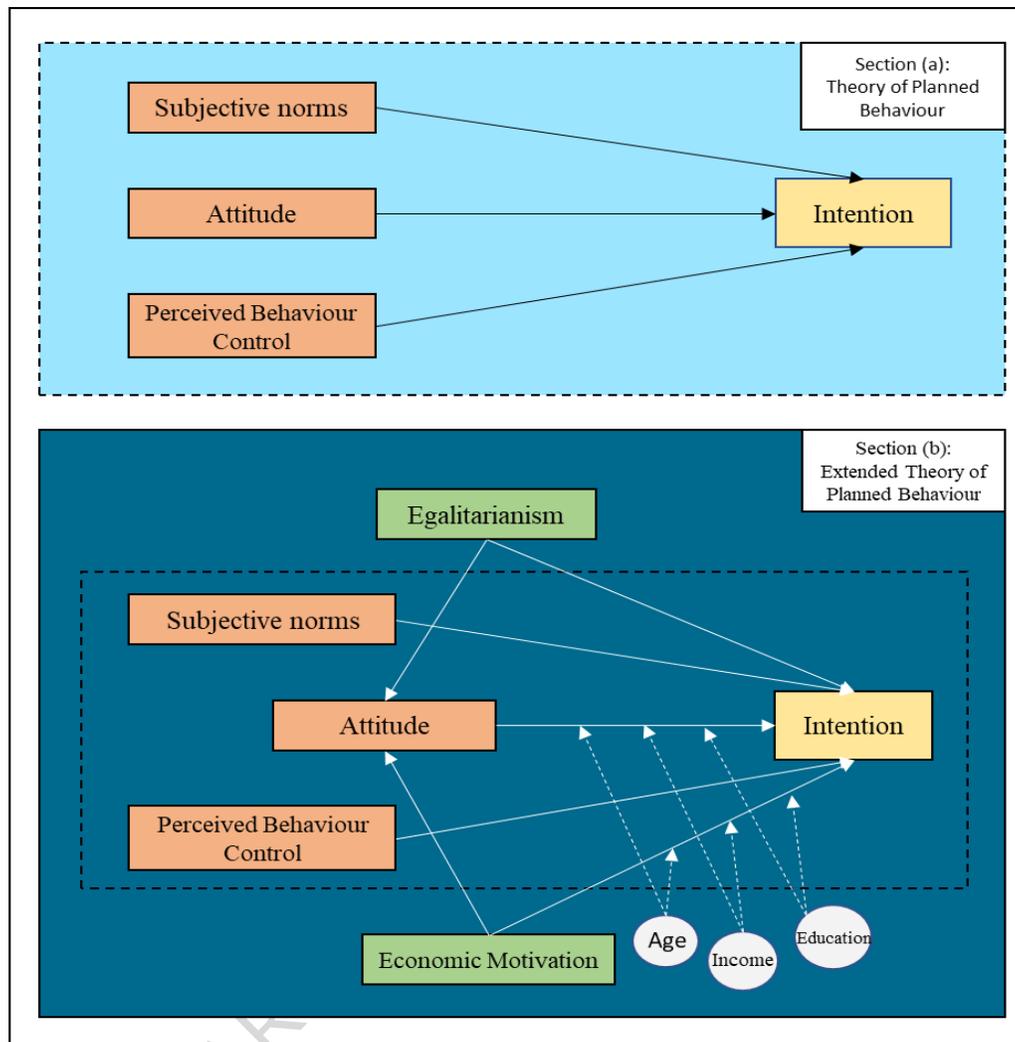


Fig. 1 Conceptual framework of Extended Theory of Planned Behaviour model. (Section (a): Theory of Planned Behaviour; Section (b): Extended theory of planned behavior)

3. RESEARCH METHODOLOGY

3.1 Sample selection

The study adopted the 'Survey' research design. It included member farmers of FPCs from purposively selected states in Southern India i.e., Telangana and Andhra Pradesh, due to the significant presence of FPCs (1,172 in total) and their substantial share of paid-up capital (59.48%) among the top 20 FPCs in India (Neti and Govil, 2022). A total of 8 FPCs were selected purposively from both the states in crop and dairy sectors. The crop sector FPCs (4 No.s) were selected from the districts having the highest number of FPCs in the states whereas, all the available 4 dairy FPCs from both the states were selected for obtaining the sample of dairy FPCs.

Due consideration was given in selecting the member farmers from the FPCs promoted by various funding agencies in the states *viz.*, NABARD (National Bank for Agriculture and Rural Development), SFAC (Small Farmers Agribusiness Consortium), NRLM (National Rural Livelihood Mission) and National Dairy Development Board (NDDB). The sample was drawn from a list of FPCs fulfilling the five criteria *viz.*, (i) Incorporated at least 3 years prior to the time of data collection (ii) A minimum membership size of 300 (iii) Involved in crop/ dairy sector operations (iv) Consistently disclosed their financial reports to the Ministry of Corporate Affairs (MCA), India, over the past three consecutive years., and (v) The FPCs were active in function at the time of data collection. In the next stage, 40 farmers were selected randomly from each FPC, thus constituting a sample size of 320 farmers from eight FPCs.

Partial Least Square- Structural Equation Modelling (PLS-SEM) technique was applied for the present study using SmartPLS-4.0 (Ringle et al. 2022). It is an empirically substantiated method for estimating and establishing complex relationships among the variables in the model under study (Gudergan et al, 2008). The general guideline of PLS-SEM to have a sample size of >150 for a model with the number of constructs ≤ 7 was followed to ensure the sample representativeness for the present study (Hair Jr. et al, 2006).

