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INSTITUTIONAL CREDIT AND ORGANIC FARMING: EVIDENCE FROM SELECT ORGANIC CROPS IN SIKKIM

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ABSTRACT

This research examines how institutional agricultural financing impacts the production of important organic crops such as rice, maize, wheat, buckwheat, finger millet, and barley in Sikkim, India's first entirely organic state. Analysis of survey data from 400 farmers shows that obtaining formal credit greatly enhances agricultural productivity. Additional influencing factors consist of land ownership, agricultural experience, and involvement in training and extension programs, all of which enhance farm productivity. In contrast, the nuclear family structure has a negative correlation with output, highlighting the benefits of shared labor and resources found in joint families. Elements like gender, level of education, and closeness to financial institutions demonstrated minimal or no direct impact on productivity. The research highlights the essential importance of institutional finance and capacity-building programs in improving organic farming results and indicates that specific policy measures can promote sustainable agricultural growth in the area.

Keywords: Institutional, Finance, Organic Farming

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1. INTRODUCTION

Institutional finance refers to the provision of financial services and credit by organized financial institutions towards supporting various sectors of the economy. Such institutions involve banks, cooperative societies, microfinance institutions, development banks, and government-backed financial organizations. In agriculture, institutional finance plays a significant role in offering timely credits for inputs such as seeds, fertilizers, machinery, and irrigation, thus improving productivity and income among farmers. Unlike informal sources, institutional finance is normally controlled, and credit is provided at reasonable interest rates with a structured repayment system. Institutional finance promotes economic development by meeting the financial needs of the individual, business, and farmer, reducing dependency on informal lenders, and promoting sustainable growth. In the agricultural sector, institutions such as NABARD, rural

development banks, and commercial banks are very important for ensuring that credit is available to small and marginal farmers. Institutional finance enables long-term investments in infrastructure and innovation, thereby promoting higher productivity and rural development. Nonetheless, it faces challenges in the form of strict documentation requirements, limited reach into remote areas, and delays in loan disbursement, thereby limiting its effectiveness.

The agriculture serves as the main source of livelihood for the population of Sikkim. However, the growth of the agricultural sector has been affected by various biotic and abiotic components. It is estimated that around 80 percent of the rural economy relied on the agriculture sector. The agriculture of Sikkim has some inherent strength that is largely supported by organic farming practices. Various interventions have been taken by the government of Sikkim, particularly by the Department of Agriculture, to boost the rural economy with our natural endowment as a model organic state in the country. The main crops grown in the state are rice, wheat, maize, finger millet, barley, buckwheat, pulses, and oil seeds. Importance has also been given to cash crops such as orange, large cardamom, ginger, fruits, and floriculture.

Improvements in the agriculture sector are directly related to economic growth in emerging economies. Investment in agricultural inputs, adoption of contemporary technologies, and technical efficiency are important determinants of agricultural output. These elements are influenced by financial resources and the administrative abilities of farmers. Purchasing inputs, making effective use of resources, and implementing high-yield technologies like better seed varieties are all depend on having access to financial services. According to Carter (1989), having access to financing enables farmers to overcome resource limitations, embrace more lucrative input combinations, and maximize production. Food security and poverty reduction are significantly impacted by increased agricultural output, which is made possible by financial access. Although Bashir et al. (2010) emphasized the significance of financial services for the uptake of technology and the expansion of productivity, there are still obstacles in the way of making these services more widely available. Nevertheless, later research, such as that conducted by DFID (2004), shows a clear connection between financial access and both economic growth and poverty alleviation. Levine (2004) also noted that economists generally agreed that access to financial services was positively correlated with increased agricultural output, highlighting the importance of financial services for economic growth (Awunyo-Vitor & Al-Hassan, 2014a).

Research has demonstrated how financing can improve farmers' technical efficiency. According to recent research, loans greatly increased farmers' productivity in Swaziland. Similar findings were noted by Duy (2015) in the Mekong Delta, where rice farmers' production efficiency was improved by both authorized and informal funding. Shahidur and Khandker (2003) found that formal credit predominantly supports agricultural investment. Laha (2013) found that farmers in West Bengal who used formal credit were more efficient than those who relied on non-bank financial intermediaries. In a similar vein, Abdallah (2016) discovered that access to financing increased maize farmers' productivity by 3.8% in Ghana. These findings highlight how crucial formal credit systems are for improving agricultural productivity.

