

Institutional Credit Access and Interlinkage Programmes among Horticultural Farmers in Karnataka: An Empirical Study of Awareness, Utilisation, Perception and Agricultural Productivity

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ABSTRACT

Institutional credit is a major source of investment and productivity in horticulture and the awareness, accessibility, utilisation and perception of the formal credit and interlinkage programme's may vary among the farmers. In this study, these dimensions are studied among horticultural farmers of Karnataka and relationship with agricultural investment and productivity is analysed. The study was carried out through the use of primary data obtained from 540 horticultural farmers through a structured questionnaire. Descriptive statistics, reliability and validity assessment, exploratory factor analysis, confirmatory factor analysis, correlation, ANOVA, multiple regression and a Partial Least Squares Structural Equation Modelling (PLS-SEM) are used for analysis. Based on the findings, it can be seen that awareness and accessibility to institutional credit has a significant impact on the utilization of institutional credit whereas, institutional credit utilization and positive perception about interlinkage programmes is significant in determining agricultural investment. Agricultural investment, in turn, is highly correlated positively with agricultural productivity. There are also noteworthy variations between landholding categories with respect to credit access, perception of programmes and agricultural productivity. Results of the mediation analysis suggest that interlinkage programmes and agricultural productivity are significantly mediated by agricultural investment, which has an impact on institutional credit-related factors. The study emphasizes the need for raised awareness, ease of access, better institutional coordination and productive utilization of agricultural credit in enhancing horticultural situation in Karnataka.

Keywords: *Institutional Credit, Horticultural Farmers, Credit Accessibility, Credit Utilisation, Interlinkage Programmes, Agricultural Investment, Agricultural Productivity, Karnataka.*

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

There is a growing importance of horticulture in Indian agriculture due to its role in diversification of agriculture production, food and nutrition security, employment and farm income. Horticultural farming encompasses fruits, vegetables, flowers, plantation crops and other high value crops which typically require higher levels of investment in planting material, irrigation, labour, inputs, storage and post production. Therefore, an effective access to cheap institutional finance would be useful for the farmers to sustain and augment horticultural

farming activity. The findings from India show that institutional agricultural credit continues to be important source of agricultural finance but farmer wise availability depends on their socio-economic and institutional and farm size (Kumar, 2023; Gupta et al., 2025).

Institutional credit is provided through commercial banks, regional rural banks, cooperative banks and other formal financial institutions. The formal agricultural finance is made more available with programmes like Kisan Credit Card, which is designed to supply timely working capital to the farmers for crop production and other needs. More recent evidence suggests that KCC and other financial inclusion schemes have helped to enhance access to formal agricultural finance, but there are still issues of awareness, accessibility and effective use (Pavithra & Singh, 2025; Jayaseelan & Sudhakar, 2026). Special attention should be given to the horticulture sector, since cycles of production, perishability and investment needs may vary greatly from those of field crops.

1.2 Institutional Credit and Horticultural Development

Institutional credit may be available for the use of seeds/planting material, fertilisers, pesticides, irrigation, farm equipment, labour and post harvest facilities. With the availability of credit at the right time and proper circumstances, credit can mitigate the liquidity constraints and enable farmers to invest in productive activities. The literature has shown positive linkages of institutional agricultural credit with agricultural output/farm income but the extent of these linkages is related to the extent of credit access and its use (Pandey et al., 2022; Malaizarasan et al., 2025)..

Horticultural growers might need credit to plant orchards, replace plants, install an irrigation system or implement protected cultivation and upgrade storage facilities and cover on-going production costs. The research that directly deals with horticultural-sector credit has also revealed the significance of formal credit and also indicates some constraints in accessing formal credit (Roy & Roy, 2022). Recent evidence from Karnataka has also delved deeper into institutional credit flows to agriculture and horticulture which shows that formal financial institutions are still relevant in the farm economy of Karnataka (Mangala et al., 2025).

1.3 Credit Awareness and Accessibility

Key prerequisite is awareness for effective participation of institutional credit programmes. Farmers must be aware of eligibility, types of credit, how to apply, interest rates and other government support. Even when programmes are formally available, lack of information can limit the effective use of these programmes. According to recent studies awareness and institutional accessibility are important factors affecting farmers participation with agricultural credit system (Behera & Behera, 2022; Hiranya & Joshi, 2025).

