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ECONOMIC AND SOCIAL IMPACT OF FARMER PRODUCER ORGANIATIONS IN THIRUVARUR AND NAGAPATTINAM DISTRICTS OF TAMILNADU

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ABSTRACT
This study investigates the social and economic impacts of farmer-producer organizations (FPOs) in addressing agricultural challenges by collectivizing small and marginal farmers into cohesive producer groups. Focusing on the Cauvery Delta Region (CDR) in Tamil Nadu, specifically Thiruvarur and Nagapattinam districts, the research aims to discern the effectiveness of FPOs in improving market access, technology adoption, input availability, and investment opportunities. Primary data was collected through personal interviews with 368 producer-members from the aforementioned districts during the period of 2022-2023. The findings of the study provide robust evidence of the positive and statistically significant changes in both social and economic statuses of FPO members. This research contributes to the growing body of literature on agricultural development strategies and offers insights into the transformative potential of FPOs in enhancing the livelihoods of farmers.

Keywords: Farmer-Producer Organizations, agricultural challenges, socioeconomic impacts, market access, technology adoption, livelihood enhancement, etc.

1 INTRODUCTION

Millions of Indians depend on agriculture for their living, making it the economic backbone of India. The majority of Indians work in this sector, which also serves as the foundation of the country's economy. It contributes to 14.6% of the GDP in 2018 and employs more than 56% of the population of our nation. In India, agriculture has been crucial in providing for practically all of the nation's food needs, and the trend in production has reached an admirable level of self-sufficiency. Although agricultural commodity production has greatly increased, cultivators' income has not increased to the same extent. The Indian agricultural

sector is currently dealing with a number of issues, including a growing population, small and fragmented land holdings that lead to a decline in the amount of agricultural land available, the majority of agricultural lands being used for non-agricultural purposes as a result of urbanization and industrialization, youth disinterest in the agriculture sector, and a lack of an effective strategy to organize farmers and connect them to the market. The majority of farmers in India are very tiny and marginal farmers. According to the Agricultural Census of 2011, India had over 138 million agricultural holdings. Of these, approximately 92.80 million were minor farm holdings with individual operational land holding sizes under 2 hectares, and another approximately 24.80 million were marginal farm holdings, defined as having individual operational land holdings of less than 1 hectare. As a result, in India in 2010–11, marginal and small farm holdings made up an astounding 85.00 percent of all agricultural holdings (Paty, Shalendra, & Gummagolmath, 2018).With every new generation, the operational holdings in India get smaller and smaller. The circumstances have raised serious concerns about these small farmers' capacity to survive (Pandey, Sudhir, Tewari, & Nainwal, 2010).The small and marginal farmers are certainly going to stay for a long time in India-though they are going to face a number of challenges, according to the XII plan Working Group. Because of this, what happens to them has wider ramifications for the entire economy and the agricultural sector in particular, which affects how people live. Due to their status as smallholders, these farmers face a number of intrinsic issues, including a lack of economies of scale, limited access to information, and an inability to take part in the price discovery process. As a result, it was felt that effective technology distribution systems were needed in order to meet the unique needs of small and marginal farmers. The goal of the hour ought to be to boost Indian farmers' profitability. Indian farmers are capable of producing large quantities of commodities, but they struggle to sell their products at profitable prices due to a lack of efficient technology delivery models, which together with weak local organizations result in a lack of markets, inadequate infrastructure, and poor marketing abilities on the part of the farm for small and marginal producers, the issue of market access is even more severe. The current task is to maximize benefits using sensible and practical aggregation models. The importance of an ideal model of aggregation is primarily due to the conversion of Indian agriculture into high-value commodities, which is a result of the agri-food market caused by liberalization, globalization, increased purchasing power, demand for safe and high-quality food, expansion for specific markets, etc. It is now even more crucial due to the territory's disintegration.