3.2 Survey instrument and data collection

The primary data was collected from the respondent farmers using a structured interview schedule. Before administering the interview schedule, respondents were prudently informed about its content, objectives and were guaranteed anonymity, confidentiality, and the right to withdraw from the study at any time. The initial part of the schedule consisted of demographic characteristics of the respondents such as age, education, income, gender. The later part of the schedule consisted of items measuring the constructs under Theory of Planned Behaviour (TPB) i.e., attitude, subjective norms, perceived behavioural control along with the additional variables, economic motivation and egalitarianism. The scale items were adapted from previous studies and later, suitable modifications were made to suit the context of the study. The ATI items were adapted from Mukherjee et al. (2018), Mollers et al. (2017) and Vázquez (2011). Items of SNO were adopted from Abadi (2020) and Baeuml et al. (2021), while those of PBC were adapted from Abadi (2020), Yazdanpanah et al. (2015) and House (1998). The scale items of EM were adapted from Meena and fulzele (2008) and Supe (1969), while those of EGL were adapted from Aranda and montes-

berges, (2013), Kluegel and Mateju (1995), Arneson and richard, (1989). The scale items to measure INT were adapted from Gagana and Velmurugan (2023), Verhees et al. (2015) and Abadi (2020). Since the respondents for this study were farmers with limited formal education, a 5-point Likert scale was employed to enhance simplicity, minimize cognitive load and the risk of survey fatigue. Also, previous research indicates that, 5-point scales tend to yield slightly higher mean scores relative to the maximum possible score than even-numbered alternatives (Chandra Pant et al. 2024; Dawes, 2008). The scale items (Table 1) measured using Likert's 5-point continuum scale, where 1 indicates strong disagreement and 5 indicates strong agreement.

Table 1. Scale items

Indicators	Intention towards active participation (INT)
INT1	I wish to market my harvested produce (crop/ milk) through the FPC
INT2	I wish to purchase inputs/ hire machinery from the FPC
INT3*	I do not wish to participate in FPC meetings due to political interferences
INT4	I intend to participate in FPC activities to enhance my abilities as farm manager
INT6	I wish to continuously engage with the FPC business activities
INT7	I think about submitting my needs to the FPC to obtain quality services
INT8	If an opportunity arises, I would be ready to serve the FPC as an office bearer
INT9*	I plan not to waste my time in attending FPC meetings
INT10	I am ready to commit my time and effort for any sort of responsibility handed over by the FPC
	Attitude (ATI)
ATI1	I feel that my FPC provides better price for my harvested produce
ATI2	Skill development activities undertaken by the FPC are useful
ATI3*	I feel that members in my FPC have less role to play in decision-making
ATI5*	The FPC is influenced by political interferences
ATI6	Purchase of the FPC share can give better chance to avail its services
ATI10	I feel that business transactions with FPC assures income security to the farmers
ATI11*	I feel that members of FPC have no financial benefits in the long run
ATI12	As an FPC shareholder, I gain easy access to the capital required to meet farm expenses
ATI13	I believe that FPC increases my bargaining power in the market
ATI14*	I feel that my FPC is not free from nepotism
ATI15	Attending the FPC meetings throw light on new opportunities to enhance income
	Subjective norms (SNO)
SNO1	My family supports me to participate in FPC business activities
SNO2	My friends opine that I should actively associate with the FPC activities

SNO4	The engagement with FPC activities enhances my personal image among the fellow villagers
SNO5*	My fellow farmers opine that only a particular section of farmers are meant to be office bearers in FPC
SNO6	My neighbours inform me about the official gatherings of the FPC
SNO7*	My family is not in favour of me to attend meetings proposed to address the conflicts/ constraints faced by FPC
Perceived Behavioural control (PBC)	
PBC1	For me, submitting the felt needs in meetings conducted by FPC is easy
PBC2	I am confident about selling the committed harvested produce to the FPC regularly on time
PBC3	I am able to conform to the rules and regulations of the FPC
PBC5	I can overcome the obstacles, if any, faced while transacting with the FPC
PBC6	I will enhance my income in near future by associating with FPC activities
PBC7	I am comfortable to share my ideas in the FPC board meetings
Economic Motivation	
ECM1	I believe that a farmer should work towards higher yields and returns
ECM2	I am ever willing to try any new idea/ technology which may bring higher profits
ECM3*	The way things are happening these days are discouraging me to work hard
ECM4	I should venture in diversified enterprises to increase monetary profits
ECM5*	It is better to be satisfied with meagre returns than struggling for higher returns
ECM6	One should set difficult financial goals for oneself and try to reach them
Egalitarianism	
EGL1	An equal opportunity to transact with the FPC should be given to all members irrespective of their economic status
EGL2	The board members of an FPC requires to have fair representation from both the genders
EGL3*	Decisions in an FPC should be weighed based on the scale of land holding/ herd size of farmers
EGL4	The opinions of members should not be deferred by the social group to which one belongs
EGL5*	Illiterate and old aged member farmers need not be included in FPC activities
EGL6	FPC services should reach equally to the members located in all villages

Note: ‘*’ indicates negative statement and the score are reversed for such statements