In developing nations, having access to financial services is essential for fostering economic expansion, raising productivity, and lowering poverty. Bee (2007) highlighted that financial access helps rural households create jobs, expand their asset base, and increase their output opportunities. However, farmers are unable to completely benefit from financial services because of insufficient and ineffective frameworks for policy. Rationality theory, bounded rationality, prospect theory, intertemporal choice theory, delegated monitoring theory, information asymmetry, and transaction cost theory are some of the theories offered in economic literature to examine decision-making processes (Scholtens & Wensveen, 2003). Particular emphasis is placed on theories that are pertinent to smallholder farmers' access to financial services in developing countries. Banks play a role in bridging the gap between savers and the financial market. People can access services like lending and savings by assigning these duties to financial intermediaries, which helps them achieve their financial objectives. Financial intermediaries are essential for effective resource distribution and satisfying financial demands, which affects the demand for financial services.

A pillar of neo-classical economics, rational choice theory sheds light on how people make decisions in financial markets. This theory places a strong emphasis on utility maximization. The limitations people encounter when making decisions are emphasized by the theory of bounded rationality. These limitations lead to decisions that are impacted by the terms associated with services provided by financial intermediaries. Managing contingent claims obligations pertaining to future resources generated in the present is at the heart of financial intermediation. The quality of information that intermediaries may access has a significant impact on their capacity to assess the creditworthiness of their clients. However, clients often possess more thorough financial information than institutions, which leads to information asymmetry. This results in incomplete markets and limits credit expansion.

Demand side and supply side are the two perspectives of access to financial services. Demand for financial services comes from individuals who need financing, and it depends on the policies and lending ease provided by banks. The supply side includes service providers like SCB, RRB, and cooperative banks. Theories like information asymmetry and transaction cost explain the supply side, while delegated monitoring and rational choice theory help understand the demand side. Financial intermediaries manage savings and investments, and they must protect deposits and manage financial information carefully and confidentially. While institutional finance has been widely studied in the context of agricultural productivity, limited research exists on its specific role in enhancing organic agriculture in regions like Sikkim, where organic farming is the dominant practice. Despite being India's first fully organic state, there is a lack of empirical evidence assessing how institutional financial access impacts organic crop production, input adoption, and farmer income in Sikkim. This gap highlights the need for region-specific studies that examine the effectiveness of formal credit in supporting organic agricultural development.

2. REVIEW OF LITERATURE

Institutional agricultural finance plays a critical role in agricultural productivity and helps in agricultural sector growth. Well-developed financial systems and economic growth are positively correlated, and access to credit by farmers contributes to agricultural sector growth (Schumpeter, 1934). It enables farmers to acquire technology, inputs like seeds, fertilizers, and labor, especially in resource-constrained areas (Siddique & Pandey, 2021). According to Hicks (1969), the establishment of financial systems stimulates economic growth and leads to rural economic development. Agricultural income, productivity, and development are positively related to credit. Wickramanyake (2004) found that the number of bank branches in rural areas and credit disbursements to these regions are positively related. Ahmad and Masood (2009) analysed the impact of institutional credit on agricultural production and found that credit had a significant impact.

Chand et al. (2015) observed that despite differences in regional development and availability of informal credit, the demand for institutional agricultural credit had improved, and government efforts to strengthen financial inclusion were showing positive results. They also found that factors such as asset ownership, household education level, gender, and caste significantly influence access to formal credit. Boucher et al. (2014) analyse the credit constraints on farm productivity and found that credit constraints have a significant and negative effect on the farmers' productivity, whereas non-credit constrained farmers are statistically significant and positively correlated with the productivity of agriculture. Boucher (2008) stated that credit constraints adversely impact profitability, productivity, and efficiency of the firm. Kumar et al. (2015) pointed out the existence of moneylenders as the main source of credit disbursement to farmers despite the continuous increase in institutional credit. The role of commercial banks is found to be the major source of credit disbursement to the agriculture sector, and it has been observed that socio variables like education, age, number of family members, gender, caste, and occupation affect the use of institutional credit. Maurya (2015) analyzed the number of farmers who have taken loans from cooperative banks, and farmers' attitudes have been examined. It was found that the maximum number of beneficiaries who avail credit from the cooperative banks are medium farmers.

