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ASSESSING SOCIAL CAPITAL AND ITS IMPACT ON ECONOMIC PERFORMANCE: A COMPARATIVE STUDY OF MEMBERS AND NON-MEMBERS OF FARMER PRODUCER COMPANIES IN INDIA

Abstract

Farmer producer companies (FPCs), modern farmer collectives registered under India's Companies Act, play a crucial role in providing core services like input supply, marketing, technical, and financial support, as well as auxiliary services such as social capital and consultancy, which are linked to higher economic performance and innovation. The study analyzes the levels of social capital among members and non-members of FPCs and their relationship to the economic performance of their members. The data on social capital were collected from 20 FPCs (292 members and 77 non-members) from Maharashtra state of India. Unpaired student T-tests and Mann-Whitney tests were performed to compare the levels of social capital among the members and non-members. OLS regression was performed to understand the difference in social capital and its effect on economic performance. The results reveal that all the indicators of social capital were significantly higher for the members (Mean = 4.27) than for non-members (Mean = 3.14). The social capital indicators related to membership and participation in groups (p -value < 0.10) and the sharing of production and other information (p -value < 0.01) positively affected economic performance. Higher levels of education (p -value < 0.05) and frequent contact with members (p -value < 0.01) positively affected, whereas higher landholding (p -value < 0.10) and years of membership (p -value < 0.01) negatively affected the economic performance of members. As the Indian government plans to add 10,000 FPCs in the next three years, the strategy to increase the social capital of FPCs may enhance the overall resilience and sustainability of rural economies.

Keywords

farmer collectives, farmer companies, economic welfare, rural development, farmer empowerment, collective action, Maharashtra

JEL Classification

Q13, O35, O13, M21

INTRODUCTION

Small and marginal farmers are often resource-poor and need help accessing farming inputs and markets to sell and process their produce. Farmer producer organizations (FPOs) are one of the solutions through which small and marginal farmers can collectivize to reduce the input cost, increase their bargaining power, process their produce, and create social capital. FPOs come in different legal structures like trusts, societies, cooperatives, or companies. Those formed under the Indian Companies Act are termed farmer producer companies (FPCs). FPCs enable farmers to collectively register as a company to leverage the benefits of operating as a unified entity. The Indian government is also planning to promote the concept of farmer collectivization through FPCs.

In the context of FPCs, social capital refers to the resources, networks, and relationships that FPCs possess within their internal connections

and with external stakeholders like government agencies, supporting organizations, and other stakeholders. Higher social capital is associated with higher economic performance, innovation, governance, improved learning outcomes, and trust. It is critical to address two issues: the need for effective farmer collectivization through analyzing the levels of social capital among FPC members and non-members and the impact of social capital on their economic performance. These young companies are expected to innovate their value chains, build brands, become suppliers to fast-moving consumer goods brands, and increase their members' economic output.

1. LITERATURE REVIEW AND HYPOTHESES

Social capital has been viewed from varied perspectives in the academic literature. Social capital is defined as the stock of resources that exist or may exist within a socially or formally institutionalized network, and being part of this network gives credit to the member and builds trust just because the member is a part of the network (Bourdieu, 1986). Another perspective of social capital is that an individual or an organization may generate it, and it is the pool of actual or potential resources developed through the network of relationships (Nahapiet & Ghoshal, 1998). Coleman (1988) defined social capital as a public good with an aspect of social structure that raises the returns to individuals from any investment they make in a resource. However, as it is a public good, it remains under-invested as the user who invests in it can only get a small share of it (Coleman, 1988). Putnam (1993) used the example of American neighborhoods to explain that collective action is needed to keep their residential areas safe. He described social capital as features of a social organization, such as networks, norms, and social trust, that facilitate coordination and cooperation for the mutual benefit of all.