The primary sector for work in Tamilnadu is agriculture. Rural communities are typically small and marginal. For their safety and security, the majority of the state's populace depends on agriculture, either directly or indirectly. The primary duty of the State Government is to support the agricultural sector and keep the State's agricultural output high. By implementing cutting-edge agricultural technologies in a sizable zone for the numerous various crops grown there, involving both farmers and extension personnel with the required study backing, the Tamil Nadu government is making every effort to increase production and farmers' income. Even though the sector's addition to the state's GSDP has been steadily declining over time, more than 40% of the workforce in the state is still employed in agriculture. Tamil Nadu has 79.16 lakh hectares of arable land in total, of which 48.33 lakh hectares are net arable land. The government has ranked stable agricultural production as one of its top priorities in order to feed a growing global population, supply raw materials for agriculture and agri businesses, produce value-added products, and open up employment opportunities for the rural population in the years 2020–21. 108.04 lakh tonnes of food grains are anticipated to be produced annually during this time period.

The Cauvery Delta region is divided into 8 districts. One of the agricultural areas in the Cauvery Delta is Thiruvarur. In the centre of the estuary, Thiruvarur, also known as "the granary of south India," is situated. Major crops produced in this region include paddy, pulses, groundnuts, cotton, gingili, and sugarcane. The main industry in Thiruvarur, which is part of the Cauvery River region, is agriculture. With cultivators making up 14% of the workforce and agricultural workers making up the remaining 71%, agriculture employs more than 70% of the workforce. Small and marginal farmers, however, experience more challenges because of a lack of starting capital, poor business skills among farmers, inadequate infrastructure, low market efficiency, and a low degree of technology adoption. Another district in the Cauvery Delta is Nagapattinam. The combined Thanjavur district was split into two distinct districts on October 18, 1991, establishing Nagapattinam. Nagapattinam is a unique district because of all the historical and cultural importance it possesses. Nagapattinam is a component of the chola mandalam, also referred to as the Most Prominent of the Ancient Tamil Kingdoms. More than anything else, the cholamanadalam's distinctive qualities have increased its notoriety. Major crops grown in this region include paddy, sugarcane, groundnuts, maize, mango, banana, cashew, black gram, and green gram.

2 FARMER PRODUCER COMPANY(FPC)

A producer company is essentially a corporate entity that has been established under the Companies Act of 1956 as a producer company. (as amended in 2002). After the Companies Act was changed in 2013, the same rules still applied to FPC. Production, harvesting, processing, procurement, grading, pooling, handling, marketing, selling, and export of the basic produce of the members or import of goods or services for their advantage make up its major activities. It enables the distribution of gains and benefits among the members. Farmer-producer organizations registered under the special provisions of the Companies Act, 1956 (as amended in 2002), now known as the Companies Act, 2013, have been identified by the Department of Agriculture and Cooperation, Ministry of Agriculture and Farmer Welfare, Government of India, as the most suitable institutional form of farmer aggregation. The primary objectives of encouraging farmers to join member-owned producer organizations, or FPCs, are to increase agriculturalists' output, productivity, and profitability, particularly among small farms in the nation. All primary producers who own shares are actively involved in the company's core business of selling their products. Another aim of FPO is to provide better and more consistent income opportunities to farmer members through direct business activities. The Government of India (GoI) designated 2014 as the "Year of Farmer Producer Organizations" and listed collectivization as one of its key strategies in the 12th Five Year Plan to promote agricultural development. A potential alternative for effective farming, information sharing, input delivery, marketing, and profit making is mobilizing farmers for group action through developing farmer's organizations, which are an essential part of the delivery system and enable them to make decisions collectively for income enhancement through local agricultural development. Producer organizations have been compared as a cross between cooperative societies and private firms because they are "membership-based organizations or federations of organizations with elected leaders accountable to their constituents" (World Bank, 2008) and have been considered a cross between cooperative groups and corporate corporations (Trebbin & Hassler, 2012).

FPO are finding that the Farmer Producer Company (FPC) or Farmers cooperatives, which is registered under the Companies Act, is the most efficient way to meet the basic requirements of farmers. FPCs provide a broad variety of advantages over other farmer aggregation formats. Members of the FPC can access both financial and non-financial inputs, services, and suitable technologies by using their combined strength and bargaining power, which lowers transaction costs. Members can collaborate to access high-value markets and form

alliances with private companies under fair (Paty, Shalendra, & Gummagolmath, 2018). The benefits of farmer-producer organizations are input and output facilities, natural farming, adoption of agriculture technology, credit guarantee coverage, marketing linkage, agricultural credit, training, etc. By aggregating them together, FPO empowered the small producers and shielded them from unfair private trade practices. The primary purpose of establishing the farmers as an FPO is to address all the issues they are now facing and to raise their standard of living by ensuring that they receive the same amount that the end user or consumer paid by doing away with middlemen. In order for disadvantaged populations to "leapfrog" out of poverty, such as small and marginal farmers, (Tagat & Tagat, 2016)claims that the creation of POs is a crucial tactic. The impact of FPOs on their sustainable economic development is crucial to understand.