Various studies examined the structure of rural credit organizations Modi and Raj (1993) and this studies highlighted the contribution of institutional and non-institutional credit among farmers and found that due to the Kisan Credit Card Scheme, Service Area Approach, Lead Bank Scheme, and the Policy Framework of Institutions, the contribution of credit from institutional sources was greater than non-institutional sources. Suryawanshi et al. (1980) supported these findings, noting the increasing share of institutional credit from co-operative societies in the agricultural sector. Singh et al. (2001) observed that commercial banks played a larger role in credit disbursement compared to co-operative banks, especially after India's economic reforms in 1991. Bedbak (1985) favoured the performance of co-operative banks due to their lower acquisition costs compared to other institutional sources. Islam et al. (2011) opined that the size of the firm and the capital used by the firm affect the production of the agricultural sector. Due to small land holdings, farmers' productivity is affected, and they rely less on institutional finance.

Khatun et al. (2014) examined various constraints faced by farmers in availing loans from financial sources and found that the process for the disbursement of loans to farmers is time-consuming and sluggish, negatively affecting the demand for credit. Kumar et al. (2017) pointed out that capital formation in agriculture and technology adoption by the farmers are adversely impacted by the lack of institutional agricultural finance like credit. Chand (2017) opined that institutional credit is the main factor for agricultural growth and development in India, and the present policy regime has been made to raise agricultural productivity. Ayyagari et al. (2008) undertook the study to see the growth and

financing pattern of Chinese firms and found that small-sized samples availed credit from formal sources. However, the fast growth of the firm was seen to be directly affected by formal finance.

Mohanty and Haque (2003) examined the regional distribution of agricultural credit in India. Ghose and Patel found that states like Uttar Pradesh, Punjab, Rajasthan, Nagaland, Maharashtra, Kerala, Haryana, Himachal Pradesh, and Gujarat had a higher contribution of short-term credit to marginal and small farmers, whereas Mohanty and Haque observed low credit supply in Assam, Jammu and Kashmir, Madhya Pradesh, Bihar, and Rajasthan. Srivastava et al. (1981) stated that the easy and timely availability of crop loans at a normal rate of interest increased the use of inputs like seeds, fertilizers, and labor, also increasing cropping intensity and significantly increasing the incomes of crop loan borrowers.

2.1. OBJECTIVE

To examine the impact of agricultural institutional finance in production of select organic product in Sikkim.

To recommend strategies for improving the credit delivery mechanism and strengthening financial inclusion among farmers in the state.

2.2. HYPOTHESIS

There is positive impact of agriculture institutional finance in production of select organic product in Sikkim.

3. METHODOLOGY

1) Data Source

Secondary data for agricultural finance in Sikkim with a focus on organic products can be sourced from a wide range of institutions, covering the period from 2010 to 2023. Government reports such as those from the Sikkim Organic Mission (2010-2023) provide extensive insights into organic farming policies, production, and financial support. The Agriculture and Horticulture Department of Sikkim offers data on organic certification, subsidies, and crop statistics across these years, particularly in their annual reviews and progress reports. Financial data can be accessed from the Annual Credit Plan Documents (2010-2023) published by Lead Banks operating in Sikkim, NABARD's State Focus Papers for the same period, and records from Cooperative and Land Development Banks. Academic contributions from ICAR-National Organic Farming Research Centre and Sikkim University, including studies and publications during this timeline, provide deeper insights into the financial dynamics of organic farming.

2) Sample Design

This study have been carried out with household level primary data collected from agricultural farming households who are availing institution[1] financial credits for agricultures in Sikkim. Apart from socioeconomic and demographic features of farmers the study relied exclusively on household level collected on major six crops productions in the namely; Rice, Maize, Wheat, Finger Millet and Barley for their significance in concentration in area under cultivation and production in the state. The study followed a multi-stage sampling method for the selection farming households availing financial credits for agricultures in Sikkim.