Social capital has three dimensions. The structural dimension has social and cultural ties; the relational dimension contains trust; and the cognitive dimension includes a shared vision of the organization (W. Tsai & Ghoshal, 1998). The structural dimension comprises the composition, density, and diversity as the characteristics of the network; the relational dimension consists of the relationship quality, including trust and reciprocity; and the cognitive dimension includes the shared vision, codes and narratives (Nahapiet & Ghoshal, 1998). The dimensions of social capital are also defined as bonding (internal) and bridg-

ing (external). Bonding social capital is essential for building solidarity; some notable examples of such groups are ethnic groups (Putnam, 2000). Bridging social capital is vital for linking external assets and helping move ahead. Some examples may include civic engagements (Putnam, 2000). There is also a third dimension of social capital related to linkages of the groups and individuals with the people in power, known as linking social capital (Woolcock, 1999). World Bank provides a comprehensive scale based on the above dimensions of social capital, including six indicators of social capital that are relevant for calculating social capital at an individual or household level. These indicators are groups and networks, trust and solidarity, collective action and cooperation, information and communication, social cohesion and inclusion, empowerment, and collective action (Grootaert et al., 2013).

There are multiple benefits of social capital, as highlighted in the previous literature. In a study on firms in Denmark, Wales, and the UK, enhanced business and innovation were found to benefit social capital (Cooke & Wills, 1999). Some of the studies also highlight the role of social capital in collective action for ecological governance (Paavola & Adger, 2005). In a study of a chemical firm, the findings revealed that it is not human capital that significantly increases innovative performance but the combined effect of human capital and social capital improves innovative performance (Dost et al., 2016). Higher marketing innovation was observed in firms with higher social capital amongst Korean small and medium export-oriented firms (Jeong & Chung, 2023). A study of manufacturing firms in the United States of America found that social capital is an important antecedent to supply management performance (Bernardes, 2010). Regarding Turkish cooperatives, increased social capital is observed with membership in cooperatives, and increased

revenue, trust, production, and collaborative attitude are observed with increased social capital (Öztopcu, 2023). Social capital is also associated with the new venture's ability to gather financial capital or gain access to venture capitalists in the initial phases (Baron & Markman, 2000; Florin et al., 2003). Trust and civic norms dimensions of social capital were the reasons for higher economic growth in a multi-country study (Knack & Keefer, 1997). The literature has explicitly mentioned that the relations within and between social groups are significant predictors of economic growth (Woolcock, 1998). Knowledge acquisition for gaining competitive advantage is a primary benefit of social capital (Yli-Renko et al., 2001). Other social capital benefits within a family include higher educational achievements (Israel et al., 2001). Membership-based associations are essential in building social capital by exchanging information and vital resources (Li & Barbieri, 2020). In Sri Lanka, farmer organizations with higher social capital were better able to cope with risks in emergencies (Uphoff & Wijayarathna, 2000). Lower levels of social capital are also associated with poor health (Kawachi et al., 1999). Other health benefits include lower rates of depression (Bae et al., 2023).

In the context of collective organizations, Pretty (2003) mentions that in the last 20 years, more than 8 million members have been collectivized in more than 50 countries in several social movements and transitions with the help of social capital. For the groups that are purposefully organized, social capital is vital for agricultural innovations (Wedajo et al., 2020). In Uganda, social network and participation factors of social capital helped farmers achieve a higher price of coffee (Mawejje & Terje Holden, 2014) and stringent quality and supply standards for modern food outlets through social capital cooperatives (Kaganzi et al., 2009). Chinese farmers who were a part of the cooperative and possessed higher social capital had a higher chance of using inputs guided by external agencies than their personal experiences (Zhou et al., 2018). Social capital is also one of the factors of increased use of microcredit among Chinese farmers (Qin et al., 2019). In China, social capital increases the willingness to pay for new initiatives (Wang et al., 2022). Other intangible benefits of social capital include the perceived benefits of the initiatives of cooperatives (Qiu et al., 2021). All forms

of social capital are positively related to farmer's income; the cognitive dimension affects meeting participation, and the relational dimension involves training participation (Liang et al., 2015). In India, joining the FPC improved the members' livelihood compared to the non-members, and social capital is one of the reasons (Mukherjee et al., 2020). Lalitha et al. (2024) explained how efforts to build social capital by Sahyadri FPC in India resulted in higher income and sustainable livelihood for farmers. The study also found that members received higher economic benefits than non-members. In the Indian context, social capital can help access credit, knowledge, and new technology (Bantilan & Padmaja, 2008).

