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THE FACTORS INFLUENCING FARMERS DIVERSIFICATION IN TIRUPATTUR DISTRICT: A CASE STUDY

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ABSTRACT :

Crop diversification is an important strategy for improving farm income, reducing production and market risks, enhancing resource utilisation and promoting sustainable agricultural development. Farmers increasingly change their cropping patterns in response to changes in market prices, irrigation availability, labour supply, input costs, climatic conditions, technological development and access to institutional support. The present study examines the factors influencing farmers' crop diversification and the changes in cropping patterns among farmers in Tirupattur District, Tamil Nadu. The study is based on primary data collected from selected farming households using a structured interview schedule. The study considers socio-economic, farm-level, institutional and market-related factors, including age, education, family size, landholding size, irrigation facilities, farming experience, access to agricultural credit, labour availability, market distance, agricultural extension services, farm mechanisation, input costs, crop prices and expected profitability. The extent of crop diversification is measured using the Simpson Index of Diversification (SID), while changes in cropping patterns are examined by comparing farmers' earlier and present crop choices. Descriptive statistics are used to analyse the socio-economic and farm characteristics of the respondents, while correlation and regression analysis are employed to identify the factors associated with crop diversification. The study is expected to identify the major economic, institutional and farm-level factors responsible for changes in farmers' diversification decisions. The findings will provide useful insights for strengthening irrigation facilities, agricultural credit, market access, extension services, farm mechanisation and technological support, thereby encouraging sustainable and economically viable crop diversification in Tirupattur District.

Keywords: Diversification, farmers, irrigation, market Access, Agricultural income.

Introduction:

Agriculture plays a vital role in the rural economy by providing employment, income and livelihood opportunities to a large section of the population. However, farmers face several uncertainties arising from fluctuations in market prices, changing climatic conditions, irregular rainfall, rising input costs, shortage of agricultural labour, limited irrigation facilities and variations in consumer demand. In this context, crop diversification has emerged as an important strategy for improving the economic sustainability of farming households. Crop diversification refers to the practice of cultivating different crops rather than depending on a single crop. It enables farmers to make better use of available land, water, labour and other farm resources while reducing dependence on one particular crop and its associated risks.

Farmers' decisions regarding crop diversification are influenced by a combination of socio-economic, farm-level, institutional, climatic and market factors. Landholding size, education, age, farming experience, family labour, irrigation availability and access to credit can affect farmers' capacity to adopt different crops. Similarly, labour availability, farm mechanisation, input prices, expected returns and access to agricultural technology can influence the choice of crops. Market-related factors such as distance to markets, availability of traders, price fluctuations, storage facilities and market demand also play an important role. Government programmes, agricultural extension services, crop insurance, subsidies and access to institutional credit may further influence farmers' diversification decisions.

Changes in climatic conditions have also become increasingly relevant to farmers' cropping decisions. Variations in rainfall, temperature, drought conditions and water availability can encourage farmers to modify their traditional cropping patterns. Farmers may shift towards crops that require comparatively less water or have shorter growing periods when irrigation and rainfall become uncertain. At the same time, improved irrigation and access to modern technologies may enable farmers to cultivate a wider range of crops. Thus, changes in crop diversification reflect the interaction

between farmers' resources, economic incentives, environmental conditions and institutional support.

Statement of the Problem

Indian agriculture is increasingly exposed to climate variability, rising input costs, labour shortages, fluctuating crop prices and uncertain market conditions. In this context, crop diversification provides farmers with an opportunity to reduce production and income risks by cultivating different crops according to available resources and market opportunities. However, farmers do not have equal access to irrigation, credit, technology, extension services, quality inputs and markets, which can influence their diversification decisions. Small and marginal farmers may face greater constraints due to limited land, capital and irrigation facilities. In Tamil Nadu, variations in agro-climatic conditions, water availability, soil characteristics and market opportunities create differences in cropping patterns across regions. Despite the importance of diversification, limited micro-level evidence is available on the specific socio-economic, farm-level, institutional and market factors influencing farmers' decisions. Therefore, the present study examines the major factors influencing diversification among farmers.

Objectives

1. To identify the major socio-economic, market and climatic factors influencing diversification among farmers in the study area.
2. To examine the farmers' diversification and cropping patterns over time in the study area.
3. To give policy recommendations and remedial suggestions to improve farmers livelihood and sustainability in the study area.

Methodology

The study adopts a descriptive and analytical research design to examine the factors influencing farmers diversification in selected villages of Tirupattur District. A multistage sampling method will be adopted by selecting agricultural blocks, villages and farmer respondents, with a sample size of 220 farmers. Primary data will be collected through a structured and pre-tested interview schedule covering socio-economic characteristics, farm characteristics, irrigation facilities, farm income, input expenditure and expected profitability. Secondary data will be obtained from government reports, agricultural statistical publications, Tamil Nadu agriculture reports, research journals and official databases.