Documentation requirements, collateral conditions, transaction costs, institutional proximity, processing time and responsiveness of financial institutions, are also important for accessibility. Procedural and institutional constraints have been found as persistent constraints to access to agricultural credit especially for the farmers having less resources (Madhulagna & Mishra, 2024; Singh et al., 2023). The data from Karnataka also reveals that access to suitable

financial services and institutional support are factors affecting financial inclusion among agricultural households (Kumar et al., 2023).

1.4 Credit Utilisation and agricultural investment

Credit alone does not necessarily bring benefits to agriculture. Its proper use is essential in order to transform the financial resources into investments and improve the farming level. For the farmers, institutional credit is available for agricultural operations like crop input, irrigation, equipment, land development and storage. Productive utilization can make the farmers more capable of making investments which may be deferred due to liquidity constraints.

In the past there are empirical studies which showed that institutional credit is related to agricultural output and a number of studies on particular agricultural sectors have discussed the relationship between credit and productivity and farm income (Pandey et al., 2022; Shivaswamy et al., 2020). The role of agricultural credit in the income and investment and welfare of the farmers is still under study (Supriya et al., 2024; Malaizarasan et al., 2025). This renders credit utilisation as an important and significant connection between credit accessibility and agriculture outcomes.

1.5 Programme Interlinkage and farmers' perception

Institutional credit programmes are becoming more common, and they are often linked to agricultural development programmes run by farmer groups, cooperatives, banks and other rural institutions and government departments. These linkages between farmers and loans, subsidies, technical service, inputs and market related services. These arrangements are, in part, dependent on the farmers' perceptions of their accessibility, usefulness, transparency and institutional coordination.

An important way for farmers to access formal finance is through the Kisan Credit Card, cooperative credit arrangements and government-supported financial inclusion programmes. The effectiveness of these programmes and problems in implementation have been studied recently, and it is found that farmers' experience can be affected by the design and delivery conditions of the programme (Pavithra & Singh, 2025; Jayaseelan & Sudhakar, 2026). The perception of the farmers of the interlinkage programmes is therefore an important explanatory construct in the present study.

1.6 Agricultural Investment and Productivity

One potential channel that institutional credit can affect productivity is the investment in agricultural production. The production capacity and efficiency can be enhanced through investment in irrigation, quality planting material, and farm technology and machinery, storage and other productive assets. The study of agricultural credits reveals that formal finance is related to productive investment and agricultural performance (Pandey et al., 2022; Malaizarasan et al., 2025).

Productivity is especially relevant to horticultural farmers as many crops have relatively high input costs and need constant management. Investment through credit could therefore impact

yield and quality of crops, production efficiency and farm profitability. In the present study the focus is on the role of agricultural investment as an important link between institutional credit and interlinkage programme with agricultural productivity.

1.7 Problem Statement

Although institutional agricultural credit has expanded, access and utilisation of credit is irregular among farmers. Some institutional barriers like documentation requirement, lack of awareness, problems with collaterals, delay in processing etc. can be faced by small and medium farmers. Studies have reported that access to agricultural credit and its utilization continues to be a problem in various parts of the country (Madhulagna & Mishra, 2024; Singh et al., 2023). Meanwhile, there is evidence that institutional credit can have a contribution towards agricultural investment and productivity if it is accessed and used properly (Pandey et al., 2022; Malaivasan et al., 2025).

In the context of Karnataka, horticultural farmers are engaged in production of different crops, farm sizes and institutional set-up. But there is potential for looking at these dimensions together by connecting awareness and accessibility with credit utilisation and programme perception, agricultural investment and productivity. The present study is an attempt to remedy this with an integrated empirical study for horticultural farmers of Karnataka.

1.8 Need for the Study

The study is relevant because horticultural production needs timely financial resources and continual investment. Knowledge of institutional credit and capacity to access it, how farmers use it and their perceptions of supporting programmes can all provide valuable information to help to make programmes more effective. A study of agricultural and horticultural finance in Karnataka also confirms that it is essential to analyse the institutional finance in the context of Karnataka agriculture (Khan & Benny, 2024; Mangala et al., 2025).

The relationship between institutional credit-related factors and productivity is also explored through the lens of agricultural investment, a new dimension in the literature. Considering farmer level perceptions and access challenges adds to the evidence to understand the differential outcomes of formal credit for different categories of farmers.

1.9 Objectives of the Study

1. To assess the awareness and accessibility of institutional credit and interlinkage programmes of horticultural farmers in Karnataka.
2. To analyse the usage of institutional credit and farmers perception of institutional credit interlinkage programme in Karnataka.
3. To study impact of institutional credit access, utilisation and interlinkage programmes on agricultural investment and productivity of horticultural farmers of Karnataka.
4. To identify major problems of the horticultural farmers in obtaining institutional credit and interlinkage programme and to recommend measures for their effectiveness.