There is a good amount of literature on social capital and organizational performance, but the literature is sparse in the area of FPCs (Jayaraman et al., 2023). There are a few studies on the social capital assessment of FPCs in India, but those studies are based on one or a few FPCs. In addition, a comprehensive analysis of the differences in dimensions of social capital between members and non-members of Indian cooperatives or FPCs and its relationship with economic performance is absent from the body of knowledge.

The purpose of this study is to investigate the levels of social capital among the FPCs in Maharashtra. To reap the benefits of social capital, it is essential to understand whether these new collective organizations can generate social capital. As FPCs are considered a necessary tool for community development and creating resilient communities, it is vital to analyze whether these organizations successfully build trust, cooperation, and collaboration among the members. Further, the study aims to provide insights into the effectiveness of FPCs as organizational structures for building social capital and enhancing member's economic performance. Thus, the second aim of this study is to assess the relationship between social capital and economic performance of FPC members. While previous research has examined social capital within FPCs or agricultural cooperatives, this study explicitly compares social capital dynamics between members and non-members, providing differences and potential implications. The study is vital to policymakers as social capital is considered a driver for promoting agricultural practices,

productivity, and other outcomes. Understanding differences in social capital between members and non-members can also help to identify barriers to FPC membership and participation. The elaborated hypotheses are:

- H1: *The levels of social capital are higher among members than non-members of farmer producer companies.*
- H2: *Social capital indicators positively influence the economic performance of the members of farmer producer companies.*

2. METHODS

The study utilized a sample of 292 members and 77 non-members of 20 FPCs. A non-member farmer is a participant who is indirectly associated with the FPC, and the member does not hold the shares of the FPC. The survey was conducted from October 1, 2022, to November 23, 2022. The selected FPCs were from different districts of Maharashtra, India. The selected districts and the number of FPCs from each district were Pune (6), Ahmednagar (3), Nashik (4), Satara (3), and one each from Ratnagiri, Beed, Akola, and Nagpur. The active FPCs running successful operations over the last two years were selected. The sample FPCs have an average paid-up capital of ₹1.08 million, an average revenue of ₹21.67 million for the financial year 2021–2022, and an average membership size of 538 members. The study employed a stratified sampling technique by selecting various districts within the state to represent the distribution of FPCs across regions.

Within each district, the sample was gathered using a convenience sampling technique to determine the FPC and the members and non-members were selected using a simple random sampling technique. There are two reasons for choosing Maharashtra as the study's sample. First, Maharashtra accounts for one of India's highest numbers of FPCs (Neti et al., 2019). Second, Maharashtra is known for farmer collective movement. For example, the first sugar cooperative in Asia, Pravara Sahakari Sakhar Karkhana Ltd., was established in Ahmednagar, Maharashtra, 1951–52 (Baviskar, 2007). The members' average age

and landholding were 46.15 years and 5.5 acres; non-members showed 43.5 years and 4.64 acres. The average membership age of the FPC for members was six years. Among the members, 72% of the farmers were high school graduates and below, and 28% were graduates and above; 81% of the non-members were high school graduates or below, and 19% were graduates and above.