4. RESULTS AND DISCUSSION

4.1 Demographic characteristics. The Demographic characteristics (Table 2) showed that more than half (53.75 %) of the respondents were male and the rest of the sample comprised of female

respondents (46.25 %). Majority of the respondents (57.50 %) belonged to the middle age category (36-50 years) followed by 25.31 per cent of them in young age (≤ 35 years) and 17.19 per cent in the elder age category (≥ 51 years). Most of the respondents (39.69 %) had only primary education followed by illiterate (24.06 %) and secondary school education level (15.63 %). It was encouraging to note that the average education score of the respondents was 5.59 and more than 70 per cent of the respondents had better literacy which may help in making right decisions while engaging in FPC business activities. Based on the land holding, most of the respondents (42.19 %) owned one to two ha land size followed by marginal land size (39.06 %) with less than one ha. Together the marginal and small land holders from both the states comprised of 81.25 per cent. More than three-fourth (77.81 %) of the respondents had medium level of annual income (₹ 3.89 - 8.62 lakhs) followed by low level (19.06 %) of annual income (₹ 1.5- 3.88 lakhs) and 3.13 per cent of respondents had high annual income (₹ 8.63 – 18.60 lakhs)

Table 2. Demographic details

(N= 320)				
S.No.	Variable	Category	Frequency (f)	Percentage (%)
1.	Age	Young (≤ 35 years)	81	25.31
		Middle age (36-50 years)	184	57.50
		Old (≥ 51 years)	55	17.19
2.	Sex	Male	172	53.75
		Female	148	46.25
3.	Education	Illiterate	77	24.06
		Primary (1 st – 5 th)	127	39.69
		Secondary (6 th – 10 th)	19	15.63
		Higher Secondary (11 th - 12 th)	47	5.94
		Graduate and above ($> 12^{\text{th}}$)	21	14.69
4.	Land Holding	Landless	20	6.25
		Marginal (≤ 1 ha)	125	39.06
		Small ($>1-2$ ha)	135	42.19
		Semi-medium ($>2-4$ ha)	18	5.63
		Medium ($>4-10$ ha)	14	4.38
		Large (>10 ha)	8	2.50

5.	Annual income from Agri and allied enterprises (in Rs.)	Low (₹ 1.5-3.88 lakhs)	142	19.06
		Medium (₹ 3.89-8.62 lakhs)	168	77.81
		High (₹ 8.63-18.60 lakhs)	10	3.13

4.2 Measurement model (outer model).

The results pertaining to the Partial Least Square- Structural Equation Modelling (PLS-SEM) analysis were reported and discussed in the format widely suggested by other researchers (Hair et al. 2019; Alnakhli, 2021). The analysis using SEM mainly has two models (i) the measurement model and (ii) the structural model. The measurement model needs to be assessed before the structural model. To ensure the robustness of the measurement model, the reliability and validity (convergent and discriminant validity) were evaluated for the constructs in the model.

4.2.1 Reliability (Indicator and construct reliability). The ability of a measuring instrument to produce consistent and stable results from one set of measures to another (Mark, 1996; Goode and Hatt, 1952) was measured using Composite reliability and Cronbach's Alpha. Firstly, the overall sample was analyzed and 11 out of the initial 55 items which had lower factor loadings (<0.50) were removed as this action had significantly contributed in improving the composite reliability and Average Variance Extracted (Pett et al. 2003). Hence, the finalized 44 items under the respective constructs and their factor loadings were depicted in the Table 3. The constructs of the present study have Cronbach's Alpha values ranging between 0.856 and 0.912 and composite reliability between 0.893 and 0.926 (Table 3) which were considerably higher than the required threshold value of 0.7 (Hair et al. 2011). The multi-collinearity in the indicators was tested and the value of each indicator's Variance Inflation Factor was ideally found to be below 5 as suggested by Hair et al. (2016) (Table 3).

Table 3. Factor loadings, reliability and convergent validity of constructs in the model

Indicators	λ	α	CR	VIF
ATI1	0.661	0.912	0.925	1.878
ATI2	0.751			2.833
ATI3	0.829			2.029
ATI4	0.667			2.335
ATI5	0.741			2.278
ATI6	0.725			2.282
ATI10	0.691			3.274
ATI11	0.815			2.169

ATI12	0.714			2.312
ATI13	0.766			1.75
ATI15	0.633			2.187
SNO1	0.728	0.880	0.907	1.809
SNO2	0.834			2.574
SNO4	0.760			1.897
SNO5	0.767			2.037
SNO6	0.804			2.049
SNO7	0.823			1.839
PBC1	0.893	0.903	0.926	3.524
PBC2	0.854			3.012
PBC3	0.821			2.67
PBC5	0.715			1.894
PBC6	0.866			2.634
PBC7	0.769			1.872
INT1	0.641	0.872	0.898	1.896
INT2	0.684			1.952
INT3	0.619			1.615
INT4	0.700			1.677
INT6	0.740			2.128
INT7	0.794			2.708
INT8	0.715			2.106
INT9	0.714			2.04
INT10	0.707			1.736
ECM1	0.790	0.876	0.905	2.241
ECM2	0.774			2.228
ECM3	0.767			1.846
ECM4	0.800			1.916
ECM5	0.788			1.863
ECM6	0.785			1.862
EGL1	0.826	0.856	0.893	2.211
EGL2	0.740			1.651
EGL3	0.709			1.618
EGL4	0.776			1.886
EGL5	0.784			1.932
EGL6	0.740			1.764

(Note: ATI- Attitude; SNO- Subjective norms; PBC- Perceived Behavioural Control; INT- Intention; ECM- Economic Motivation; EGL- Egalitarianism)

4.2.2 Validity (Convergent and discriminant validity). The values of Average Variance Extracted (AVE) depicted in Table 4 revealed that the items under each construct exhibited high

covariance and proved to be the valid measures of the concept (Bagozzi et al. 1991). The obtained AVE values were greater than or equal to the recommended value of 0.5 (Fornell & Larcker, 1981), which confirms the convergent validity. The results of Fornell and Larcker (1981) criterion proved that the square root of AVE for a construct is greater than its correlation with all other constructs. Further, the results of Heterotrait-Monotrait Ratio (HTMT) ratio presented in Table 4 reveals that all the constructs had the values much lower than the required threshold (Kline 2011) of 0.85. This observation suggests the successful establishment of discriminant validity.