1.10 Hypotheses of the Study

H1: Institutional credit availability and awareness significantly positively affects the institutional credit utilization by the horticultural farmers in Karnataka.

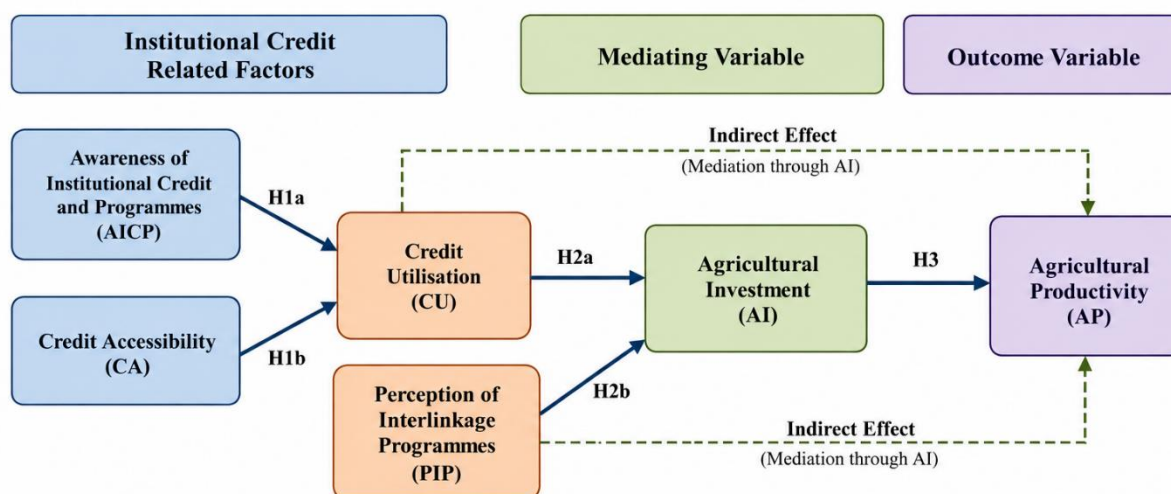
H2: There is a close relationship between credit utilisation and farmers' positive perception of institutional credit interlinkage programmes to the extent of their positive impact on agricultural investment of horticultural farmers in Karnataka.

H3: The role of the mediation of agricultural investment in the relationship between institutional credit access, interlinkage programmes and agricultural productivity between the horticultural farmers in Karnataka is significant.

1.11 Scope of the Study

The study considers the institutional credit access, awareness, credit utilisation, perception of interlinkage programmes, agricultural investment and productivity of horticultural farmers of Karnataka. For the empirical analysis, there are 540 respondents. Institutional formal sources like commercial banks, regional rural banks, cooperative institutions and related agricultural credit programmes are taken into account. Statistical analysis includes descriptive analysis, reliability assessment, EFA, CFA, correlation, ANOVA, regression and PLS-SEM-based mediation analysis.

1.12 Conceptual Framework



Construction of the conceptual framework of the study is that institutional credit related factors affect agricultural outcomes of horticultural farmers through a chain of accessibility, utilisation and productive investment. The availability of information and ease of access (Awareness of Institutional Credit and Programmes (AICP) and Credit Accessibility (CA)) are deemed as antecedent factors impacting Credit Utilisation (CU) because better information and more accessible formal credit facilities enhance a farmer's chances of successful use of formal institutional credit facilities (Behera & Behera, 2022; Hiranya & Joshi, 2025). Credit utilisation and Perception of Interlinkage Programmes (PIP) are likely to affect Agricultural Investment (AI) as it helps to invest in irrigation, planting material, technology and other productive activities (Pandey et al., 2022 and Pavithra & Singh, 2025). Considering the positive relationships between productive agricultural finance and better performance of the farm

(Malaivasan et al., 2025; Shivaswamy et al., 2020), agricultural investment is regarded as a mediation variable between institutional credit-related factors and agricultural productivity (AP). Access Challenges (AC) are explored separately to isolate institutional and procedural barriers to farmers' access to credit. In this way, direct and indirect relations between credit access, utilisation, interlinkage programmes, investment and productivity are all brought together.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Institutional Credit and Agricultural Development

The supply of institutional credit has always been acknowledged as a key financial input in Indian agriculture as it enables farmers to overcome liquidity constraints and engage in production and investment activities. According to Shivaswamy et al. (2020), institutional credit had a significant positive relationship with agricultural productivity and Pandey et al. (2022) pointed out that institutional credit from commercial banks, co-operatives and RRBs had significant impact on agricultural output. A similar positive relationship was found between formal agricultural credit and productivity in Indian states by Manoharan (2022). Keerthikumara and Susanna Kumari (2022) also found that short, medium and long term institutional credit has a positive impact on agricultural productions. The result of this research provides the general understanding of the role of formal agricultural finance.