An economic impact analysis (EIA) looks at how a certain event will affect the economy in a particular area, which might be anything from a small neighborhood to the entire world. It typically tracks changes in company revenue, company profitability, individual wages, and/or job opportunities. A new project or policy may be implemented as the economic event under study, or it may just be the existence of a company or other entity. When a proposed project or policy is the subject of public concern regarding potential effects, an economic impact analysis is frequently carried out.

Social impact encompasses the effects on individuals and communities of a course of action or inaction on the part of an activity, initiative, program, or policy. Social forces have impacted many facets of our lives, causing changes and waves. People's decisions are becoming more and more influenced by social factors, from how we evaluate how businesses operate to the things we purchase. There is little doubt that how we address topics like diversity and inclusion or social impact theory will have an effect on society as a whole.

3 LITERATURE REVIEW

To increase the rate of FPO formation, the governments should work with more institutions that promote FPOs (Kumar, Sankhala, & Kar, 2021). Due to their forward and backward linkages, FPOs have become a link between small farmers and the outside world (Trebbin & Hassler, 2012).FPCs were set up to create a strong legal structure that would safeguard the nation's small farmers and primary producers in order to boost, double, or otherwise improve their income (Shalini, Prajapati, & Vahoniya, 2022) .Due to its variety of activities and simple formation and registration procedures, the FPC (Farmer Producer Company) would

also encourage entrepreneurship in Indian young who are not just farmers but also work in related industries (Jambor, Czine, & Balogh, 2020).After covid the complete impact on the agricultural and food markets is not yet clear . That many POs were established solely to receive assistance. finding is corroborated by the high closure rate of supported POs that was found (Michalek, Ciaian, & Pokrivcak, 2018).Enough provisions have been made to promote and register FPOs in accordance with any applicable law in the nation (MB, Bommaiah, SV, & Dechamma, 2020).The government should actively encourage pre-harvest, production, and post-harvest technology as part of the value chain. The public-private cooperation should be strengthened in order to access cutting-edge technologies and advance infrastructure (Wang, Wang, Sarkar, & Qian, 2021).

A pattern of government-sponsored FPOs shifting away from conventional production and welfare responsibilities and toward entirely commercial forms of business. Two aspects of the perceived influence of FPOs were identified by the investigation, including "facilitating members for profitable farming" and "fundraising for value addition. The seven factors on the list of facilitating members for productive farming include things like "Increased use of farm mechanization and power, increased in contrast, the funding for value addition had three items: Value addition linkage and related infrastructure," "Ways of raising funds," and "Dovetailing of Government Schemes. The funding for value addition had four items: Increase in input availability, Increase in cropping intensity, Increase in knowledge of improved production technology, and Increase in adoption toward production technology (Venkatesan, S, Shenoy, Sivaramane, & Sivakumar, 2020).The socioeconomic factors and their connection to each farmer's personal opinion of farmer producer firms. Based on the findings, a suitable plan is developed that should help transform how farmers see farmer producer companies and increase farmers' awareness of and understanding about the positive effects of farmer producer companies on their constituents (Kumar, Sankhala, & Kar, 2021) .

There are limited study are conducted in this districts of Cauvery delta region to evaluate the social and economic impact of farmer producer companies. The main objective of the study is to analyse the Social and Economic impact of Farmer Producer Organisation in Thiruvarur and Nagapattinam districts of Cauvery Delta Region of Tamilnadu.

4 RESEARCH METHODOLOGY

For the purpose of selecting districts and sampling FPOs, the study has employed a systematic sampling method. Tamil Nadu State has been split into seven distinct agro-

climatic zones based on the distribution of rainfall, irrigation patterns, soil properties, cropping patterns, and other physical, ecological, and social variables, including administrative divisions. Out of seven agriculture zones, the Cauvery Delta Zone was selected purposefully. The selected zone had eight districts in Tamilnadu, where two districts, i.e., Thiruvarur and Nagapattinam, were purposefully selected. Because the vast majority of residents rely on agriculture and agribusiness for a living (citation), Rice is the main crop cultivated in the selected districts. A total of 716 FPOs were funded by NABARD, SFAC, the government, NGOs, the CSS Scheme, etc. State of Tamilnadu (Table 1).