Lumley et al. (2002) recommend the *t*-test to analyze significant differences for a sufficiently large sample. This study used an unpaired *T*-test and its non-parametric equivalent, Mann-Whitney (Nahm, 2016) (based on the results of the normality test), to assess the statistical significance of differences in social capital between members and non-members. Mann-Whitney formula is:

$$U_1 = n_1n_2 + \frac{n_1(n_1+1)}{2} - R_1, \quad (1)$$

$$U_2 = n_1n_2 + \frac{n_2(n_2+1)}{2} - R_2, \quad (2)$$

where R_1 is the ranks for first group, and R_2 is the sum of the ranks for the second group (McKnight & Najab, 2010). In addition, for ordinal data, both the *T*-Test and Mann-Whitney test are recommended (de Winter & Dodou, 2010). The effect of the indicators of social capital on the economic performance was estimated by ordinary least squares regression. The regression model is:

$$\begin{aligned} \text{Economic performance} = & \beta_0 \\ & + \beta_1 \text{Groups and networks} \\ & + \beta_2 \text{Information sharing} + \beta_3 \text{Trust} \\ & + \beta_4 \text{Mutuality and collective production} \quad (3) \\ & + \beta_5 \text{Contact with members} + \beta_6 \text{Age} \\ & + \beta_7 \text{Gender} + \beta_8 \text{Education} + \beta_9 \text{Caste} \\ & + \beta_{10} \text{Family members} \\ & + \beta_{11} \text{Years of membership} + \beta_{12} \text{Landholding.} \end{aligned}$$

An observational research design, which is popular for the study of social capital (Febrianti, 2020; Kumar, 2016), was used for the study in which the members and non-members were naturally divided into groups. The scale to measure social capital includes groups and networks, information sharing, trust, mutuality, collective production, and

Table 1. Variable definition and measurement

Variable	Definition	Measurement
Income Increase	Members' income increased after joining the FPO	Log of Percentage from 1 to 100
Groups and Network (G&N)	Factor yielded by three variables (membership of groups, participation, and frequency of participation in groups)	7-point Likert scale
Information Sharing (IS)	Factor yielded by four variables (sharing production decisions with other farmers, women of the family, sharing outcomes and experiments with others)	7-point Likert scale
Trust	Factor yielded by seven variables (trust in villagers, friends, relatives, input dealers, extension services, FPO, trust for lending and borrowing, general trust)	7-point Likert scale
Mutuality and Collective Production (M&CP)	Factor yielded by nine variables (contribution in schemes that benefit others, volunteering for community services, collaboration of different castes and classes, collective input purchase, marketing of produce, shared labor, shared soil conservation practices, collective credit, and collective repayment)	7-point Likert scale
Contact with Members	FPO with frequent contact with members like agri input, marketing of fruits and vegetables	1 = Frequent Contact, 0 = Less Frequent Contact
Age	Age of the member	Number of Years
Gender	Gender of the member	1 = Male, 0 = Female
Education	Education Status of the member	1 = Graduate and Above, 0 = Others
Caste	Member belongs to any backward or scheduled caste	1 = No, 0 = Yes
Family Members	Number of family members	Number of Members
Years of Membership	Age of the FPO membership of the member	Number of Years
Landholding	Land size in acres	Number of Acres

empowerment and action (Grootaert et al., 2013). The responses were collected on a 7-point Likert scale. All Cronbach's alpha values were above the satisfactory and above the minimum level of 0.70 (Cortina, 1993), thereby indicating acceptable internal consistency reliability except for empowerment and action, which was dropped from the social capital variable. The variance inflation factors were within acceptable limits for the indepen-

dent variables used in the regression model. Table 1 presents the definitions and the measurements of the variables used in the regression model.

3. RESULTS

Figure 1 shows the composition of social capital in all four dimensions among members and non-members. Table 2 reveals that trust, mu-