Initially, we have selected four undivided districts of Sikkim, viz. east, west, north, and south districts of Sikkim. Given the vastness of the universe of the study area, resource and time constraints of an individual researcher, the present study concentrated on two Block Administrative Centre (BAC) in each districts of Sikkim. From east district, Gangtok and Pakyong BAC was selected, Gyalshing and Soreng BAC from west district, from north district, Manga and Mangan Kabi Tigda BAC, and Namchi and Temi Tarku BAC were sleceted from south district. The reasons for selection of these BAC in the present study were their importance in terms of area under cultivation, and output. In the next stage, two non-contagious Gram Panchayat Unit (GPU) from each BAC were selected. From Martam BAC, Samlik-Marchak and Chalamthang GPU were selected, while Pacheykhani and Namcheybong GPU from Pakyong BAC. Similarly, Lingchom Tikjya and Omchung from Gyalshing BAC, and Chakhung and Zoom Salghari GPU were selected from Soreng BAC. Meanwhile, T-Tubu and Mangshila GPU from Mangan BAC, and Lingdhok and Kabi Rongpha GPU were selected from

[1] Agricultural credit financing institutions in Sikkim are such as Schedule Commercial Banks, Cooperative Banks and Microfinance

Kabi Tigda BAC in the study. Subsequently, Maniram Phalidara and Sandam Suntalay, while Namthing and Temi Tarku GPU were surveyed from from Namchi BAC. The rationale for the selection of these GPUs is its significance in highly concentration agricultural activities in terms of area under cultivation and output. The detail of sample design for the present study is reported in figure 1.

The present study has selected 16 GPU selected from four undivided districts of Sikkim opting 4 each from the sampled districts. Finally, 16-21% of farming households from each sampled GPU were selected randomly for the primary survey. Selection was done randomly from the non-contiguous farming household availing agricultural credit finance from the sampled GPU. The field survey was administered for farming households by conducting interviews with male or female heads of the household. Thus 50 farming households from farming households were interviewed from each sampled BAC with a break up of 25 farming households from each GPU in the study area. In total 400 farming households were selected, with 100 households each from sampled districts of Sikkim. The primary data were collected on various aspects[2] of farming household in Sikkim with a structured interview schedule by conducting personal interviews during August 2023 till March 2024.

4. RESULT AND DISCUSSION

4.1. SOCIO ECONOMIC AND DEMOGRAPHIC PROFILE OF FARMERS

Table 1 presented the summary statistics of the socio-economic and demographic background of the surveyed farmer's household. The variable are categorised into categorical (dummy) and Non categorical (continuous). Below statistics gives the overview of basic characteristics of th sampled farmers household, highlighting variation in education, age, land ownerships, income levels and household composition.

It has been observed from the table 4.1 the mean age of the household age is 46 years, with a standard deviation of 15.08 years, implies the broad range of farmer's age is between 20 to 70 years. The education attainment of the surveyed farmers is found to be relatively low, with a minimum education attainment of zero years and a maximum of 15 years. This replicate the inconsistencies in educational access and attainment within the sample household. Data represent the significant variability in agricultural expertise among the sample farmers, with an average farming experience of 13. 27 years, with SD of 11.94 years. One of the important determinant factor in agricultural production is size of the land and average land holding of the farmers are found to be 1.23 hectares and the minimum size of the land is found to be 0.10 hectares and maximum size of the land holding is found to be 3.47 hectares. Result indicate that most of the surveyed household are functioning in small and medium size land, which may have positive impact on agricultural production and stability of income. The average number of household size is 6 with a minimum of 2 and maximum of 10 member in the family, which indicate a relatively large family structure. The average number of adult member in the surveyed household is 3 and average number of school going children are found to be 2.24 per family. The number of non-school going children 0.96 implies that household have young dependent who are yet to join the formal education or have a dropped out member in the family.