Data analysis and Interpretation:

Table The Socio-Economic Status of the farmers in the study area

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age of the respondent	220	1.00	5.00	3.0591	.86598
Gender of the Respondents	220	1.00	2.00	1.3500	.47806
Educational Qualification of the respondent	220	1.00	4.00	1.9682	.79029
Marital status of the respondent	220	1.00	4.00	2.0545	.28143
Category of the respondent	220	1.00	4.00	2.7136	1.07048
Major Occupations of the respondent	220	1.00	4.00	1.7500	.97749
Nature of land Ownership	220	1.00	3.00	1.3045	.61412
Size of landholding	220	1.00	3.00	1.7864	.49175
type of Irrigation	220	1.00	4.00	1.5318	.69826
nature of Crops	220	1.00	4.00	1.6318	.86847
Types of soil	220	1.00	5.00	1.9364	.87874
Nature of farming	220	1.00	4.00	1.7636	.77551
Farming cycle of	220	1.00	4.00	1.7682	.85789
method of farming adopted by farmers	220	1.00	4.00	1.7409	.90213
Type of family	220	1.00	4.00	1.7000	.88674
Primary source of income	220	1.00	4.00	1.5955	.75548

Source: Primary data analysis

The descriptive statistics provide an overview of the socio-economic and farming characteristics of the 220 respondents in the study. The analysis uses measures such as minimum, maximum, mean, and standard deviation to understand the distribution of different variables. The results show that most respondents belong to the middle-age group (Mean = 3.0591), indicating that economically active and experienced farmers are involved

in oilseed cultivation. The gender mean (1.3500) suggests that male farmers dominate agricultural activities in the study area. Educational qualification (Mean = 1.9682) indicates that many farmers possess basic levels of education, which may influence the adoption of improved farming practices. The marital status mean (2.0545) shows that the majority of respondents are married. The category of respondents (Mean = 2.7136) reflects variation among social groups, while the major occupation (Mean = 1.7500) confirms that agriculture is the primary occupation for most respondents. Land-related variables show that many farmers cultivate their own land (Mean = 1.3045) and mainly belong to small or marginal landholding groups (Mean = 1.7864). In terms of agricultural practices, the type of irrigation (Mean = 1.5318), nature of crops (Mean = 1.6318), and types of soil (Mean = 1.9364) indicate moderate variation among farmers. Similarly, the nature of farming, farming cycle, and farming methods (Means around 1.74–1.76) suggest that traditional farming practices are still widely followed, though some variation exists. Finally, the type of family (Mean = 1.7000) and primary source of income (Mean = 1.5955) indicate that many respondents belong to nuclear families and rely mainly on agriculture for their livelihood show that the respondents are predominantly small-scale farmers with moderate education levels who depend largely on traditional agricultural practices for their income.

Correlations										
		Major Occupations of the respondent	climatic changes influence your diversification decisions	Obstacle for Agricultural diversification	face any market-related challenges while diversifying	education level help you make better decisions in agricultural diversification	Age influences my ability or willingness to diversify	Reasons to diversify from agriculture	children or younger family members influence diversification decisions	modern technologies (e.g., machinery, mobile apps, precision tools) in affected diversification
Pearson Correlation	Major Occupations of the respondent	1.000	-.024	-.171	-.035	-.013	-.005	-.218	.125	.004
	climatic changes influence your diversification decisions	-.024	1.000	.100	.052	.205	.039	-.051	.060	-.084
	Obstacle for Agricultural diversification	-.171	.100	1.000	-.113	.002	.193	.070	.033	-.030
	face any market-related challenges while diversifying	-.035	.052	-.113	1.000	.251	.001	.155	-.018	-.139
	education level help you make better decisions in agricultural diversification	-.013	.205	.002	.251	1.000	-.037	.063	.038	-.162

	Age influences my ability or willingness to diversify	-.005	.039	.193	.001	-.037	1.000	.109	.052	.253
	Reasons to diversify from agriculture	-.218	-.051	.070	.155	.063	.109	1.000	.048	.076
	children or younger family members influence diversification decisions	.125	.060	.033	-.018	.038	.052	.048	1.000	-.056
	modern technologies (e.g., machinery, mobile apps, precision tools) in affected diversification	.004	-.084	-.030	-.139	-.162	.253	.076	-.056	1.000
Sig. (1-tailed)	Major Occupations of the respondent	.	.360	.005	.303	.426	.468	.001	.032	.477
	climatic changes influence your diversification decisions	.360	.	.069	.221	.001	.282	.227	.186	.108
	Obstacle for Agricultural diversification	.005	.069	.	.048	.490	.002	.150	.313	.330
	face any market-related challenges while diversifying	.303	.221	.048	.	.000	.494	.011	.395	.020
	education level help you make better decisions in	.426	.001	.490	.000	.	.290	.178	.287	.008