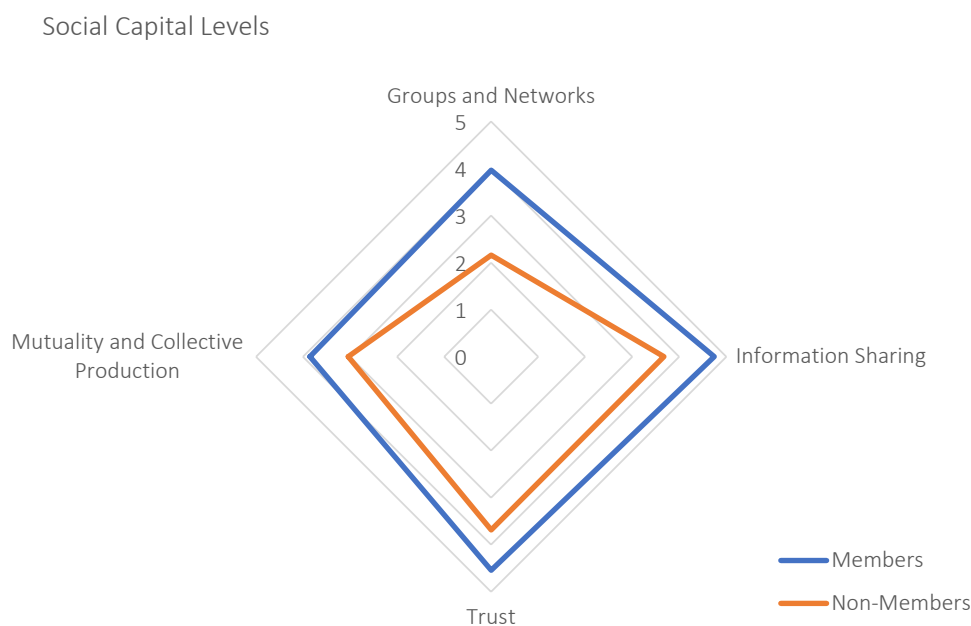


Figure 1. Composition of social capital amongst members and non-members

Table 2. Normality tests

Membership		Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Groups and Networks	Nonmember	.227	77	.000	.768	77	.000
	Member	.128	292	.000	.922	292	.000
Information Sharing	Nonmember	.135	77	.001	.956	77	.010
	Member	.107	292	.000	.961	292	.000
Trust	Nonmember	.069	77	.200*	.978	77	.201
	Member	.082	292	.000	.967	292	.000
Mutuality and Collective Production	Nonmember	.080	77	.200*	.974	77	.108
	Member	.077	292	.000	.984	292	.002

tuality, and collective production for the non-member group are normally distributed. All the other variables are not normally distributed for members and non-members. The results of the *t*-tests are presented in Table 3.

Table 3 reveals that for all four forms of social capital, the levels of social capital are significantly different between members and non-members. All the indicators of social capital were significantly higher for the members (Mean = 4.27) than for non-members (Mean = 3.14). Thus, the study accepted H1. The effect size of the *t*-test in all four cases is large (>0.8) or medium (>0.5), and as per the recommendation of Lakens (2013), an effect size of 0.8 is considered large, and 0.5 and above is medium. The study also recommends using Glass's delta

in case of unequal variances and using Hedge's *g* when the sample size is different.

As the data failed the normality tests, the Whitney Test was also performed to analyze the difference in social capital indicators between members and non-members (Table 4). The non-parametric Mann-Whitney *U* test also reveals that all four factors of social capital are significantly different for members and non-members. The effect size of the tests is in the medium and large range (Lakens, 2013).

Table 5 shows the descriptive statistics for each variable. Table 6 represents the influence of social capital on the economic performance of FPC members. The results reveal that groups and networks and information sharing increase the perceived economic benefit of farmer members. Thus, the study partially

Table 3. Results of unpaired students' *t*-test

Item	Member		Non-Member		T-Test		Effect Size		
	Mean	SD	Mean	SD	t	df	Cohen's d	Glass's delta	Hedges' g
Groups and Networks	3.96	1.94	2.16	1.55	8.55**	145.649 ^a	1.02	0.92	0.96
Information Sharing	4.74	1.31	3.67	1.42	6.24**	367	0.78	0.81	0.8
Trust	4.53	1.09	3.68	1.19	5.96**	367	0.74	0.77	0.76
Mutuality and Collective Production	3.85	1.23	3.04	1.04	5.81**	137.183 ^a	0.71	0.65	0.67

Note: ^aAdjusted *t*-values and degrees of freedom were used to determine statistical significance due to the violation of the homogeneity of variance assumption, ** *p* < 0.01.

