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Determinants of Non-farm Diversification in Central Zone of Punjab

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ABSTRACT

This study investigated the determinants of non-farm diversification among agricultural households in Punjab. The research used a logistic regression model to identify factors influencing non-farm participation, analyzed data from a multistage random sample of 180 agricultural households from central zone of Punjab. Key determinants included household heads' age, skill development training and access to institutional credit. The findings highlighted the need for targeted policies to support skill development, improve access to credit and create opportunities for non-farm employment to enhance rural livelihoods in Punjab.

Key Words: Agriculture, Determinants, Diversification, Household, Livelihood.

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INTRODUCTION

Diversification in rural livelihoods is a focus of conceptual and policy-oriented research due to the increasing strain on farming income caused by population growth (Barrett *et al,* 2001; Bryceson, 1999). It has been acknowledged for some time that rural individuals no longer limit themselves to agricultural farming, fishing, forest management, or livestock keeping, but instead integrate many occupations to create a varied portfolio of operations (Dercon and Krishanan, 1996; Ellis, 2000; Unni, 1996). Livelihood diversification is a process by which rural households develop a varied portfolio of enterprises and social support mechanisms to enhance their survival and increase their living standards (Ellis, 1998). A recent research by the Food and Agriculture Organization (FAO) on farming systems and poverty indicates that diversification is the paramount strategy for alleviating poverty among small farmers in South and Southeast Asia (FAO/World Bank, 2001). In India, the land-based livelihoods of small and marginal farmers are increasingly unsustainable, as their land can no longer provide the food needs of their families and the fodder requirements for their livestock (Hiremath, 2007). Consequently, rural households are compelled to seek alternative income sources.

The Situation Analysis Study of Indian Farmers, conducted by the National Sample Survey Organization (NSSO), indicates that approximately 27 per cent of farmers find farming unprofitable, and nearly 40 per cent would opt for alternative livelihood activities if given the opportunity (Kumar et al., 2006). The agricultural economy of Punjab once experienced high growth during the green revolution era, but now it has reached a plateau with agricultural growth becoming stagnant (Joshi, 2004). The Green Revolution in the mid-1960s triggered significant growth in Punjab's agricultural sector, particularly through wheat and rice cultivation. However, this growth has slowed in recent decades. In the early 1990s, Punjab was India's third-richest state in terms of per capita income, trailing only Maharashtra and Haryana. Today, it has fallen to the 10th position, reflecting a decline in agricultural growth. Historically, Punjab's agriculture thrived during the Green Revolution of the 1960s and 1970s. However, since the 1990s, the sector's growth rate has been diminishing. The contribution of agriculture to Punjab's Gross State Value Added (GSVA) has dropped significantly, from 48 per cent in the early 1980s to about 28.94 per cent in 2022-23 (GOI, 2023). Many factors have led to this precautious situation in Punjab agriculture. Rising input costs, less or no increase in MSP of main crops, thus shrinking profit

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margins, no technological breakthrough in agricultural sector in recent times, soil degradation, overuse of ground water resources, prevailing monoculture all this has led to dwindling crop incomes. On the other hand, inflated aspirations based on post growth has caused higher consumption expenditure including that on social ceremonies, housing and durables. The rising input cost and inflationary pressure at the macroeconomic level led to the agricultural crisis, which provoked the susceptibility of rural livelihoods even to a greater extent. This present scenario has encouraged rural households to have all the greater reasons to generate multiple income and employment activities. The prominence of non-farm income has been increasingly significant for marginal and small farmers, as noted by Vatta *et al* (2008). This trend highlighted the growing reliance on non-agricultural activities to supplement income and enhance economic stability among smaller-scale farming households. What are the factors that determine the non-farm diversification of the rural households in Punjab? The present study was an attempt to answer this question.

MATERIAL AND METHODS

The present study was conducted in Punjab state during 2020-21. The state is divided into three different agro-climatic zones. The sub mountainous/Kandi zone (Zone I) covers nearly 10 per cent of the total area of the state. The central zone (Zone II) is largest zone comprising more than 60 per cent area of the state. The south western zone/cotton belt (Zone III) is the third agro-climatic zone with about 30 per cent area of the state. It is low rainfall region with arid conditions. A multistage random sampling technique was used for the selection of sample agricultural households. In the process, one district from sub-mountainous zone, six districts from central zone and three districts from south-western zone were selected on random basis comprised ten districts from all zones according to area covered by each zone. Then, two blocks were selected from each sampled district and then one village from each block was selected randomly. At the final stage, 15 agricultural households were selected from each sampled village. In this study, a sample of 180 agricultural households from central zone were selected for the further analysis.