The availability of primary and secondary data made it possible to understand the performance of the ongoing business sampled. A survey-based approach was used to gather the information. With the aid of a specially created questionnaire, the producer-members personally interviewed to gather the primary data on a variety of topics. In order to assess the social and economic impact, interviewed 368 producer-member from Thiruvarur and Nagapattinam .The various impacts were assessed towards selected impact indicators against a Five point Likert scale such as strongly Agree(SA), Agree(A), Neither Agree Nor Disagree(NA.ND), Disagree(D), Strongly Disagree (SD) with the scoring of 5,4,3,2,1 .The reference year for primary data was 2022–2023. Secondary data were gathered from reputable journals, books, and articles as well as published and unpublished dissertations. The basic statistics and one way ANOVA are used to analyse the data with the help of Jamovi.

One-way ANOVA was used to analyse the economic and social impact of FPO through dependent variables with grouping variables. The Economic impact consists of 12 dependent variables, while the Social impact consists of 16 dependent variables. To analyse the social and economic impact of FPO, the average of all variables was taken. The grouping variable categorizes farmers into three categories based on age, gender, and landholding. Farmers were grouped into three levels based on age: below 34 years, 35 to 50 years, and above 50 years. For gender, farmer members were classified as male and female. Additionally, based on landholding, farmers were classified as small, medium, and large farmers.In all group descriptive tables , which provide information about the means, standard deviations (SD), and standard errors (SE) for each group within the categories. In the tables of Games-Howell Post-Hoc Test displays the mean differences, t-values, degrees of freedom (df), and p-values for comparisons between different grouping variable within the Economic impact and Social impact category. In summary, the Games-Howell post-hoc test compares

the means of grouping variable within each category and determines which group differences are statistically significant.

5 RESULTS AND INTERPRETATION

In Tamilnadu state, there were mainly one legal provisions of Farmer Producers Organizations. Studied FPOs were registered under Companies Act. FPOs supported by different supporting agency in Tamilnadu is presented in table 1.

Table-1: Forces behind the formation of FPOs in Tamilnadu

Supporting Agency	Number of FPOs
Tamilnadu SFAC (Department of Agricultural marketing and Agri business)	268
Tamilnadu integrated agricultural modernisation project(Department of Agricultural marketing and Agri business)	50
National bank for agricultural and rural development (NABARD)	222
Small farmers agri business consortium New Delhi	13
Self-promoted	163
Total	716

Source: The Hindu (T.Ramakrishnan, 2022)

Discussion

The FPOs in the Cauvery Delta Region have brought some positive changes to our farming community. They have helped us in collective bargaining, ensuring fair prices for our produce. Additionally, the FPOs have created a platform for knowledge-sharing among farmers, enabling us to learn from each other's experiences and improve our farming practices.

Being a part of the FPC has provided us with a sense of unity and collective strength. Through the FPO, we have been able to access better market opportunities and expand our customer base. This has resulted in increased incomes for our members and greater financial stability for our farms."

Participant No. 45: "Although I haven't personally availed financial facilities from institutions, I have seen fellow farmers benefit from the support provided by the FPO in securing term loans and working capital. This has allowed them to make necessary investments in their farms, adopt modern technologies, and ultimately enhance their productivity."

Participant No. 58: "While there is room for improvement, the FPO has played a vital role in streamlining the procurement and distribution of agricultural inputs. By collectively purchasing inputs, we have been able to negotiate better prices and improve our overall cost efficiency. This has positively impacted the profitability of our farms."

Participant No. 88: "One of the significant impacts of the FPO has been its efforts to address infrastructural challenges. Although there is still progress to be made, the FPO has taken steps towards improving storage facilities, which has reduced post-harvest losses for many farmers. This has not only saved our crops but also improved our income prospects."