The income of the household are the main factor which is positively associated with socio economic indicator. Among the surveyed farmers the average per capita monthly income (PCI) is ₹15,249 with the substantial standard deviation of ₹11,013.23 indicating significant income disparity among the household. The maximum per capita income reaches is ₹90,904and minimum PCI are found to be ₹3,948 reflect the income inequality within the sample household. The farmers are dependent on other sources of income to meet their consumption expenditure and directly or indirectly they depend other activity like government job, private job, small businesses, Bee keeping, vegetable farming etc. to earn for the living. The average income from the other sources are found to be ₹6,961, with larger value of SD (₹10006), indicating the significant difference in involvement of farmers in other activity to support their family members and it has been observed from the maximum earning of ₹73,738 by the single household and some household with zero income from other activity. Farm income of the farmers are separately calculated and found to be average of ₹10997 per month with the maximum and minimum value of ₹39,348 and ₹1,017 respectively.

Among the surveyed household, 53 percent of the household head are male headed remaining are headed by the female family member, which indicate almost equal dominance in decision making among the respondent. It has been

[2] Data were collected on various aspect of farming household such as institutional finance taken by the farmers, the socioeconomic and demographic status of farmers, land holding patterns, irrigation facility, total production of select organic production, profit from agricultures, cost on various inputs used on cultivation of select organic product in the study area, and many more.

observed from the respondent 46 percent of the household are classified as joint family. Training and extension program for the respondent is equally important to boost the level of agricultural production with 17 percent of household are participated in skill and extension program initiated by the government. It has been notice that 50 percent of the famers are engage in non-farm activity. This indicate the diversification of economic activity which can provide financial support beyond the agricultural sector.

Table 1: Summary Statistics for Socio Economic and Demographic Profile of the Household

Variables	Unit	Mean (SD)	Min	Max
Non Categorical Variables				
Age (Head)	Years	46.04 (15.08)	20	70
Years of Schooling	Years	6.53 (6.28)	0.00	15
Farming Experience	Years	13.27 (11.94)	0.00	50
Family Size	Numbers	6 (2.54)	2.00	10
Monthly PCI (Household)	₹	15249(11013.23)	3948	90904
Farm Income	₹	10997 (6997)	1017	39348
Income from allied activity	₹	6961 (10006)	0.00	73738
Adult Members	Numbers	3 (2.55)	0.00	9.00
School-Going Children	Numbers	2.24 (1.81)	0.00	10.00
Non School going children		0.96 (0.80)	0.00	2.00
Land Size	Hectares	1.23 (0.73)	0.10	3.47
Dummy Variables (Percent)				
Gender	1 for male 0 otherwise			53
Family Type	1 if family is Joint 0 otherwise			46
Skill	1 if the individual has attain or participated in Skill related training, 0 otherwise			17
Other activity	1 if the persons engage in other than farming activity, 0 otherwise			50
Number of observation (N)= 400				
Sources: Estimated from the field survey data.				
Note: SD stand for standard deviation and value in the parentheses represent SD				

The above findings indicate that the research population possessed an intermediate level of educational attainment, with considerable levels of farming experience, and there are marked economic disparities within the various groups comprising the populations studied. Farm-based income is still one of the relevant activities that play a major role in household income, while non-farm activities contribute greatly towards better economic resilience. That necessitates intervention-related skill development and economic diversification into a livelihood improvement paradigm.

4.2. DESCRIPTIVE STATISTICS FOR SELECT ORGANIC PRODUCT IN SIKKIM

The summary statistics presented in Table 2 provide an overview of the production levels of selected organic crops among the surveyed households in Sikkim. Rice exhibits the highest average production at 1,495 kg per household, with a standard deviation of 1,048.91 kg, indicating significant variation in production levels across different farmers. Maize follows with an average production of 1,134 kg, also showing considerable variability (SD = 848.30). This suggests that while some farmers produce maize and rice in substantial quantities, others have minimal or no production. On the other

hand, crops like wheat, buckwheat, finger millet, and barley show much lower mean production values, with wheat and barley exhibiting higher standard deviations (334.03 and 507.48, respectively), indicating variations in adoption and productivity among farmers.