Analytical techniques

Logistic Regression: In this study, households engaged in agriculture that generate income from sources other than farming in a given year are referred to as 'mix-income households'. Individuals who derived their income solely from the agricultural sector were commonly known as "agricultural households". A binary logistic regression model was used to determine the factors influencing rural non-farm diversification. The model was selected based on the fact that the dependent variable is a binary outcome variable. The binary variable used in the logit model was Yi = 1 if farmer i had access to non-farm income and 0 otherwise.

The probability of adoption (P) for a given set of values of variables can be expressed in the form of given logit model

$$\ln\left(\frac{P}{1-P}\right) = \beta o + \sum_{i=1}^{n} \beta i Xi + \varepsilon$$

Where β_is are logit coefficients for the n variables X_is, βo is intercept and ε is the error term. In both types of variables sign of coefficient reveals the direction of change. Independent variables used for this model were following:

X1 = Age of head of the family (years)

X2 = Education qualification of head of the family (years of education)

X3 = Highest educated member of the family (dummy variable graduation and above or below graduation)

X4 = Family size (number of members)

X5 = Asset value per acre (Rs.)

X6 = Any training related to skill development (dummy variable yes or no)

X7 = Operational holding (acres)

X8 = Distance from town (Access dummy within 10 km from town or more than 10 km away from town)

X9 = Access to institutional credit (dummy variable yes or no)

Table 1. Socio-economic profile of the farmers .

Sr. No.	Particular	Category	Frequency (%)
1.	Age (years)	20-30	11 (6.11)
		30-40	36 (20.00)
		40-50	48 (26.67)
		50-60	60 (33.33)
		>60	25 (13.89)
2.	Education	Illiterate	4 (2.22)
		Primary	3 (1.67)
		Middle	20 (11.11)
		Matric	62 (34.44)
		Senior Secondary	66 (36.67)
		Graduate	25 (13.89)
3.	Highest educated member	Up to primary	1 (0.55)
		5^{th} to 10^{th}	21 (11.67)
		Sen. Sec.	59 (32.78)
		Graduation and above	99 (55.00)
4.	Operational Land Holding (ha)	Marginal (< 1.0)	24 (13.33)
		Small (1-2)	36 (20.00)
		Semi-medium (2-4)	60 (33.33)
		Medium (4-10)	48 (26.67)
		Large (> 10)	12 (6.67)
5.	Family size	Small (Up to 4 members)	96 (53.33)
		Medium (>4 to 6)	72 (40.00)
		Large (>6)	12 (6.67)

The figures in the brackets represents the percentage

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X10 = Dependency ratio (percentage)

X11 = Value of livestock (Rs./farm)

X12 = Crop income per capita

RESULTS AND DISCUSSION

Based on a sample of 180 respondents, the socio-economic profile of farmers in Punjab highlighted a diverse and insightful set of characteristics. The age distribution revealed that a majority of farmers fell within the 30 to 60-year age range, with 33.33 per cent of them aged between 50 and 60 years. A significant portion, 26.67 per cent, was aged between 40 and 50, showing that most farmers were middle-aged. Younger farmers (aged 20-30 years) accounted for only 6.11 per cent of the sample, indicating a potential generational gap in agricultural participation. Meanwhile, farmers above 60 years constituted 13.89 per cent, reflecting an aging population within the farming sector. Education played an important role in shaping the profile of these farmers. While only a small percentage (2.22%) were illiterate, the majority had completed at least secondary education. Specifically, 34.44 per cent of farmers had attained matriculation, and 36.67 per cent had completed senior secondary education. A notable 13.89 per cent of the respondents held a graduate degree, reflecting the growing importance of education even in rural areas. The educational background of the households as a whole further supported this trend. Over half (55%) of the families had a member who had completed graduation or higher education, while 32.78 per cent had someone who had completed senior secondary education. This suggested that even if not all farmers were highly educated, their families were increasingly prioritizing higher education.

Table 2. Determining the Participation of Households in the Rural Non-farm Sector.

