IRJEMS International Research Journal of Economics and Management Studies
ISSN: 2583 – 5238 / Volume 5 Issue 4 April 2026 / Pg. No: 170-175
Paper Id: IRJEMS-V5I4P121, Doi: 10.56472/25835238/IRJEMS-V5I4P121

Original Article

Diversification Towards High Value Crops: A Micro Level Study of the Factors Influencing Diversification in Darbhanga District of Bihar

[1]Dr. Mudasir Hassan Bhat
[1]Assistant Professor (Senior Scale) of Economics, Millat College, Lalit Narayan Mithila University, Darbhanga, Bihar.

Received Date: 19 March 2026 Revised Date: 07 April 2026 Accepted Date: 16 April 2026 Published Date: 23 April 2026

Abstract: *This study is a micro-level study to identify the factors that influence the diversification in favour of high-value crops. The high-value crops are income augmenting, and the increased income from allocating more resources may fulfill the household's fundamental dietary and non-food requirements. However, the decision to diversify by a farm household is taken at the micro level and is influenced by a whole set of factors. The decisions are not only based on the existence and efficiency of markets for trading of commodities but are influenced by household wealth and assets, infrastructure, markets, agriculture extension services, irrigation, and other economic and non-economic factors. Considering the various studies presenting the case for diversification in favour of high-value crops, this study aims to identify the various factors influencing diversification in favor of high-value crops in the Darbhanga district of Bihar.*

Keywords: *Agricultural Diversification, Cropping Pattern, High Value Crops.*

I. INTRODUCTION

Agriculture diversification has received a great deal of attention all over the world. The process of diversification has been analyzed in various contexts and dimensions. Traditionally, diversification was used as a strategy to minimize the risk of crop failure by allocating the area under cultivation among various crops. But in recent years, diversification of agriculture has assumed multi-dimensional importance. Diversification has aimed at facilitating the process of structural transformation, overcoming low farm income, maximize efficiency of resource use, and reducing production, price, and income risks (Taylor 1994). It is viewed as a strategy to augment farm income and reduce risk at the household level, to reduce the ill-effects of mono-cropping at the regional level, and aimed at increasing the food self-sufficiency at the national level. The rising per capita income, changing food consumption patterns, increasing urbanization, and development of infrastructure are the important determinants of diversification (Joshi et al. 2007). The diversification towards high-value commodities is largely facilitated by improved infrastructure, urbanization, and technological advancement (Joshi et al., 2004). The improvement in basic infrastructure, government intervention with policies focusing on short-term food security, and prioritizing income distribution are vital for successful diversification. (Taylor 1994).

However, in recent times, diversification has emerged as the process of allocating more resources in favour of high-value crops as compared to subsistence crops. The basis underlying the process is that high-value crops are income augmenting, and the increase in income provides sufficient food security requirements. The households would allocate more resources towards high-value crops, and the income generated can provide sufficient household food and other requirements (Fafchamps, 1992; Von Braun, 1994; Weinberger and Lumpkin, 2007; Goletti, 1999; Govereh and Jayne, 2003; Shome, 2009; Joshi et al., 2004). The diversification into cash crops increases employment and productivity of labour, thereby increasing the household income. The increase in income will have a positive impact on food security and consumption patterns (Minot *et al*., 2006; Windle & Rolfe, 2005; Joshi *et al*., 2004).

The decision to diversify by a farm household is taken at the micro level, and the relationship between agricultural diversification, food self-sufficiency, and food security is influenced by a whole set of factors. The decisions are not only based on the existence and efficiency of markets for trading of commodities but are influenced by household wealth and assets, infrastructure, particularly road connectivity, access to markets, agriculture and related extension services, irrigation, and other economic and non-economic factors. Considering the various studies presenting the case for diversification favouring high value crops, this study aims at identifying the various factors influencing diversification for high-value crops in Northern Bihar.

II. DATA SOURCE AND METHODOLOGY

A) Analytical Framework of the Study

The household decides on the diversification towards high-value crops. These decisions are influenced by a number of related factors. The analytical framework is developed to study these inter-relations between variables, taking into consideration the household production and consumption requirements.