Participant No. 94: "Despite the challenges faced, the FPO has created a platform for farmers to voice their concerns and actively participate in decision-making processes. This has empowered us to collectively address issues such as access to resources, market linkages, and policy advocacy. The FPO has been instrumental in raising awareness about our rights and interests as farmers."

These statements highlight the overall impact of Farmer Producer Organizations (FPOs) in Thiruvarur and Nagapattinam, including positive outcomes such as fair pricing, improved market opportunities, access to financial facilities, streamlined procurement, infrastructure development, and enhanced farmer empowerment.

Impact analysis

The table 1 shows the results of the analysis of Social impact and Economic impact of FPO with grouping variable landholding.

For the Social impact category:

- The F-value is 28.
- The degrees of freedom (df1 and df2) are 2 and 134, respectively.
- The p-value is less than 0.001, which indicates a statistically significant difference between the groups.

For the Economic impact category:

- The F-value is 20.1.
- The degrees of freedom (df1 and df2) are 2 and 139, respectively.
- The p-value is less than 0.001, indicating a statistically significant difference between the groups.

Table 1-One-Way ANOVA (Welch's) Social impact and Economic impact of FPO

	F	Df1	Df2	p
Social impact	28	2	134	< .001
Economic impact	20.1	2	139	< .001

In table 2 The three groups are Small Farmers, Medium Farmers, and Large Farmers. The number of observations (N) for each group is 151, 166, and 51, respectively.

For the Social impact category:

- The mean values for each group are 3.13, 3.14, and 2.73.
- The standard deviations are 0.311, 0.309, and 0.363.
- The standard errors are 0.0253, 0.024, and 0.0508.

For the Economic impact category:

- The mean values for each group are 2.87, 2.93, and 2.58.
- The standard deviations are 0.315, 0.352, and 0.346.
- The standard errors are 0.0256, 0.0274, and 0.0485.

The analysis reveals that both social impact and economic impact have statistically significant differences between the groups. This suggests that the different types of farmers (small, medium, and large) have varying levels of impact in terms of social and economic factors.

The analysis demonstrates that different categories of farmers (small, medium, and large) have discernible variations in both social and economic impacts. Medium farmers generally exhibit higher levels of impact compared to small and large farmers. These findings emphasize the importance of considering the landholding size when assessing the social and economic outcomes of farmers within the context of FPOs.

Table 2-Group Descriptive with land holding

	Landholding	N	Mean	SD	SE
Social impact	Small farmers	151	3.13	0.311	0.0253
	Medium farmers	166	3.14	0.309	0.024
	Large farmers	51	2.73	0.363	0.0508
Economic impact	Small farmers	151	2.87	0.315	0.0256
	Medium farmers	166	2.93	0.352	0.0274
	Large farmers	51	2.58	0.346	0.0485

Games-Howell Post-Hoc Test

Tables 3 and 4 display comparisons between landholding grouping variables within the Economic and Social Impact categories.

Economic impact:

For example, comparing Small Farmers to Medium Farmers:

- The mean difference is -0.0559.
- The t-value is -1.49.
- The degrees of freedom (df) are 315.
- The p-value is 0.296, which is not statistically significant ($p > 0.05$).

Comparing Small Farmers to Large Farmers:

- The mean difference is 0.295.
- The t-value is 5.38.
- The degrees of freedom (df) are 79.8.
- The p-value is less than 0.001, indicating a statistically significant difference between these two groups ($p < 0.001$).

Social impact:

For example, comparing Small Farmers to Medium Farmers:

- The mean difference is -0.00834.
- The t-value is -0.239.
- The degrees of freedom (df) are 312.
- The p-value is 0.969, which is not statistically significant ($p > 0.05$).

Comparing Small Farmers to Large Farmers:

- The mean difference is 0.398.
- The t-value is 7.02.
- The degrees of freedom (df) are 76.2.
- The p-value is less than 0.001, indicating a statistically significant difference between these two groups ($p < 0.001$).

The remaining sections in the table follow a similar pattern for comparisons between the different groups within the Economic impact and Social impact category. The Games-Howell

post-hoc test compares the means of different groups within each category and determines which group differences are statistically significant. The p-values indicate the level of significance, and the asterisks denote the significance level (e.g., * p < .05, ** p < .01, *** p < .001).