Table 4. Convergent validity (AVE) and Discriminant validity (Fornell and Larcker criterion and the HTMT ratio)

Constructs	AVE	ATI	EM	EGL	INT	PBC	SN
Attitude (ATI)	0.532	0.729	0.154	0.288	0.591	0.399	0.465
Economic motivation (EM)	0.615	0.144	0.784	0.073	0.274	0.138	0.228
Egalitarianism (EGL)	0.583	0.270	-0.019	0.763	0.393	0.114	0.236
Intention (INT)	0.508	0.559	0.249	0.344	0.703	0.496	0.545
Perceived Behavioural Control (PBC)	0.676	0.376	0.124	0.091	0.452	0.822	0.487
Subjective norms (SN)	0.619	0.438	0.216	0.216	0.523	0.445	0.787

(Note: ATI- Attitude; SNO- Subjective norms; PBC- Perceived Behavioural Control; INT- Intention; ECM- Economic Motivation; EGL- Egalitarianism. The FL criterion and HTMT values were both embedded together. The diagonal elements, displayed in bold and italics, represent the square roots of the AVE (Average Variance Extracted). Below the diagonal, the elements denote the correlations between the constructs, while above the diagonal, they indicate the HTMT values.)

4.2.3 Goodness of Fit (Model's predictive capabilities). Hair et al. (2019) provided widely accepted guidelines for interpreting R-squared values in research, particularly in management contexts. These guidelines emphasized on a 'rule of thumb' regarding an acceptable R², with values 0.75, 0.50, and 0.25, describing substantial, moderate, and weak, levels of predictive accuracy, respectively (Hair et al. 2019; Henseler et al. 2009). The results reveal the R² value of 0.533 for intention towards active participation in FPCs (INT), falling in the range of moderate category (Hair et al. 2019; Henseler et al. 2009). This shows that 53.3 per cent of variance could be explained by the constructs in the model *i.e.*, ATI, SNO, PBC, EM, EGL, AGE, EDU, INC. Thus, it can be substantiated that the developed model indicated a satisfactory R² statistics (53.33)

and can be considered as valid for explaining the behavioural intentions of farmers towards their active participation in FPCs. The F-square statistic specifies the importance of an independent variable in explaining the dependent variable (Hair et al. 2013). The f^2 value of ≥ 0.02 , ≥ 0.15 and ≥ 0.35 signifies small, medium and large effect size respectively (Hair et al. 2013, 2017). The results (Table 6 and 8) in the context of the present study revealed that, the elimination of ‘Attitude of farmers towards FPC’ would have a significant influence on the farmer’s intention towards active participation in the FPC. Möllers et al. (2017) also reported that attitudes and subjective norms had a large effect size on the farmers’ intention to join producer groups. Thus, the extension agencies/ FPCs/ other stakeholders may strive to ensure that the farmers hold a positive attitude towards the FPC, to be actively associated with its activities.

The Q^2 effect size establishes if the model has predictive relevance. The recommended Q^2 value of 0.02, 0.15 and 0.35 indicates weak, moderate and strong degree of predictive relevance of each effect respectively (Hair et al, 2013). The effect size (Q^2) value of 0.365 for the present study indicates that the exogenous variables in the model have a strong predictive relevance in explaining farmers’ intentions towards their active participation in FPCs. The Standardized Root Mean Square Residual (SRMR) value obtained in this study was 0.068, affirming the model’s goodness of fit, consistent with the threshold suggested by Hu and Bentler (1999). However, the Cross-validated predictive ability test (CVPAT) was also employed to assess the model’s predictive capabilities in PLS-SEM (Sharma et al. 2023; Liengaard et al., 2021). The CVPAT results (Table 5) demonstrated the strong predictive power of the proposed model, particularly against the Indicator Average (IA) method, with significant reductions in the overall loss ($\Delta = -0.073$, $p = 0.00$). For INT, the key endogenous construct, the model outperforms IA with a large and statistically significant improvement ($\Delta = -0.126$, $p = 0.00$). When compared to Linear Model (LM), the proposed model exhibits slightly higher overall loss ($\Delta = 0.054$); however, significant t-values ($p < 0.05$) affirm its competitive relevance. These results validate the extended TPB framework’s suitability for modeling the behavioural intentions of farmers towards active participation behavior in the context of FPCs.

Table 5 CVPAT summary results

PLS-SEM vs. Indicator Average (IA)					
Construct	PLS Loss	IA Loss	Average Loss Difference	t-value	p-value

ATI	0.799	0.828	-0.029	1.712	0.08
INT	0.538	0.663	-0.126	5.778	0.00
Overall	0.681	0.754	-0.073	4.893	0.00
PLS-SEM vs. Linear Model (LM)					
ATI	0.799	0.734	0.065	2.187	0.02
INT	0.538	0.496	0.042	2.848	0.00
Overall	0.681	0.627	0.054	2.837	0.00

4.3 Structural Model (inner model)

The second part in the analysis and reporting of SEM results constitute the assessment of hypothesized relationship between the constructs to validate the proposed hypothesis.

4.3.1 Direct Relationships

H₁: Farmers' Attitude influence their intentions towards active participation in FPCs.