We can specify the model for land allocation towards high-value crops for household t, as

$Yt = Xt\beta + \nu_t$ ---------- (I)

Where,

Y is t^{th} household's land for towards high value crops

X includes all explanatory variables

β includes the coefficients with the explanatory variables X, and ν is the error term

Based on the review of literature, the regression equation with dependent and explanatory variables is specified as follows:

$A_{HVC} = f(F_{SSL}; A_G; Q_{LF}; R_D; M_D; D_{PN}; F_{LBR}; C_{IN};)$ ---------- (II)

Where,

A_{HVC} - Area for high-value crops

F_{SSL} - level of the food Self-sufficiency

A_G - Age of head of the household

Q_{LF} - Qualification of head of the household

R_D - Distance to road (km)

M_D - Distance to market

D_{PN} - Dependency-Ratio

F_{LBR} - Labour (No. of Members of the Family involved in agriculture)

C_{IN} - Intensity of Cropping

The "Level of the Food self-sufficiency " is measured as the gap in food self-sufficiency as a proportion of consumption requirements of the household's food. The direction and magnitude of the variable level of the food self-sufficiency depend on the gap in the self-sufficiency and are determinants of the food self-sufficiency level or deficiency.

The household food self-sufficiency requirements are estimated by taking into consideration the size of the household, based on the rule of 200 kg of refined cereal equivalent per head annually, according to FAO. The food self-sufficiency is measured as the gap between a household's annual food production and consumption requirements. We use FAO's rule of 200 kg of refined cereal equivalent per person per annum to measure the annual consumption requirements of households. A household is food self-sufficient if its production satisfies the consumption requirements; it is classified as food-deficient.

B) Profile of the Study Area

Darbhanga is a district situated in Northern Bihar. The district has an agrarian economy, and agriculture is the primary occupation of the people. It has vast alluvial plains devoid of hills and highly calcareous soil. The land is very fertile, and a mixture of clay and sand makes it suitable for a variety of crops. While Paddy is the main crop, other crops being cultivated are wheat, maize, pulses, oil seeds, sugarcane, and Maruwa. The district is famous for mangoes and is the top producer. The other fruit crops are litchi, Pipal, Sisoo, Khajur, Jackfruit, Khair, Palm, Jamun, Guava trees, etc. It is also one of the leading fish-producing districts in Bihar.

Table 1 below presents the socio-economic and demographic features of the district

Table 1: Socio-economic and demographic profile of Darbhanga district

Population Census 2011	**3921971**	**Geographic coordinates**	**Latitude: 25º53' to 26º 27' North**
Population density	1101 per sq. km		Longitude: 85º45 to 86º 25 East
Population growth	19%	Temperature	43° C (Max.) 9° C (Min.)
Sex ratio	911 per 1000 male	Average rainfall	1143 mm
Literacy rate	56.56%	Area	2297 sq. km
Languages spoken	Maithili, Hindi, and Urdu	Height above sea level	52 meters
Total workers	1,223,640	Per Capita GDP	Rs 15870
Agricultural land labourers	301,524	Total Cultivators	179,408

Source: *Census 2011 and Survey GoB*

The cropping pattern in Darbhanga is dominated by the foodgrains. The data reveal that agriculture in the district is still in favour of the subsistence sector, with a higher proportion of area under foodgrains (Table 2). The share of cereals is more than 80 percent, and the non- food sector accounts for a very low percentage of the total area under cultivation (Table 3).

Table 2: Land Utilization Pattern in Darbhanga District (2017-18) '000' Ha

Geographical area	254.1
Area under the forest	0
Total uncultivable land	106.6
Total uncultivable land	106.6
Net sown area (NSA)	147.5
Gross cropped area (GCA)	171.9
Cropping intensity	1.2

Table 3: Area, Production and Productivity of various crops 2018-19

Crop	Area	Production	Productivity
Rice	79.96 (2.5))	101.22 (1.6)	1266 (28)
Wheat	58.3 (2.7	146.39 (2.3)	2511 (34)
Maize	8.57 (1.3)	43.54 (1.4)	5083 (9)
Pulses	10.78 (2.2)	8.41 (1.9)	780 (30)
Sugarcane	1.36 (0.45)	7.88 (0.43)	57.91 (21)
Banana	1.03 (3)	56.8 (3.6)	-
Mango	14.27 (9)	148.61 (9.42)	-

Note: *Area in '000 hectare, Production in'000 tonnes, Productivity in kg/ha)*
Source: Economics Survey of Bihar 2019-20

Figures in parentheses denote percentages for area and production, and ranking for productivity with respect to the state-level figures.