[illegible]

	better decisions in agricultural diversification									
	Age influences my ability or willingness to diversify	220	220	220	220	220	220	220	220	220
	Reasons to diversify from agriculture	220	220	220	220	220	220	220	220	220
	children or younger family members influence diversification decisions	220	220	220	220	220	220	220	220	220
	modern technologies (e.g., machinery, mobile apps, precision tools) in affected diversification	220	220	220	220	220	220	220	220	220

The Pearson correlation analysis was conducted among major occupation, climatic changes, obstacles to agricultural diversification, market-related challenges, education, age, reasons for diversification, influence of younger family members and modern technology, based on 220 respondents. The results indicate several statistically significant relationships, although most correlations are weak in magnitude. Major occupation was significantly and negatively correlated with obstacles to diversification ($r = -0.171$, $p = 0.005$) and reasons for diversifying from agriculture ($r = -0.218$, $p = 0.001$), while its relationship with younger family members was positive and significant ($r = 0.125$, $p = 0.032$). Climatic changes were significantly associated with age ($r = 0.205$, $p = 0.001$) and education ($r = 0.205$, $p = 0.001$). Obstacles to diversification were significantly related to reasons for diversification ($r = 0.193$, $p = 0.002$) and age ($r = 0.193$, $p = 0.002$), while their relationship with market challenges was weak and negative ($r = -0.113$, $p = 0.048$). Market-related challenges showed significant positive correlations with education ($r = 0.251$, $p < 0.001$) and reasons for diversification ($r = 0.155$, $p = 0.011$), but a significant negative relationship with modern technology ($r = -0.139$, $p = 0.020$). Education was negatively associated with modern technology ($r = -0.162$, $p = 0.008$). Age was significantly and positively correlated with modern technology ($r = 0.253$, $p < 0.001$), while the relationship between age and reasons for diversification was not significant at the 5 per cent level ($r = 0.109$, $p = 0.053$). Reasons for diversification were positively associated with modern technology ($r = 0.253$, $p < 0.001$). The relationship between younger family members and modern technology was negative but statistically non-significant ($r = -0.056$, $p = 0.204$). Overall, the findings indicate that several socio-economic, climatic, market and technological variables are significantly associated with farmers' diversification-related perceptions; however, the correlation results indicate association rather than causation.

One Sample “T” Test Frequency Percentage of the Factors Influencing Agricultural Diversification

Particulars	Aware of government schemes related to agricultural		climatic changes influence your diversification decisions		think agricultural diversification reduces your financial risk		modern technologies (e.g., machinery, mobile apps, precision tools) in affected diversification		legal or land ownership issues that restrict my ability to diversify	
	N	%	N	%	N	%	N	%	N	%
Strongly Agree	49	22.3%	49	22.3%	57	25.9%	66	30.0%	69	31.4%
Agree	70	31.8%	51	23.2%	71	32.3%	46	20.9%	62	28.2%
Neutral	64	29.1%	76	34.5%	56	25.5%	70	31.8%	59	26.8%
Disagree	32	14.5%	31	14.1%	25	11.4%	22	10.0%	13	5.9%
Strongly Disagree	5	2.3%	13	5.9%	11	5.0%	16	7.3%	17	7.7%

Table: One-Sample Statistics with Bootstrap Results

One-Sample Statistics						
		Statistic	Bootstrap			
			Bias	Std. Error	95% Confidence Interval	
					Lower	Upper
Aware of government schemes related to agricultural	N	220				
	Mean	2.4273	-.0038	.0718	2.2909	2.5635
	Std. Deviation	1.05950	-.00277	.04076	.97326	1.13585
	Std. Error Mean	.07143				
climatic changes influence your diversification decisions	N	220				
	Mean	2.5818	-.0004	.0777	2.4365	2.7362
	Std. Deviation	1.15377	-.00346	.04509	1.05971	1.23634
	Std. Error Mean	.07779				
think agricultural diversification reduces your financial risk	N	220				
	Mean	2.3727	-.0001	.0762	2.2227	2.5273
	Std. Deviation	1.13362	-.00257	.04700	1.03390	1.22559
	Std. Error Mean	.07643				
modern technologies (e.g., machinery, mobile apps, precision tools) in affeered diversification	N	220				
	Mean	2.4364	.0022	.0822	2.2955	2.5955
	Std. Deviation	1.22028	-.00318	.04562	1.12897	1.30805
	Std. Error Mean	.08227				
legal or land ownership issues that restrict my ability to diversify	N	220				
	Mean	2.3045	-.0029	.0795	2.1500	2.4635
	Std. Deviation	1.19473	-.00579	.05435	1.08076	1.29175
	Std. Error Mean	.08055				
a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples						

Source: Primary data analysis.