Table 4. Mann-Whitney *U* Test

Item	Member		Non-Member		Mann-Whitney Test		Effect Size
	Mean Rank	Sum Rank	Mean Rank	Sum Rank	Mann-Whitney U	Z	Cohen's d
Groups and Networks	205.7	60074.5	106.3	8190.5	5187.5	-7.3**	0.81
Information Sharing	201.1	58721	123.9	9544.	6541.0	-5.65**	0.61
Trust	200.9	58685.5	124.4	9579.5	6576.5	-5.6**	0.61
Mutuality and Collective Production	199.7	58312	129.2	9953	6950.0	-5.15**	0.55

Note: ** *p* < 0.01.

Table 5. Descriptive statistics of variables

	Variables	Mean (S.D.)	Min – Max
Social capital variables	Income Increase	2.59 (0.92)	0 – 4.6
	Groups and Network	3.96 (1.94)	1 – 7
	Information Sharing	4.74 (1.31)	1 – 7
	Trust	4.53 (1.09)	1.25 – 6.62
	Mutuality and Collective Production	3.85 (1.23)	1.11 – 6.77
Control variables	Contact with Members	0.58 (0.49)	0 – 1
	Age	46.15 (14.15)	19 – 85
	Caste	0.63 (0.48)	0 – 1
	Education	0.28 (0.45)	0 – 1
	Gender	0.95 (0.2)	0 – 1
	Family Members	6.29 (3.41)	2 – 22
	Years of Membership	6.8 (2.69)	2 – 12
	Landholding	6.26 (5.77)	0.1 – 40

accepts H2. Additionally, education and contact with members, i.e., membership of FPOs that frequently meet members like agri input FPOs and fruits and vegetable FPOs, also positively affect the perceived economic benefit. Landholding and years of membership negatively affected the perceived economic benefit. This also reflects that old members and relatively large farmers are not harnessing the benefits of FPOs. Markelova et al. (2009) also conclude that cooperative membership plays a significant role in the increase of income of small farmers as compared to large farmers.

Table 6. OLS regression

Variable	Model: Economic Benefit
Groups and Networks	0.055 (1.842)*
Information Sharing	0.18 (3.605)***
Trust	-0.043 (-0.719)
Mutuality and Collective Production	0.076 (1.438)
Age	-0.004 (-1.023)
Caste	-0.035 (-0.327)
Education	0.267 (2.282)**
Gender	0.28 (1.168)
Family Members	-0.006 (-0.396)
Landholding	-0.051 (-1.84)*
Years of Membership	-0.017 (-2.662)***
Contact with Members	0.344 (3.158)***
Intercept	1.571 (3.859)***
R ²	0.23

Note: ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively, with *t*-values in parentheses.

4. DISCUSSION

The study reveals that FPCs considered for the study can generate social capital compared to non-member farmers. The study also indicates that active

group participation, networking, and information sharing enhance perceived economic benefits for farmer members, while education, frequent contact with members in certain FPOs, and smaller landholding positively influence these benefits, contrasting with the negative impact of longer membership duration and larger land holdings. The results of O'Brien et al. (2013) are consistent with the results of this study, as cooperative members of Uganda and Kenya have marginally higher incomes and higher social capital. The discussion surrounding farmer producer companies (FPCs) encourages exploring the implications of their social capital. As these entities aim to unite farmers under a company structure, assessing the extent and impact of their social capital and understanding its implications for agricultural development and sustainability is crucial. The results of the regression model predicting perceived income increase relate more to Xu et al. (2018), where bonding social capital was significant for income increase. The reason for the variable trust not being significant might be the form of the organization considered for the study, i.e., a company and not a cooperative form. Surprisingly, the model's results relating to economic performance have a negative sign for the variable trust. This might be because a solid social capital within the group, i.e., internal social capital, can restrict flexibility, and the social capital may have substandard effects on less powerful groups, as they cannot harness the use of higher trust on building external relationships (Carrico et al., 2019).