Explanatory variable	Odds. Value	Coefficient
Age of head	1.089*	0.085
Education of head	1.247	0.221
Highest educated family member	4.362**	1.473
Family size	1.383	0.324
Asset value per acre	0.999**	-0.00002
Any training related to skill	4.855**	1.580
Operational holding	0.967	-0.034
Access to town	0.736	-0.305
Access to institutional credit	9.673*	2.269
Dependency ratio	0.932*	-0.070
Livestock value	0.999	$-2.36e^{-06}$
Crop income per capita	0.999	$-2.97e^{-06}$
Constant	0.180	-1.712
Model information		
Pseudo R^2	0.5627	
Chi-Square	135.36*	

* denotes significance at 1 per cent level.
*** denotes significance at 5 per cent level*
Estimates of Logistic Regression analysis.
Dependent Variable = Non-farm Participation (Agriculture = 0, Agriculture + non-farm = 1)

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The operational landholding sizes among the farmers were varied, with the largest group (33.33%) falling into the semi-medium category (2 to 4 ha). Medium-sized landholders, those with 4 to 10 ha, accounted for 26.67 per cent of the farmers, while small (1 to 2ha) and marginal farmers (less than 1 ha) together made up 33.33 per cent of the total sample. Only a small proportion of farmers (6.67%) owned large tracts of land exceeding 10 ha. This distribution pointed to the prevalence of small and semi-medium farming operations, which remained the backbone of Punjab's agricultural sector.

In terms of family size, most of the respondents belonged to small families, with 53.33 per cent having up to four members. Medium-sized families (comprising more than four but up to six members) represented 40 per cent of the sample, while large families with more than six members were relatively rare, constituting just 6.67 per cent. This shift toward smaller family units reflected broader socio-economic changes, such as the nuclear family structure becoming more common in rural areas. Overall, this socio-economic profile of Punjab's farmers illustrated a community that was primarily middle-aged, moderately educated, and operating small to medium-sized farms. The increasing focus on education within farming households suggested a shift toward greater awareness and perhaps diversification of income sources. Meanwhile, the predominance of small and semi-medium landholdings highlighted the challenges of land fragmentation, a critical issue in ensuring the long-term sustainability of farming in the region.

Factors affecting non-farm livelihood diversification

In the logistic regression analysis aimed at determining household participation in the rural non-farm sector, several significant factors emerged, as presented in Table 2. The study examined various household characteristics and their influence on non-farm participation, revealing important insights. Age of the household head proved to be a notable factor, with each additional year increasing the odds of engaging in non-farm activities by approximately 8.9 per cent. This finding suggests that as household heads age, they are more likely to

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diversify into non-farm activities, possibly due to accumulated experience or a shift away from physically demanding agricultural work.

The education level of the household head also played a role, though it was not statistically significant. However, the presence of a highly educated family member had a substantial effect on non-farm participation. Households with the most educated family member were over four times more likely to engage in non-farm activities, highlighting the importance of education in promoting diversification into the rural non-farm sector. Training related to skill development had a profound impact, with households where members had received any form of training being nearly five times more likely to participate in non-farm activities. This underscores the crucial role of skill enhancement in enabling households to explore non-agricultural income sources. Similarly, access to institutional credit significantly boosted non-farm participation, with households having access to credit being almost ten times more likely to engage in non-farm activities, reflecting the importance of financial resources in supporting livelihood diversification. Asset value per acre had a marginal yet significant negative impact on non-farm participation, suggesting that households with higher land asset values were slightly less likely to diversify into non-farm activities. This may indicate that wealthier households, who rely more heavily on agricultural income, have less incentive to seek non-farm opportunities.

Other variables, such as family size, operational landholding size and access to town were not found to have significant effects on non-farm participation. The dependency ratio had a slight negative effect, indicating that higher dependency ratios reduced the likelihood of non-farm participation, potentially due to the burden of supporting non-earning family members. Livestock value and crop income per capita were found to have non-significant effects on household engagement in non-farm activities. The model's Pseudo R^2 value of 0.5627 indicated moderate explanatory power, accounting for about 56.27% of the variability in household non-farm participation. The Chi-Square statistic of 135.36, significant at the 1% level, validated the overall robustness of the model in predicting household engagement in the rural non-farm sector based on the selected explanatory variables. The findings of this study align with previous research by Devi and Ranganathan (2021) and Saini and Kaur (2022), who also emphasized the importance of education, training, and access to institutional credit in enhancing rural non-farm income. These results reinforce the need for targeted interventions in education, skill development, and financial inclusion to promote non-farm participation in rural areas. Additionally, the findings corroborate the conclusions drawn by Khatun and Roy (2012), who highlighted the role of education, training, and credit access in diversifying rural livelihoods, while variables such as asset value and family size showed minimal influence.

CONCLUSION

This study examined the determinants of non-farm diversification among agricultural households in central Punjab, revealing that older age, higher education levels, skill training and access to credit significantly increase non-farm participation. Wealthier households with higher asset and livestock values are less likely to diversify. Policy recommendations include enhancing educational and training programs, improving credit access, conducting on going research and monitoring to support non-farm activities and improve rural livelihoods.

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