The one-sample statistics with bootstrap estimates provide insights into farmers' perceptions regarding factors influencing agricultural diversification among the 220 respondents. The results indicate a moderate level of awareness regarding government schemes related to agriculture (Mean = 2.4273), suggesting that although some farmers are informed about such initiatives, awareness is not uniformly high across the sample. Climatic changes appear to have a relatively stronger influence on diversification decisions (Mean = 2.5818), indicating that farmers increasingly recognize climate variability as an important factor affecting their farming strategies. Similarly, respondents moderately agree that agricultural diversification can reduce financial risk (Mean = 2.3727), reflecting the perception that diversification may enhance income stability. The influence of modern technologies such as machinery, mobile applications, and precision tools on diversification also shows a moderate mean value (Mean = 2.4364), implying gradual acceptance of technological innovations among farmers. Furthermore, legal or land ownership issues (Mean = 2.3045) are perceived as potential constraints affecting diversification opportunities. The bootstrap confidence intervals for all variables are relatively narrow, indicating the reliability and stability of the estimated means. Overall, the findings suggest that climatic factors, technological adoption, institutional awareness, and land-related issues collectively influence farmers' diversification decisions in the study area.

Findings

The major findings of the study as follows

- ❖ Socio-economic profile: The study of 220 farmers shows that the respondents are predominantly economically active and experienced farmers. The mean age score was 3.0591, while the gender mean of 1.3500 indicates the predominance of male respondents.
- ❖ Educational status: The mean educational qualification was 1.9682, indicating that a considerable proportion of farmers had basic or moderate levels of education.
- ❖ Landholding and ownership: The mean score for land ownership was 1.3045, indicating that most farmers cultivated their own land. The mean landholding size of 1.7864 suggests that the sample was largely composed of small and marginal farmers.
- ❖ Agricultural characteristics: The mean values for irrigation (1.5318), nature of crops (1.6318), farming nature (1.7636) and farming methods (1.7409) indicate variation in agricultural practices.
- ❖ Occupation and livelihood: The mean occupation score of 1.7500 and primary-income-source mean of 1.5955 indicate that agriculture remains an important source of livelihood for the farmers.
- ❖ Climate and diversification: Climatic change had a mean score of 2.5818, the highest among the five diversification-related factors.
- ❖ Awareness of government schemes: Awareness of government agricultural schemes recorded a mean of 2.4273. The frequency results show that 54.1% of respondents either strongly agreed or agreed that they were aware of government schemes, while 16.8% disagreed or strongly disagreed.
- ❖ Financial-risk reduction: About 58.2% of farmers either strongly agreed or agreed that agricultural diversification reduces financial risk. The mean score was 2.3727, indicating a moderate perception of diversification as a risk-management strategy.
- ❖ Occupation and diversification obstacles: Major occupation was negatively associated with obstacles to agricultural diversification ($r = -0.171$, $p = 0.005$) and reasons for diversification ($r = -0.218$, $p = 0.001$). These relationships are statistically significant but weak.
- ❖ Market challenges: Market-related challenges had a positive and statistically significant relationship with education ($r = 0.251$, $p < 0.001$) and reasons for diversification ($r = 0.155$, $p = 0.011$). A weak negative association was found between market challenges and modern technology ($r = -0.139$, $p = 0.020$).

Conclusion

The study concludes that farmers' diversification in Tirupattur District is influenced by a combination of socio-economic, family, climatic, technological, irrigation and market-related factors. The findings show that agriculture remains the major occupation and livelihood source for most respondents, with a large proportion engaged exclusively in agriculture or agriculture and allied activities. Family commitments, high manpower requirements, lack of irrigation, price fluctuations, lack of buyers and transport-related difficulties emerged as important concerns associated with agricultural diversification. Farmers also reported that education, younger family members, climatic changes and modern technologies play a role in diversification-related decision-making. The study therefore highlights the importance of improving irrigation facilities, strengthening market access and storage and transport infrastructure, enhancing farmers' awareness of government schemes, promoting appropriate modern agricultural technologies and providing timely institutional and extension support. Such measures may help farmers make more informed diversification decisions, improve livelihood opportunities and strengthen the sustainability of agricultural activities in Tirupattur District.

DECLARATIONS

Ethical statement: Informed consent was sought from the study participants to conduct this study.

Data availability: All the data used in this study is not publicly available due to privacy concerns. However, further researchers may obtain from the corresponding author on reasonable request with appropriate ethical clearance.

Conflicts of interest: The authors declare no conflict of interest.

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