2.2 Credit Accessibility and Financial Inclusion.

There has been a growing interest in the literature on the issue of reaching institutional credit to the farmers. Behera and Behera (2022) studied institutional credit access and farmer satisfaction and found that the socio-economic characteristics, service features and service quality affect access and satisfaction. According to Kumar and Afroz (2022), there was significant difference in institutional agricultural credit disbursal among various regions, where institutional agricultural credit intensity of southern India is much higher than several regions. Moreover, Gupta et al. (2025) and Hiranya and Joshi (2025) also highlighted the role of accessibility, institutional conditions and farmer characteristics in accessing formal agricultural credit. The aggregate availability of credit does not guarantee the farmer level accessibility as shown in these studies.

2.3 Kisan Credit Card and Interlinkage Programmes

The Kisan Credit Card (KCC) has proved to be one such important instrument to provide timely credit facilities to farmers. The study by Pavithra and Singh (2025) revealed that there was significant variation in the KCC coverage across the regions and access was linked with factors like education, gender, size of land holding and access to extension. Their results further showed that KCC outreach was still low for a few marginalized groups. The data on the Government's side also reveals the ongoing magnitude of institutional agricultural credit, as of March 2024, there were 7.75 crore operational KCC accounts. Agrawal and Sharma (2024) spoke about the significance of KCC in the context of enhancing timely access to credit and financial inclusion. The current relevance of KCC in the agricultural credit system in India was further explored by Jayaseelan and Sudhakar (2026).

2.4 Credit Utilisation, Investment and Agricultural Productivity

Literature indicates that credit use is influenced not only by the availability of credit but also by the productive use of credit. Malaizarasan et al. (2025) applied an endogenous switching regression method to examine the effects of agricultural credit on productivity and farm income based on NSSO data, which revealed that agricultural credit positively affected productivity and farm income. The study also found that extension contacts, training, farm characteristics and awareness related factors are determinants of institutional credit access. Institutional credit and its role in agricultural modernisation was highlighted by Khan and Benny (2024) who studied the same Kalaburagi district and revealed a correlation between institutional credit, agricultural inputs, and agricultural output. Supriya et al., (2024) also studied institutional and non-institutional credit and its linkages with farmer income and Kumar (2023) emphasized the ongoing transformation of institutional credit to agriculture.

2.5 Horticultural Finance and Karnataka Context:

Unlike traditional farming, horticulture often involves heavy investment in planting stock, irrigation, labour, crop protection, storage and post harvest. Roy and Roy (2022) have pointed out the significance of credit facilities in the horticulture industry and the limitation in its availability. Mangala et al. (2025) specifically explored the institutional credit flows to agriculture and Horticulture in the district of Mysuru and shared evidence on the financial needs of agriculture and Horticulture in Karnataka. According to the National Horticulture Board (2025) programmes, there is a growing focus on horticultural infrastructure and value chain development at institutional level. These studies indicate that horticultural farmers need credit but not in isolation; rather a coordinated financial and institutional support system.

2.6 Synthesis of Literature

As noted, the literature reviewed consistently shows 4 general relationships. For one, institutional credit has been linked with agricultural investment and productivity (Shivaswamy et al., 2020; Pandey et al., 2022; Malaizarasan et al., 2025). Secondly, credit accessibility is affected by awareness, education, landholding and services of the institutions (Behera & Behera, 2022; Pavithra & Singh, 2025). Third, formal credit outreach have been increased through KCC and similar financial inclusion mechanisms, but still differences can be noted among farmer groups and regions. Fourth, there is some evidence available on agricultural credit, and horticultural farmers have been given relatively less empirical attention in the state of Karnataka.

2.7 Research Gap

While prior research has focused on institutional credit access, KCC coverage and agricultural productivity, and financial inclusion, the majority of previous research are done separately. There is also limited empirical evidence, which has investigated the awareness, access to credit, utilisation of credit, perception of interlinkage programmes, and agricultural investment and productivity of the horticultural farmers in Karnataka. Also, earlier studies in Karnataka have tended to concentrate on credit-flows or input-output linkages, but not on the farmer-perceptions and the linkage mechanisms between credit and productivity. The effect of institutional credit-related factors on agricultural productivity, through agricultural investment,

is not fully explored. The current study aims at filling this gap by using an integrated, farmer-level empirical framework.