To address the research questions and objectives, primary data were collected. A household survey was conducted in four Blocks of the district. The survey area was chosen based on the centrality and prime agricultural belt in the district, and in consultation with local district-level officers. The Blocks include Benipur, Alinagar, Ghnashampur, and Tardi. Then, 100 farm agriculture households from each of the selected blocks were selected, forming a sample of around 400 farm households for the study. The households in each block were selected in such a manner that the sample is representative of the entire district.

Before going to the field survey, the various agricultural and farm-related issues of the study area were thoroughly examined, and consultations were held with the block/village-level agriculture officers. After getting sufficient understanding, field trips were made to the sample blocks to gather ground-level information about various aspects related to farmers' land allocation decisions, public distribution system (PDS) related to food security and infrastructure, and availability of markets for purchase of farm inputs and sale of the produce. Meetings were also held with village-level officers and farm households to assess their knowledge about various schemes for agriculture and rural development. After getting insights from these interactions, a structured questionnaire was developed by carrying out a primary survey. The questionnaire was framed taking into consideration the main objectives of the study. The households selected were primarily the agri-households, with farming and livestock as primary activities. In addition to the income from the sale of the farm produce, the wage income also contributes significantly to the household's income. A sample of 100 was collected in blocks; thus, a total of 400 samples were collected from 4 selected blocks.

C) Measurement of Key Variables

Based on the research objectives and with the given methodology in the analytical framework, we first estimate the food self-sufficiency of individual households. The two main cereals produced in the area are rice and wheat. We have converted the wheat into rice equivalent based on the derived energy calories and milling ratios. The mean and standard deviations of various variables are presented in Table 4. First, we have calculated the Food Self-sufficiency status of households and then assessed the land allocation of these households.

Table 4: Caloric Value, Milling Ratio, and Rice Equivalent Comparison of Rice and Wheat

Crops	Calories/kg	Milling ratio	Rice equivalent
Rice	3450	0.65	1
Wheat	3460	0.75	0.997

Table 5: Descriptive statistics of various variables used in the analysis

Variables	Combined	
	Mean	St. Dev.
Total Cultivated area (farm size in katha)	69.18	28.30
Area under non-staples	26.89	14.31
Level o the Food self-sufficiency dummy (1 = food self-sufficient)	0.66	0.43
Food security (1=food secure)	0.95	0.16
Share of non-farm income (%)	61.34	16.82
Distance to an all-weather road (km)	3.09	0.31
Distance to main market outside Village	4.75	0.35
Credit access (1 = Yes)	0.32	0.13
Gender of farm manager (1 = male)	0.96	0.12
Household size	5.89	2.69
Land rights (1= complete rights)	0.96	0.13
Age of farm manager	50.27	7.96
level of Education of the farm manager (schooling years)	6.14	2.65
Marketing cost (Rs/quintal/km)	41	0.36
Dependency-Ratio	0.33	0.11
Family Labour	1.81	0.98

Source: *Primary Survey Data*

To identify the factors influencing the diversification towards High Value Crops, we use regression analysis with the area under High Value Crops as the dependent variable and a set of explanatory variables as given below.

$A_{HVC} = f (F_{SSL}; A_G; Q_{LF} ; R_D ; M_D ; D_{PN} ; F_{LBR} ; C_{IN};$) ---------- (II)

Where,

A_{HVC} - Area for high-value crops
F_{SSL} - Level of food self-sufficiency
A_G - Household head's age
Q_{LF} - Qualification of the Head of the Household (No. of schooling years)
R_D - Distance to road (km)
M_D - Distance to market
D_{PN} - Dependency-Ratio
F_{LBR} - Labour (No. of Members of the Family involved in agriculture)
C_{IN} - Intensity of Cropping

Generally, the household head makes the decision of land allocation, so the age of the head of household is included. The literature indicates that qualification plays a positive role in farm decisions, so qualification, measured as the number of schooling years, is also included. The availability of roads and markets is believed to influence the diversification decisions. Members of the family below the age of 16 and above 65 years of age are assumed to be non-participatory in farm activities, as a measure of the Dependency-Ratio. The variable 'Household Labour, measured as family members involved in farm-related activities and intensity of cropping, is also included in the regression analysis.