The results revealed that the attitude towards FPCs had a significant influence on the behavioural intentions of the farmers to actively participate in the FPCs ($\beta = 0.329$, $t = 4.109$, $p < 0.01$). This implies that an affirmative attitude of farmers towards FPCs can lead to the positive intentions. The favourable attitudes of farmers towards FPC business activities, functioning, price realization and new opportunities in agriculture and broader social context would in turn strongly influence their intentions to actively participate in the FPCs. The findings are in line with several earlier studies which confirmed the significant positive influence of attitude on intentions of the farmers in similar contexts (Dominic, 2023, Mollers et al. 2017 and Gagana and Velmurugan, 2023).

H₂: Subjective Norms effect the farmers' intentions towards the active participation behaviour in FPCs.

Results confirmed a significant relationship between the Subjective norms (SN) and INT to actively participate in the FPCs ($\beta = 0.254$, $t = 3.799$, $p < 0.01$). This finding contradicts those of Rifas and Jahan (2021), who found no significant impact of norms on farmers' participation intentions in agricultural cooperation, but supports the studies of Mollers et al. (2017) and Abadi (2020) on farmers' involvement in agriculture based organisations. The findings emphasize that the subjectively perceived pressure from the society, family or friends could have an influence on the farmers' decision to actively participate in the FPC. The example for this relationship could be understood from the words of a female respondent during the field data collection:

“I was an active member of the FPC board since 2016 and also worked as Managing Director for a couple of years. The FPC started a business of oilseed mill and planned for sale of the products to customers in the city. Unfortunately, we incurred losses in this business. Thereafter, my elder son was not willing for my active involvement in the FPC business activities fearing about the loss, the FPC had generated. So, I withdrew my board membership and continuing just as a member of the FPC”.

H3: Farmers’ Perceived Behavioural Control influences their intention towards active participation in FPCs.

PBC had a significant influence on the farmers’ intention to actively participate in the FPCs ($\beta = 0.187$, $t = 2.844$, $p < 0.01$). Hence, it can be understood that the farmers’ perceived abilities to face any sort of difficulties in the process of association with the FPC would impact their intentions to actively participate in the FPCs. The obtained results align with the findings of Gagana and Velmurugan (2023) who conducted study on member farmers’ intentions to participate in FPCs in Tamil Nadu, India. The findings were also consistent with recent research on farmers’ intentions to participate in environmental organisations by Boskova (2020) and agricultural cooperation by Rifas and Jahan (2021).

H4: Farmers’ economic motivation influences their intentions towards active participation in FPCs.

It was identified that, besides the exogenous constructs in the TPB model, the economic motivation of farmers also has a significant positive influence on the farmers’ intention in the context of FPCs ($\beta = 0.167$, $t = 2.898$, $p < 0.01$). It implies that a farmer who has a high economic motivation would likely intend to actively participate in the activities of the respective FPC. The findings are consistent with the previous studies (Jalali and Abadi, 2018; Greiner, 2015) which confirmed the significant role of economic motivation on farmers’ intentions in similar agricultural contexts.

H5: The Egalitarianism of farmers effects their intentions towards active participation in FPCs.

Egalitarianism of the farmer has a significant positive influence on the intention to actively participate in the FPCs ($\beta = 0.264$, $t = 5.55$, $p < 0.01$). The obtained results suggest that a farmer with positive egalitarianism would probably have positive intention to actively participate in the FPC activities such as attending the meetings, transacting with the FPC business, voting, submission of needs, and have cohesion with other FPC members in decision making. Hence, the

extension agencies associated with the formation and promotion of FPCs need to consciously work on social engineering aspect in order to effectively manage the social change and behaviour of the heterogeneous groups in FPCs. Though there are limited studies explaining the influence of egalitarianism on intention, the findings align with the previous studies that confirm its role in influencing farmers' decisions, promoting collective mindset (Whitehead, 2018) and positive inter-group relations (Waldrop, 2024).

The results of the total effects are summarized in the Table 6 and the structural model in Fig. 2.

Table 6. Results of total effects of exogenous variables with endogenous variable

Path	Beta Coefficient (β)	Sample mean (M)	Standard deviation (STDEV)	t statistics ($ \beta / \text{STDEV} $)	P values	f ² value
ATI -> INT	0.329	0.332	0.080	4.109	0.00	0.162
SNO-> INT	0.254	0.250	0.067	3.799	0.00	0.089
PBC -> INT	0.187	0.185	0.066	2.844	0.00	0.055
ECM -> INT	0.167	0.177	0.058	2.898	0.00	0.026
EGL -> INT	0.264	0.262	0.048	5.550	0.00	0.056
ECM -> ATI	0.156	0.164	0.064	2.422	0.01	0.024
EGL -> ATI	0.268	0.274	0.062	4.307	0.00	0.082

(Note: The symbol '->' indicates 'Path/ relationship', i.e., A->B indicates the influence of A on B)

4.3.2 Mediation Analysis

H₆: Attitude of farmers mediates the relationship between economic motivation and intention towards active participation in FPCs.

In the presence of attitude as mediator, the direct effect of economic motivation on intention was found significant ($\beta = 0.118$, $t = 2.284$, $p < 0.05$). On the other hand, the results of specific indirect effects with the inclusion of mediator (i.e., attitude) in the relationship between economic motivation and intention were also significant at 5 per cent level of probability ($\beta = 0.049$, $t = 2.030$, $p < 0.05$). Economic motivation contributes in building a positive attitude towards FPCs which in turn influences the farmers' behavioural intentions to actively participate in the FPCs. Hence, it can be concluded that, attitude shows '*partial mediation effect*' (i.e., economic motivation influences intention directly as well as indirectly through the mediated effect of

attitude) on the relationship between economic motivation of farmers' and intention to actively participate. The findings are in conformity with the earlier research that demonstrated influence of economic motivation on farmers' attitudes toward improved agricultural practices aimed at income enhancement (Bora et al. 2018; Siddhu and Padakannaya, 2009).