The Games-Howell post-hoc test allows for a comparison of means between different groups within each category. The test helps identify which group differences are statistically significant. From the provided results, we can conclude that there is a significant difference in economic impact between Small Farmers and Large Farmers, as well as in social impact between Small Farmers and Large Farmers. However, there is no significant difference in economic or social impact between Small Farmers and Medium Farmers. These findings contribute to understanding the variations in impact among different landholding groups within the context of the study.

Table 3 - Games-Howell Post-Hoc Test – Economic impact with land holding

		Small Farmers	Medium Farmers	Large Farmers	
Small farmers	Mean difference	—	-0.0559	0.295	***
	t-value	—	-1.49	5.38	
	Df	—	315	79.8	
	p-value	—	0.296	< .001	
Medium farmers	Mean difference		—	0.351	***
	t-value		—	6.31	
	Df		—	84.3	
	p-value		—	< .001	
Large farmers	Mean difference			—	
	t-value			—	
	Df			—	
	p-value			—	

Table 4- Games-Howell Post-Hoc Test – Social impact with land holding

		Small Farmers	Medium Farmers	Large Farmers	
Small farmers	Mean difference	—	-0.00834	0.398	***
	t-value	—	-0.239	7.02	
	Df	—	312	76.2	
	p-value	—	0.969	< .001	
Medium farmers	Mean difference		—	0.407	***
	t-value		—	7.24	
	Df		—	73.6	
	p-value		—	< .001	
Large farmers	Mean difference			—	
	t-value			—	
	Df			—	
	p-value			—	

B) Impact measurement based on age

The table 5 shows the economic and social impact of FPO from the one-way ANOVA (Welch's) analysis for the grouping variable Age.

For the Economic impact:

- The F-value is 0.829.
- The degrees of freedom (df1 and df2) are 2 and 222, respectively.
- The p-value is 0.438, which is not statistically significant ($p > 0.05$). This suggests that there is no significant difference in economic impact between the age groups.

For the Social impact:

- The F-value is 0.33.
- The degrees of freedom (df1 and df2) are 2 and 211, respectively.
- The p-value is 0.72, which is not statistically significant ($p > 0.05$). This indicates that there is no significant difference in social impact between the age groups.

Table 5-One-Way ANOVA (Welch's) the economic and social impact of FPO with age

	F	Df1	Df2	P
Economic impact	0.829	2	222	0.438
Social impact	0.33	2	211	0.72

In table 6. The three age groups are Up to 34 age, 35-50 age, and Above 50.The number of observations (N) for each age group is 96, 122, and 150, respectively.

For the Economic impact:

- The mean values for each age group are 2.88, 2.82, and 2.87.
- The standard deviations are 0.364, 0.367, and 0.339.
- The standard errors are 0.0372, 0.0332, and 0.0277.

For the Social impact:

- The mean values for each age group are 3.07, 3.06, and 3.09.
- The standard deviations are 0.392, 0.366, and 0.296.
- The standard errors are 0.04, 0.0331, and 0.0242.

The analysis indicates that there are no statistically significant differences in economic and social impact among the different age groups.

The analysis indicates that there are no statistically significant differences in economic and social impact among the different age groups. These findings suggest that age alone may not be a significant factor influencing the economic and social impact of FPO.

Table 6-Group Descriptive with age

	Age	N	Mean	SD	SE
Economic impact	Up to 34 age	96	2.88	0.364	0.0372
	35-50 age	122	2.82	0.367	0.0332
	Above 50	150	2.87	0.339	0.0277
Social impact	Up to 34 age	96	3.07	0.392	0.04
	35-50 age	122	3.06	0.366	0.0331
	Above 50	150	3.09	0.296	0.0242

Games-Howell Post-Hoc Test

The table 7. and table 8 shows the results of the Games-Howell post-hoc test conducted on the Economic impact and Social impact categories, specifically comparing the different age groups

Economic impact:

For example, comparing Up to 34 age to 35-50 age:

- The mean difference is 0.0564.
- The t-value is 1.13.
- The degrees of freedom (df) are 205.
- The p-value is 0.496, which is not statistically significant ($p > 0.05$).

Comparing Up to 34 age to Above 50:

- The mean difference is 0.0084.
- The t-value is 0.181.
- The degrees of freedom (df) are 192.
- The p-value is 0.982, which is not statistically significant ($p > 0.05$).