Higher social capital among groups can be used to drive change. In the UK, members with high external or linking social capital were more likely

to adopt change (Arnott et al., 2021). Social capital was also a positive factor in helping to complete conservation projects in Indonesia (Wulandari et al., 2021). Social capital is also essential for members' loyalty to the cooperatives and for retaining their long-term membership (Ollila et al., 2014). Social capital is also considered a vital group management tool (Lopes et al., 2015). Along with human capital, social capital is considered a vital driver for livelihood diversification of farms (Ngo et al., 2020). High social capital also brings several opportunities, such as appropriability (Adler & Kwon, 2002). This means social capital can be used to create trust, collaborations, investment in social infrastructures, and advocacy initiatives to address challenges.

There are also a few limitations and negative aspects of social capital which must be considered. Trust between members is not enough for collective action, as it was found that members with high trust and weak institutions failed to engage

in collective action, so the focus should also be on creating external networks (Qurniati et al., 2017). Based on the experiences of Chinese cooperatives, external social capital may negatively affect the farmers' income because of member's heterogeneity (Xu et al., 2018). Also, the homogeneity of cooperatives in terms of speciality positively affects the members' income, and technological proximity also leads to knowledge spillovers (M. Tsai & Luh, 2023). Two negative aspects of social capital highlighted by Villalonga-Olives and Kawachi (2017) are behavioral contagion and interactions of social cohesion and individual characteristics. The risk of behavioral contagion means that there might be a risk that individuals might adopt certain behaviors from the group that are risky or harmful. That means the leaders of the FPCs must be positive moral actors. The negative aspect of social cohesion and individual characteristics may result in a few alienated individuals, which might create pressure to conform or a situation where members echo each other's points.

CONCLUSION

The purpose of the study was to assess the social capital levels among members and non-members of farmer producer companies (FPCs) and the relationship between social capital and the economic performance of FPC members. The results reveal that social capital levels were significantly higher among members of FPCs than non-members in all four dimensions, i.e., groups and networks, information sharing, trust, mutuality, and collective production. The findings suggest that FPCs considered for the study facilitate the development of social cohesion, trust, and reciprocity within rural communities, which is essential for enhancing agricultural productivity, resilience, and community development. The results also reveal that more participation in groups and networks and information sharing relates to higher economic benefits. Members with higher levels of education and FPCs that are in frequent contact with members were positively affected, whereas higher land size and more years of membership negatively affected the economic performance of members. This means that FPCs need to come up with better and newer initiatives for older members and members with larger land sizes, as they cannot reap the benefits of FPCs. Digital information sharing and training platforms can be provided to FPCs by the government or supporting organizations to reap the benefits of social capital further and enhance economic welfare.

Despite the valuable insights gained from this study, it is necessary to acknowledge a few limitations. First, these FPCs are relatively new, with a mean membership age of 6.8 years for the members considered for the study. Therefore, in the future, other components of social capital might also affect economic performance. Second, investigating homogenous FPCs within specific agricultural sub-sectors would provide a comprehensive understanding of how social capital dynamics vary across value chains. Future research can explore the relationship between social capital and various other benefits of social capital, such as innovation, risk management, and resilience within the context of Indian FPCs. Investigating how different dimensions of social capital influence these outcomes, the literature can provide valuable insights into other factors through which social networks and collective action contribute to agricultural development. Additionally, there is a need to explore the concept of negative social capital, such as social exclusion, conflict, and distrust.

AUTHOR CONTRIBUTIONS

Conceptualization: Sushant Malik, Dilip Kajale.

Data curation: Sushant Malik, Dilip Kajale.

Formal analysis: Sushant Malik.

Investigation: Sushant Malik, Dilip Kajale.

Methodology: Sushant Malik, Dilip Kajale.

Project administration: Sushant Malik, Dilip Kajale.

Resources: Sushant Malik, Dilip Kajale.

Software: Sushant Malik.

Supervision: Dilip Kajale.

Validation: Sushant Malik, Dilip Kajale.

Visualization: Sushant Malik, Dilip Kajale.

Writing – original draft: Sushant Malik.

Writing – review & editing: Dilip Kajale.

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