III. RESULTS AND DISCUSSION

We have analyzed the data to figure out the factors that influence diversification in favour of the high-value crops. The combined sample size of 400 is analyzed, and the results are presented in Table 5.

Summary of the Model and ANOVA

R	R-Square	Adjusted R-Square	Std. Error of Estimate	F	Sig.
.779	.614	.598	9.3251	49.784	.000

Table 5: Factors influencing diversification for high-value crops

Area HVC's (Dependent Variable)	Coefficient	t-Values
Constant	-3.299	-.0489
Level of the Food Self-Sufficiency	.049	7.998*
Household Head's Age	0.89	1.059
Qualification of the Head of Household	0.47	2.229**
Distance to Road	-.151	-1.784**
Distance to the Market	-.121	-1.229*

Dependency-Ratio	-.295	-4.656*
Household Labour	.899	6.891**
Cropping Intensity	.047	2.190

Source: *Primary Survey Data*
**1% level of significance; ** 5% level of significance; N = 400*

The analysis of data reveals that the coefficient of the variable Level of the Food Self-sufficiency is positive and is significant at 5% level of significance, indicating that food self-sufficient households have a tendency to assign more area for high-value crops than households that are food-deficient. The analysis is supported by the literature that a household's food security situation affects the pace of diversification for high-value crops (Joshi et al. 2007). Various studies in the developing countries also revealed that the households, while diversifying in high-value crops or cash crops, allocate significant resources to subsistence crops in order to maintain their food security (Govereh and Jayne 2003; Von Braun, 1994; Joshi *et al*., 2003; Jayne, 1994).

The coefficients of variables 'Distance to road' and 'Distance to the market', which capture the role of infrastructure on farm diversification, are negative and significant. The negative coefficient indicates that poor markets and infrastructure have an adverse impact on diversification. Since high-value crops have commercial value for income generation, the higher the level of infrastructure development, the higher the propensity for more resource allocation towards cash crops. The literature has also highlighted that higher proportions of land allocation to the subsistence crops are mainly due to the poor infrastructure facilities that increase the transaction costs and maintenance of higher food self-sufficiency levels by the households (Delgado and Siamwalla, 1997). The development of infrastructure benefits both the staple and cash crops and enhances household food security (Von Braun & Kennedy, 1994; Pingali & Rosegrant, 1995). The development of infrastructure and markets is important to boost the diversification, so as to increase income and employment generation.

The other variables that influence farm diversification are 'Qualification of the Head of the Household', 'Dependency-Ratio', and Household Labour. The variable "Qualification of the Head of the Household" has a positive coefficient, indicating that the farmers with better knowledge and information tend to allocate more allocation towards commercial crops. The results are consistent with the literature Etea et al., 2020). The better-educated household head was likely to be more aware of risk and opportunities and focused on long-term benefits. Age and education are the socio-demographics that are used the most, and the high share of significance across models suggests that they are good predictors of diversification choices. Akinrinde et al. (2018). The review suggests that propensity to diversify increases with education, probably because increased education can equip farmers with new skills for their enterprise. (Zakaria et al. 2015).

The variable 'Dependency-Ratio' has a negative coefficient, implying that higher dependency dissuades the farmers from going for commercial crops. The finding was consistent with the study of Wan et al. (2016). The higher Dependency Ratio signifies the food security concerns and more vulnerability of the households to continue with the traditional staple crops. The variable 'Household Labour is a measure of the availability of labour in the household. The positive coefficient indicates that more availability of labour in the household induces the farmers to diversify towards high-value crops. Since diversifying high-value crops is more labour intensive, the availability of labour in the household reduces the dependence on hired labour and also the cost of production, thus increasing the employment and income of the household.