H7: Attitude of farmers mediates the relationship between egalitarianism and intention towards active participation in FPCs

Table 7 revealed that, the direct effect of egalitarianism on intention was significant at 1 per cent level of significance ($\beta = 0.174$, $t = 3.711$, $p < 0.01$). Similarly, the results of specific indirect effects with the inclusion of mediator variable (i.e., attitude) in the relationship between egalitarianism and intention were also significant at 1 per cent level of probability ($\beta = 0.09$, $t = 2.667$, $p < 0.01$). It implies that an egalitarian farmer who believes that all individuals are equal and should gain equal rights and opportunities in the concerned activities of an FPC is more likely to build a positive attitude towards FPC which in turn triggers his/her intentions to actively participate in the FPC activities. Hence, the results revealed that attitude shows '*partial mediation effect*' on the relationship between egalitarianism of farmers' and intention to actively participate in FPCs. Similarly, Dall'Ara and Maass, (1999) demonstrated that egalitarianism influences positive attitudes in self-volunteering behavior and, Rosenblum et al. (2022) claimed that it fosters a sense of connectedness.

Table 7. Results of mediation analysis

Path	Total Effect		Direct effect		Indirect effects		
	Beta Coefficient (β)	p values	β	P values	Path	β	P values
ECM -> INT	0.167	0.00	0.167	0.02	ECM->ATI->INT	0.049	0.04
EGL -> INT	0.264	0.00	0.264	0.00	EGL->ATI->INT	0.09	0.00

(Note: The symbol '->' indicates 'Path/ relationship', i.e., A->B indicates the influence of A on B)

4.3.3 Moderation Analysis

H_{8a,b}: The annual income of the FPC member farmers moderates the relationship between Economic Motivation (EM) and Intention (INT)

The results from the moderation analysis (Table 8) revealed that, without the inclusion of moderation effect $INC*EM \rightarrow INT$, the R^2 value for INT was 0.481. However, after the inclusion of interaction term *i.e.*, income, the R^2 value had increased to 0.494 per cent. This shows that an increase of 1.3 per cent variance in the dependent variable (INT) can be attributed to the moderation effect of annual income of member farmers. It was interesting to find that the annual income had a significant negative moderating effect on the positive relationship between EM and INT ($\beta = -0.166$, $t = 3.325$, $p < 0.01$). It implies that, the higher annual income of the member farmers would negatively influence/ weaken the positive effect of economic motivation on intention to actively participate in the FPCs. The probable reason might be that individuals earning higher annual income could be self-sufficient and seldom intend to actively participate in the FPC activities. In other words, lower the annual income of farmers, stronger is the impact of economic motivation on the intention of farmers' to actively participate in FPCs. Conversely, income had a partially significant positive moderating effect on the AT and INT to actively participate in the FPCs ($\beta = 0.113$, $t = 1.781$, $p < 0.10$)

H_{9a,b}: The education of the member farmers moderates the relationship between Economic Motivation (EM) and Intention (INT), as well as Attitude (ATI) and Intention (INT)

Education level of the farmer had a significant negative influence (Table 8) on the relationship between EM and INT ($\beta = -0.161$, $t = 2.23$, $p < 0.05$). It suggests that higher the education level of the farmers, lower would be the influence of economic motivation on the farmers' intention to actively participate in the FPCs and *vice-versa*. Therefore, the proposed alternate hypothesis (H_{9a}) was accepted. The possible reason could be that the higher education level of farmers would enable them to diversify their sources of income and avail the required services from several other platforms which could limit their intention to actively participate in FPC activities.

Conversely, Education had no significant moderating effect on the relationship between ATI and INT ($\beta = 0.061$, $t = 0.86$, $p > 0.10$). Hence the alternate hypothesis H_{9b} was rejected. This finding is in support with the results of Manocha et al. (2023) who found that education had no moderation effect on the relationship between attitude and investment intentions of the rural farmers in Punjab, India.

H_{10a,b}: Age of the member farmers moderates the relationship between Economic Motivation (EM) and Intention (INT)

The significance of moderation effect of age was analyzed (Table 8) and the results showed a negative and partially significant moderation effect of age on economic motivation and intention to actively participate in FPCs at 10 per cent level of significance ($\beta = -0.159$, $t = 1.826$, $p < 0.10$). This shows that with increase in age of the farmers, the influence of economic motivation on intention to actively participate in FPCs is weakened. Similarly, results revealed that age had a non-significant positive moderation impact on the AT and INT (Age: $\beta = 0.124$, $t = 1.506$, $p > 0.10$). This finding is in contrast with Monocha et al. (2023) who claimed a significant moderation effect of age on farmers' attitude and their investment intentions of farmers in Punjab.

In the present study, the F-Square effect size of majority of the moderating effects was above 0.02. So, the obtained results indicated small effect size in explaining the endogenous constructs. However, the relationships of moderating variables were found to be significant in most of the cases (Table 8). Besides that, the R-square value of Intention was 0.481 prior to the inclusion of moderation effects which was improved to 0.533 post-inclusion. This shows an increase of 5.1 per cent variance explained by the influence of moderation on the endogenous variable (Intention to actively participate in the FPCs). It implies that the moderation effects of socio-economic characteristics of the farmers (age, education, income) play significant role in determining the behavioural intentions of farmers to continue active participation in FPCs. The structural model along with the t-statistics developed for the study is depicted in Fig. 2.