Table 2 Summary Statistics for Select Organic Product

Variables	Unit	Mean (SD)	Min	Max
Non Categorical Variables				
Rice	Kilogram	1495 (1048.91)	0	4381
Wheat	Kilogram	150 (334.03)	0	2000
Maize	Kilogram	1134 (848.30)	0	5025
Buckwheat	Kilogram	122 (197.59)	0	900
Finger Millet	Kilogram	41 (95.29)	0	500
Barley	Kilogram	169 (507.48)	0	6000
Number of observation (N)= 400				
Sources: Estimated from the field survey data.				
Note: SD stand for standard deviation and value in the parentheses represent SD				

The minimum production value of zero across all crops suggests that not all surveyed farmers cultivate every crop, highlighting differences in crop choices based on agro-climatic conditions, market demand, and access to resources. The maximum production values indicate that a few farmers produce significantly higher quantities, such as 6,000 kg of barley or 5,025 kg of maize, potentially reflecting differences in farm size, input use, or market access. The high variability in production across crops underscores the need for targeted policy interventions to enhance productivity and ensure equitable distribution of benefits from organic farming. Additionally, understanding these disparities can aid in designing support mechanisms such as improved extension services, better access to credit, and the promotion of high-yielding organic varieties to enhance overall production efficiency in Sikkim.

4.3. IMPACT OF AGRICULTURAL FINANCE IN SELECT ORGANIC PRODUCT

In Sikkim, India's first completely organic state, agricultural finance is essential to raising the output and profitability of organic farming. In order to increase the production and marketability of important organic crops including rice, maize, wheat, buckwheat, finger millet, and barley, farmers who have access to credit can invest in high-quality organic inputs, enhanced seed varieties, contemporary irrigation methods, and improved post-harvest infrastructure. Furthermore, the availability of credit makes it easier to obtain organic certification, which raises market value and generates income by giving farmers access to premium markets. To maximize the advantages of agricultural finance for organic farmers in Sikkim, however, obstacles including exorbitant certification fees, volatile prices, and restricted access to official financial institutions continue to exist. The profitability and long-term viability of organic agriculture in the state can be greatly increased by bolstering targeted lending policies and financial inclusion.

Using the value of output as the dependent variable, multiple regression analysis has been used to examine the effect of agricultural finance on major organic product in Sikkim. Agricultural finance, gender, family type, land Size, distance from financial institution, ownership of land, education, experience and training and extension program as independent variables.

$$Y_i = \beta_0 + \beta_1 AF_i + \beta_2 GEN_3 + \beta_3 FT_3 + \beta_4 LS_4 + \beta_5 DFFI_5 + \beta_6 OWN_6 + \beta_7 EDU_7 + \beta_8 EXP_8 + \beta_9 TEP_9 + U_i$$

To ensure the validity of regression analysis, Cook-Weisberg/ Breusch-Pagan test for heteroskedasticity was conducted. It has been conducted to check whether the variance of the error term remains constant across observation or not.

H_0: Constant variance

H_1 :Non-constant variance (Heteroskedasticity)

Table 3: Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity

Chi-square	2.16
Prob > χ^2	0.1419

Source Estimated from the field survey data.

The results of the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity show a p-value of 0.1419 and a chi-square statistic of 2.16. We are unable to reject the null hypothesis of constant variance since the p-value is higher than the traditional significance levels (0.01, 0.05, or 0.10). This suggests that the error components have constant variance and that the regression findings are probably accurate because there isn't any compelling evidence of heteroskedasticity in the model.