IV. REFERENCES

[1] Akinrinde, A. F., Omotesho, K. F. and Ogunlade, I. (2018), "The issues of income diversification among rural farming households: Empirical evidence from Kwara State, Nigeria" *Journal of Agribusiness and Rural Development*, 3:231-238.

[2] Delgado, C. L., & Siamwalla, A. (1999). *Rural economy and farm income diversification in developing countries*. Food security, diversification and resource management: refocusing the role of agriculture, pp. 126-143. Vermont, USA: Ashgate Publishing Company.

[3] Etea, B. G., Zhou, D., Abebe, K. A. and Sedebo, D. A. (2020), "Is income diversification a means of survival or accumulation? Evidence from rural and semi-urban households in Ethiopia. Environment" *Development and Sustainability*, 22:5751-5769

[4] Fafchamps, M., (1992), "Cash Crop Production, Food Price Volatility, and Rural Market Integration in the Third World", *American Journal of Agricultural Economics:* Volume 74, Issue 1, Pages: 1-99, February 1992.

[5] Goletti, F., (1999), "Agricultural diversification and rural industrialization as a strategy for rural income growth and poverty reduction in Indochina and Myanmar", *Discussion Paper 30. Washington, D.C. International Food Policy Research Institute.*

[6] Govereh, Jones & Jayne, T. S., (2003), "Cash Cropping and Food Crop Productivity: Synergies or Trade-offs?" *Agricultural Economics*, Blackwell, vol. 28(1), pages 39-50, January.

[7] Joshi, P. K., Gulati, A., Birthal, P. S., & Tiwari, L. (2004). "Agriculture Diversification in South Asia: Pattern, Determinants and Policy Implications" *Economic and Political Weekly*, June 12, Vol. 39 (24), pp. 2457-2467.

[8] Joshi, P. K., Birthal, P.S., & Minot, N. (2006), "Sources of Agricultural Growth in India: Role of Diversification towards High Value Crops". *MTID Discussion Paper* No. 98, IFPRJ, Food Policy, 20(3), Washington D.C.

[9] Joshi, P. K., et al. (2007)., "*Agricultural Diversification in South Asia: Beyond Food Security"* Agricultural Diversification and smallholders in South Asia, 47-82, Academic Foundation, New Delhi.

[10] Joshi, P. K., Gulati, A., & Birthal, P. S. (2007). *Agricultural Diversification in India: Status, Nature and Pattern.* Agricultural Diversification and smallholders in South Asia, 219-242.

[11] Pingali, P. L., & Rosegrant, M. W. (1995). "Agricultural Commercialization and Diversification: Processes and Policies". *Food Policy,* Vol.20, No.3, pp. 171-185.
[12] Shome, S (2009), "An Analysis of Crop Diversification: Experience in the Asia- Pacific Region", *ICFAI University Journal of Agricultural Economics*, Vol .6 Issue No. 1, January 2009.
[13] Taylor, D. C. (1994). "Agricultural Diversification: An Overview and Challenges in ASEAN in the 1990s", *ASEAN Economic Bulletin*, Vol. 10, No. 3, pp. 264-279
[14] Von Braun, J. and Kennedy, E, (1994), "Agricultural Commercialization, Economic Development and Nutrition". *The Johns Hopkins University Press*, Baltimore.
[15] Wan, J., Li, R., Wang, W., Liu, Z. and Chen, B. (2016), "Income diversification: A strategy for rural region risk management", *Sustainability*. 8:1-12.
[16] Weinberger, K, & Lumpkin, T. A (2007), "Diversification into Horticulture and Poverty Reduction: A Research Agenda", *World Development* 35(8):1464-1480, August 2007, DOI:10.1016/j.worlddev.2007.05.002
[17] Windle, J. & Rofle, J. (2005), "Diversification choices in agriculture: a Choice Modelling case study of sugarcane grower", *The Australian Journal of Agricultural and Resource Economics*, 49, 63-74,https://doi.org/10.1111/j.1467-8489.2005.00279.x
[18] Zakaria, H., Abujaja, A. M., Adam, H., & Salifu, W. Y. (2015)," Does gender make any difference in livelihoods diversification? Evidence from Northern Ghana", *International Journal of Agricultural Extension & Rural Development Studies,* 1(1): 36-51.