Table 8. Results of moderation analysis

Path	Beta Coefficient (β)	Sample mean (M)	Standard deviation (STDEV)	t statistics ($ \beta /STDEV$)	P values	f ² value
INC x ECM-> INT	-0.166	-0.153	0.05	3.325***	0.001	0.044
EDU x ECM -> INT	-0.161	-0.146	0.072	2.23**	0.026	0.026
AGE x ECM -> INT	-0.159	-0.146	0.087	1.826*	0.068	0.022
INC x ATI -> INT	0.113	0.108	0.063	1.781*	0.075	0.022
EDU x ATI -> INT	0.061	0.055	0.071	0.86	0.39	0.004
AGE x ATI-> INT	0.124	0.117	0.082	1.506	0.132	0.017

(Note: ***- indicates significance at 1 % level, **- at 5 % level, *- at 10 % percent level)

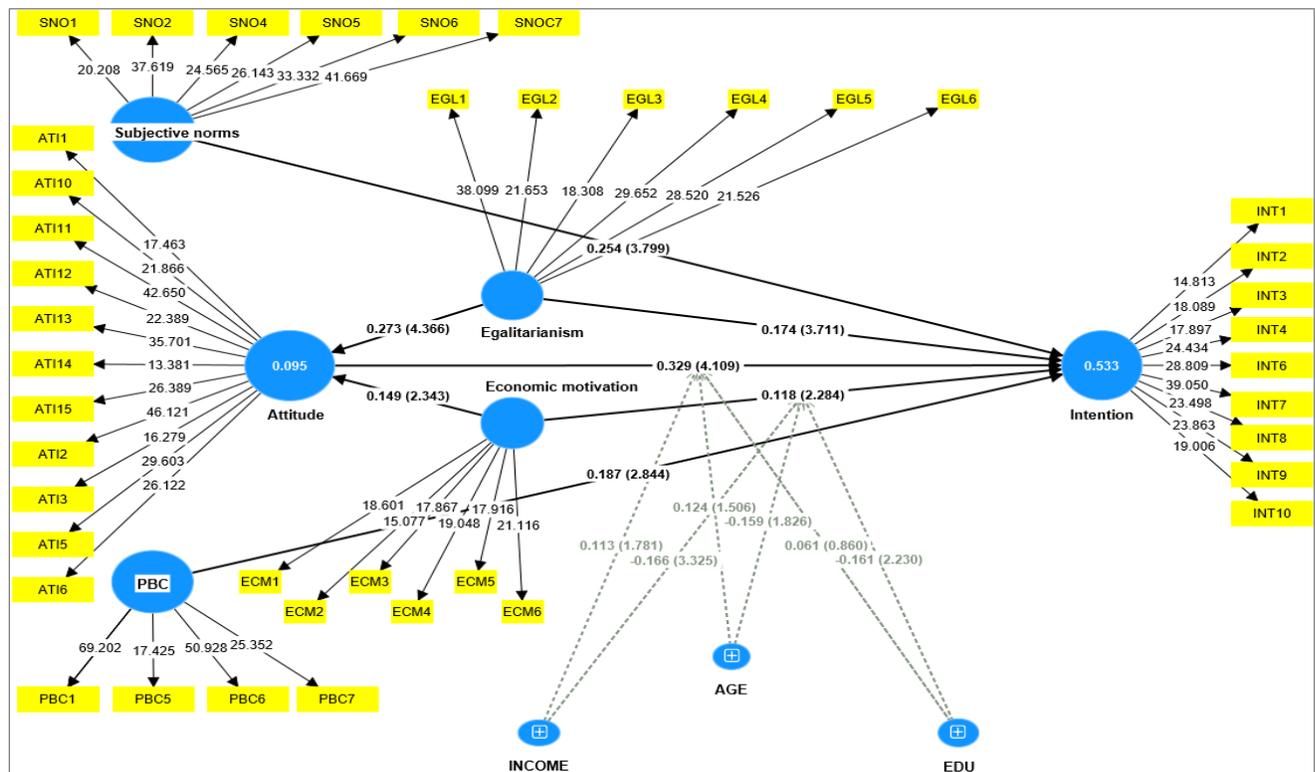


Fig. 2 Structural model of behavioural intentions of farmers towards active participation in FPCs

Implications of the study

Theoretical implications

The present study is one of the initial attempts which focused on using TPB for identifying the factors influencing farmers' behavioural intentions to continue active participation in the FPCs along with the additional socio-psychological variables i.e., egalitarianism and economic motivation. The findings also contribute to the growing body of literature on agricultural collective action and cooperative behavior, specifically in the context of the developing country like India. While prior studies have examined the role of quantitative variables like economic incentives (Batzios et al., 2021; Aflakpui, 2007), reduced transaction costs (VanDijk et al., 2016), market access and price-quality (Ahado et al., 2022; Kyeyamwa et al., 2008) as primary motivators for cooperative farming, this study underscores the significance of qualitative variables like egalitarianism and economic motivation, besides the variables of TPB in enhancing active participation intentions. Another important theoretical contribution is the study's alignment with

‘Social Identity Theory’ (Tajfel, 1978), which posits that individuals are motivated to engage in collective behavior when they identify with the group and its objectives. This study reveals that egalitarian principles contribute to creating a sense of belonging within FPCs, which aligns with the social identity framework. Farmers who perceive FPCs as platforms for mutual benefit and social equality are more likely to identify with the group and actively engage in its activities. This finding suggests that the success of FPCs is not solely dependent on economic benefits but also on fostering a strong collective identity that resonates with the core values of its members. Most importantly, this study made substantial contribution by expanding TPB with egalitarianism and economic motivation which were found to be compelling in forming farmers’ behavioural intentions for active participation in FPCs.