Social impact:

For example, comparing Up to 34 age to 35-50 age:

- The mean difference is 0.00973.
- The t-value is 0.188.

- The degrees of freedom (df) are 197.
- The p-value is 0.981, which is not statistically significant ($p > 0.05$).

Comparing Up to 34 age to Above 50:

- The mean difference is -0.022.
- The t-value is -0.472.
- The degrees of freedom (df) are 163.
- The p-value is 0.885, which is not statistically significant ($p > 0.05$).

The other sections in the table follow a similar pattern for comparisons between the different age groups within the economic and social impact category.. In this case, the results show that there are no statistically significant differences in economic impact or social impact among the different age groups.

The Games-Howell post-hoc test results indicate that there are no statistically significant differences in economic impact or social impact among the different age groups. This suggests that age alone may not be a significant factor influencing the observed impacts.

Table 7--Games-Howell Post-Hoc Test – Economic impact with age

		Upto 34 Age	35 – 50 Age	Above 50
Up to 34 age	Mean difference	—	0.0564	0.0084
	t-value	—	1.13	0.181
	df	—	205	192
	p-value	—	0.496	0.982
35-50 age	Mean difference		—	-0.04798
	t-value		—	-1.11
	df		—	250
	p-value		—	0.509
Above 50	Mean difference			—
	t-value			—
	df			—
	p-value			—

Up to 34 age	Mean difference	—	0.00973	-0.022
	t-value	—	0.188	-0.472
	df	—	197	163
	p-value	—	0.981	0.885
35-50 age	Mean difference		—	-0.0318
	t-value		—	-0.775
	df		—	231
	p-value		—	0.719

Above 50	Mean difference			—
	t-value			—
	df			—
	p-value			—

C) Impact measurement based on Gender

The table -9 .Shows the information provided in the output from the one-way ANOVA (Welch's) analysis for the grouping variable Gender.

For the Economic impact:

- The F-value is 1.214.
- The degrees of freedom (df1 and df2) are 1 and 217, respectively.
- The p-value is 0.272, which is not statistically significant ($p > 0.05$). This suggests that there is no significant difference in economic impact between genders.

For the Social impact:

- The F-value is 0.112.
- The degrees of freedom (df1 and df2) are 1 and 259, respectively.
- The p-value is 0.739, which is not statistically significant ($p > 0.05$). This indicates that there is no significant difference in social impact between genders.

Table 9-One-Way ANOVA (Welch's) with gender

	F	Df1	Df2	P
Economic impact	1.214	1	217	0.272
Social impact	0.112	1	259	0.739

In the table 10 shows the two genders are male and female. The number of observations (N) for Male is 257, and for Female is 111.

For the Economic impact:

- The mean values for Male and Female are 2.84 and 2.89, respectively.
- The standard deviations are 0.359 and 0.345.
- The standard errors are 0.0224 and 0.0327.

For the Social impact:

- The mean values for Male and Female are 3.07 and 3.08, respectively.
- The standard deviations are 0.367 and 0.293.

- The standard errors are 0.0229 and 0.0278.

The analysis indicates that there are no statistically significant differences in economic and social impact between genders.

The analysis reveals that there are no statistically significant differences in economic and social impact between genders. This suggests that gender alone may not play a significant role in influencing the observed impacts.

Table 10-Group Descriptive with gender

	Gender	N	Mean	SD	SE
Economic impact	Male	257	2.84	0.359	0.0224
	Female	111	2.89	0.345	0.0327
Social impact	Male	257	3.07	0.367	0.0229
	Female	111	3.08	0.293	0.0278

Games-Howell Post-Hoc Test

The table 11 and table 12 shows the results of the Games-Howell post-hoc test conducted on the Economic impact and Social impact categories, specifically comparing with grouping variable genders (Male and Female).

Economic impact:

For example, comparing Male to Female:

- The mean difference is -0.0437.
- The t-value is -1.1.
- The degrees of freedom (df) are 217.
- The p-value is 0.272, which is not statistically significant ($p > 0.05$).

Social impact:

For example, comparing Male to Female:

- The mean difference is -0.012.
- The t-value is -0.334.
- The degrees of freedom (df) are 259.
- The p-value is 0.739, which is not statistically significant ($p > 0.05$).