Table 4 Result of Regression Analysis

Variables	Coefficient/other
Agricultural Finance	0.818 (.040)***
Gender: 1 for Female, 0 otherwise	-0.134(0.038)
Family Type: 1 for Nuclear, 0 otherwise	-0.228 (0.044)***
Land Size (H)	0.017 (0.214)*
Distance to Financial Institution (KM)	0.004 (0.007)
Ownerships of the Land	0.551 (0.034)***
Training and extension program	0.234 (0.038)***
Education (Years)	0.010 (0.021)
Experience (Years)	0.072 0.019)**
Constant	2.125 (0.416)**
R	0.71
F	885.21***
VIF	6.95
N=400	
Source: Estimated from the field survey data.	
Note> ***p < 0.01, ** p < 0.05 *p < 0.10; Figures in the ( ) are standard errors	

Table 4 present the regression result of impact of agricultural finance and various socio economic variable in the value of select organic product in Sikkim. Most of the explanatory variables have statistically significant coefficients, consistent with theoretical expectations. Out of nine variables, six were statistically significant, emphasizing their critical role in shaping agricultural performance. Key determinants include agricultural finance, family type, land size, land ownership, training and extension programs, and farming experience. These variables reflect structural, institutional, and individual factors influencing productivity and income among the farming households in the study area.

The results highlight the positive and significant impact of agricultural finance on outcomes, indicating that improved access to credit enhances agricultural performance. Similarly, land ownership and participation in training programs positively influence productivity, as households with land ownership or training opportunities likely adopt better farming practices. Conversely, family type shows a significant negative association, suggesting that joint families tend to perform better compared to nuclear ones due to shared resources and labor. Farming experience also shows a significant positive influence, aligning with studies emphasizing the value of expertise in agricultural efficiency.

Interestingly, gender, education, and distance to financial institutions were not significant, indicating these factors may not directly impact agricultural outcomes in this context. However, land size shows a weakly significant positive effect, underscoring the marginal benefits of additional land. The model's R-squared value of 0.71 and the highly

significant F-statistic ($p < 0.01$) demonstrate the overall robustness and explanatory power of the model. These findings underscore the importance of targeted interventions, such as improving credit access and training programs, to boost agricultural performance and reduce disparities in the sector.

The regression analysis indicates a notable and beneficial effect of institutional agricultural financing on the production of certain organic products in Sikkim. The coefficient for agricultural finance is notably high and statistically meaningful, suggesting that improved credit access allows farmers to invest in vital resources like quality seeds, organic fertilizers, irrigation systems, and post-harvest facilities. These investments directly lead to increased productivity and improved results. This discovery reinforces the theory that institutional finance is crucial for improving agricultural performance, especially in a state like Sikkim that advocates for organic farming methods. The outcome emphasizes the necessity of enhancing financial services customized for organic farmers to promote sustainable agricultural development.

4.4. POLICY IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

The results of this research highlight the necessity for focused and inclusive agricultural credit strategies to enhance organic farming in Sikkim, where access to institutional finance greatly impacts productivity. Policymakers ought to prioritize improving credit access for smallholder organic farmers by streamlining loan processes, decreasing interest rates, and lessening collateral demands. Enhancing training and extension services is vital for boosting farmer knowledge and effectiveness. Considering the significance of land ownership and agricultural experience, it is crucial to implement policies that encourage secure land tenure and facilitate knowledge-sharing initiatives for novice farmers. Promoting collaborative or group farming within nuclear families could enhance labor and resource efficiency. Future studies could benefit from longitudinal research to reveal the long-lasting impacts of credit access, while investigating informal financial networks, gender dynamics, and market obstacles would enhance comprehension. Moreover, examining qualitative aspects like financial literacy, confidence in institutions, and the use of digital banking, in addition to comparative analyses within similar organic areas, can provide tailored and scalable approaches for sustainable agricultural growth.

5. CONCLUSION

The study concludes that agricultural finance significantly enhances the value of organic agricultural output in Sikkim, with access to credit emerging as a key driver of productivity and profitability. Regression analysis reveals that, alongside finance, factors such as land ownership, training and extension programs, farming experience, and family structure also play critical roles in determining agricultural performance. While gender, education, and proximity to financial institutions were not statistically significant, the findings underscore the importance of structural and institutional support in promoting organic farming. The model's strong explanatory power ($R^2 = 0.71$) and statistically significant coefficients affirm that targeted credit policies, coupled with training initiatives, can substantially improve outcomes for organic farmers. These insights advocate for policies that strengthen financial inclusion, expand training coverage, and support smallholders to foster sustainable and inclusive growth in Sikkim's organic agriculture sector.

CONFLICT OF INTERESTS

None.

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