Practical implications

The findings of the present study offer numerous policy level insights and practical implications for the nodal agencies responsible for the implementation of central sector scheme on ‘formation and promotion of 10000 FPOs by 2027’. These implications are also relevant for institutions promoting FPOs, Cluster Based Business Organisations (CBBOs), NGOs, local administrators, and FPC officials all of whom play a crucial role in fostering sustained participation of farmers in FPCs.

The findings of the study highlight the importance of integrating egalitarian values as well as the needs of economically motivated low-income farmers into the FPC design and operation. Policymakers can promote a sense of social equity by ensuring fair representation of all members bargaining (Rani et al. 2023), particularly marginalized groups such as small-scale farmers, women, and low-income farmers. This can be achieved through inclusive governance structures, transparent decision-making processes, and mechanisms that guarantee equitable distribution of benefits. By fostering an environment that ensures fairness, trust, and mutual respect, policymakers can significantly enhance farmers’ intrinsic motivation to participate actively in FPCs.

Additionally, the socio-psychological factors (i.e., attitude, subjective norms, perceived behavioural control, egalitarianism) and socio-economic factors (education, income, age and economic motivation) identified in the study offers guidance for consciously selecting the farmers at the formation stage and ensuring their active participation during promotion stage of the FPCs. These insights can inform strategic decisions in membership approval and operational planning.

The role of subjective norms in encouraging participation intention is also emphasized. Practitioners could consider adopting the "whole family principle" of extension education (Pratt and Bowman, 2008) in awareness campaigns and meetings, particularly for women-led FPCs, in line with India's cultural context. The applications of the present study extend beyond FPCs to other farmer collectives such as Commodity Interest Groups, Cooperatives, Self-Help Groups (SHGs), Farmer Youth Clubs and Cooperatives. This will help to address the key challenges faced in ensuring a hassle-free operations and profitable business by such farmer collective organisations.

Finally, the government through its operational guidelines for central sector scheme may ensure that FPCs have a legal framework that protects the rights of all members, especially the most vulnerable, and encourages fairness in internal disputes. The results may help to motivate the policy makers and practitioners to supplement existing guidelines with social incentives that positively shape the factors such as farmers' attitudes, subjective norms, perceived behavioural control, economic motivation and egalitarianism. This might include (i) granting exclusive recognition for products sold through FPCs to foster positive attitudes; (ii) establishing a dedicated public relations department for knowledge, training and conflict resolution purposes, thus positively shaping the subjective norms and PBC; (iii) recognizing FPCs that promote social inclusion, such as empowering women and marginalized communities, to instill egalitarian values; and (iv) implementing profit-driven sustainable agricultural practices to maintain the active participation of economically motivated small-scale farmers.

Conclusion and prospects for future research

The Indian agricultural ecosystem heavily relies on the welfare of resource-poor farmers. Collective farming approaches offer a promising solution to integrate these small-scale farmers, providing economies of scale and better bargaining power. Consequently, the success of Farmer Producer Companies (FPCs) becomes vital for the agricultural economy of a developing country like India. However, limited farmer participation has hindered the success of many FPCs. This study aims to identify factors influencing farmers' behavioral intentions for sustained active participation in FPCs, thus ensuring their improved performance and farmer incomes. By extending the Theory of Planned Behavior (TPB), the findings of the study emphasized the significant role of socio-psychological constructs, such as egalitarianism and economic

motivations besides the TPB constructs, in shaping the farmers' intentions. The socio-economic variables (income, education) had significant moderating effects in explaining the farmers' intentions towards active participation of farmers. These insights highlight the need to consider these variables when designing strategies to promote FPCs, drive membership, and enhance their business outcomes.

The study has certain limitations that could be addressed in future research. Firstly, the study was conducted drawing sample from the southern region of India, which is geographically and culturally distinct. Given India's large geographical area, diverse socio-economic landscape (NIC, n.d), future studies could replicate this research across different regions of India or in other countries. Additionally, future research could expand the model by incorporating additional constructs to enhance its explanatory power and deepen our understanding of farmers' intentions to sustain active participation in FPCs. Future studies may also benefit from using a mixed-methods approach, combining qualitative and quantitative techniques to explore the influence of government incentives, competition between FPCs, and consumer perceptions on farmers' decisions to engage in FPCs. Such research would provide valuable insights for policymakers and FPC promoters in framing effective policies and strategies to support the growth and sustainability of farmer collectives.

Data availability

The original contributions presented in the study are included in the article/Supplementary Material (S1), further inquiries can be directed to the corresponding author/s.

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Authors contributions

Akshith Sai Pabba: Conceptualization, visualization, methodology, data collection, formal analysis, and writing- original draft. *K. Ponnusamy*: Framing the objective of the study, supervision, conceptualization, comprehension and editing of the article. *Gopal Sankhala*:

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Competing interests

The authors declare no potential competing interests with respect to research, authorship and/or publication of this article.

Ethics approval

Approval was granted by the Research Ethics Committee of the ICAR- National Dairy Research Institute, Karnal, Haryana, India (Approval number: 20-P-DX-009, Dated: April 02, 2022). This study has been conducted in line with the Declaration of Helsinki.

Informed consent

Written informed consent was obtained from all participants during the survey period, which spanned from April 03, 2022 to November 01, 2023, using a survey form. The research study was non-interventional and participation was wholly voluntary, without any risks, and did not involve any form of compensation. Participants provide their consent to publish, present and/or share the anonymous data.

Additional information

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