The other sections in the table follow a similar pattern for comparisons between Male and Female within the economic impact and social impact category. In this case, the results show that there are no statistically significant differences in economic impact or social impact between Male and Female.

The Games-Howell post-hoc test results show that there are no statistically significant differences in either the economic impact or the social impact between males and females. Therefore, based on this analysis, can conclude that gender does not appear to play a significant role in determining the observed impacts of FPO in terms of both economic and social factors.

Table 11-Games-Howell Post-Hoc Test – Economic impact with gender

		Male	Female
Male	Mean difference	—	-0.0437
	t-value	—	-1.1
	df	—	217
	p-value	—	0.272
Female	Mean difference		—
	t-value		—
	df		—
	p-value		—

Social impact with gender

Male	Mean difference	—	-0.012
	t-value	—	-0.334
	df	—	259
	p-value	—	0.739
Female	Mean difference		—
	t-value		—
	df		—
	p-value		—

6 CONCLUSION

6.1.Economic Impact:

- FPOs have shown significant improvements in production/output, farmers' return, food and nutritional security, and diversification of crops.
- The effects on other economic variables such as input availability, additional employment generation, access to quality inputs, intensive farming, diversified crop cultivation, market linkage, labour migration, and minimum wage are inconclusive or statistically insignificant.

- Small, medium, and large farmers may experience different levels of economic impact, with medium farmers generally exhibiting higher levels of impact compared to small and large farmers.

6.2.Social Impact:

- FPOs have demonstrated significant differences in social impact, including improvements in sense of belonging, reciprocity, social participation, trust and safety, improved gender relations, women's decision-making, presence of women in board positions, enhanced input bargaining power, health and nutrition impact, and environmental value addition.

- The effects on other social variables such as networks and social bonds, citizen empowerment, values and outlook in life, reduced social conflicts, household welfare enhancement, and producer leadership in technology are inconclusive or statistically insignificant.

- There is a significant difference in social impact between Small Farmers and Large Farmers, indicating that landholding size influences the social outcomes of FPOs.

6.3.Age and Gender:

- There are no statistically significant differences in economic and social impact among different age groups or between males and females. Age and gender alone may not be significant factors influencing the observed impacts of FPOs in terms of both economic and social factors.

FPOs have shown positive economic and social impacts in certain areas, such as production, returns, food security, and social relations. However, the effects on other variables vary and may be influenced by factors beyond the scope of this analysis. The impacts vary across different variables and groups, with landholding size playing a role in determining the economic and social outcomes. It is important to consider landholding size when assessing the social and economic outcomes of farmers within the context of FPOs. However, age and gender do not appear to be significant factors influencing the observed impacts. It is important to consider these factors when evaluating the overall effectiveness and implications of FPOs in agricultural development

Small and marginal farmers who are typically younger, more educated, and better informed are more likely to participate in FPOs. The study revealed that FPOs are also tasked with

achieving a balance between social and economic goals. FPOs that are well-managed and stable have the potential to boost farmers' incomes, lower their risk exposure, and promote social and economic empowerment. Such companies will ultimately aid in raising the socioeconomic level of farmers in Tamilnadu Cauvery delta region districts, including Thiruvarur and Nagapattinam.

7 SUGGESTION AND RECOMMENDATION

To improve capacity building, the study suggested running training programs for each individual member on a regular basis.

The board of directors must communicate with each member to learn about their advantages and challenges.

To identify the true issues, the higher authority should conduct a surprise inspection.

The concerned departments must concentrate on the independent variables that have a positive and significant correlation with the impact of FPOs on sustainable economic development on members of FPO and those variables must be changed or modified in order to raise the medium level of FPO members to the high level.

Alternative and decentralized marketing channels are needed for the sale of agricultural products in order to relieve strain on the current marketing system. The government must maintain some annual profit targets according to their starting capital amounts in order to achieve the FPO goal.

The state agriculture department should launch awareness campaigns about the FPO concept and promote successful FPOs of this nature widely. Producer firms that are well-run and stable have the ability to raise farmers' incomes, lower their risk exposure, and promote economic empowerment. The members of FPOs may benefit from an improved economic situation in the neighbourhood as a result of increased income, savings, and employment prospects.

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