2.8 Research Question

RQ1: What role does awareness and institutional credit accessibility, credit utilisation and perceptions of interlinkage programmes play in agricultural investment and productivity of horticultural farmers in Karnataka and to what extent does agricultural investment mediate the relationship between institutional credit related factors and agricultural productivity?

RQ2: Is there any significant difference in institutional credit accessibility, perception of interlinkage programmes and agricultural productivity among different landholding of horticultural farmers in Karnataka?

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

The study is descriptive and analytical in nature to study institutional credit access and interlinkage programmes among the horticultural farmers in Karnataka. The socio-economic profile, farm characteristics, awareness, accessibility, utilisation, programme perception, agricultural investment, productivity and access challenges are covered by the descriptive component. The analytical part investigates the relationships between the study variables, differences between variables, and test the assumed structural relationships. A cross sectional approach of primary data is followed; responses obtained from horticultural farmers during the study period.

3.2 Nature and Approach of the Study

The study is a Quantitative type of Research. The primary data is gathered from the horticultural farmers by using structured questionnaire. The research framework consists of seven major constructs namely: Awareness of Institutional Credit and Programmes (AICP), Credit Accessibility (CA), Credit Utilisation (CU), Perception of Interlinkage Programmes (PIP), Agricultural Investment (AI), Agricultural Productivity (AP) and Access Challenges (AC).

3.3 Population and Unit of Analysis

The population consists of horticultural farmers of Karnataka. The unit of analysis is the individual horticultural farmer. Farmers who are involved in fruits, vegetables, flowers, plantation crops and mixed horticultural activities are included in scope of the study.

3.4 Sampling Technique and Sample Size

Purposive sampling technique was used to select respondents that were actively involved in horticultural crop production and have experience of institutional agricultural credit and/or agricultural related programmes. 540 valid respondents were used in the study.

An appropriate sample size, n , for a large population can be determined using Cochran's formula as:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where,

n_0 = required sample size

Z = standard normal value at 95% confidence level = 1.96

p = estimated population proportion = 0.50

$q = 1 - p = 0.50$

e = acceptable margin of error = 0.05

The calculation is:

$$n_0 = \frac{(1.96)^2(0.50)(0.50)}{(0.05)^2}$$

$$n_0 = \frac{3.8416 \times 0.25}{0.0025}$$

$$n_0 = 384.16 \approx 385$$

This suggests that there should be a minimum sample of about 385 respondents. The study has 540 respondents, which creates a significant empirical foundation for the multivariate analysis, CFA and PLS-SEM.

3.5 Data Collection Instrument

Primary data were gathered using a structured questionnaire which was designed based on the objectives, hypotheses and conceptual framework of the study. The questionnaire comprised of two general sections. The first focused on the demographics, socio-economic and farm characteristics. The second assessed the seven study constructs with multiple statements on a 5-point Likert scale ranging between 1 = Strongly Disagree and 5 = Strongly Agree.

The questionnaire included awareness of institutional credit, awareness of programmes, accessibility of credit, utilisation of credit, perception of interlinkage programmes, agricultural investment, agricultural productivity and challenges in accessing institutional programmes.

3.6 Operationalisation of Variables

The operationalization of the main constructs was as follows:

- ☐ **Awareness of Institutional Credit and Programmes (AICP):** Assesses farmers knowledge about different sources of institutional credit, eligibility, schemes and programme related information.
- ☐ **Credit Accessibility (CA):** the ease of access to formal credit, including application, documentation, institutional availability, processing and timely access.
- ☐ **Credit Utilisation (CU):** It is a measure of the use of institutional credit for productive-agricultural purposes.
- ☐ **Perception of Interlinkage Programmes (PIP):** Farmers' perceptions of the coordination between banks, government programmes, agricultural institutions and farmer-support mechanisms.
- ☐ **Agricultural Investment (AI):** Investment in irrigation, planting material, farm equipment, technology, infrastructure and other productive agricultural activities.
- ☐ **Agricultural Productivity (AP):** Reflects perceived changes in production, yields, efficiency, quality and farm performance.

- 📄 **Access Challenges (AC):** Reflects any obstacles or difficulties associated with documentation, information, institutional processes, collateral, delays and other issues affecting access to credit and program.

3.7 Reliability of the Research Instrument

In this study, the researcher employed a questionnaire as a research instrument.

Cronbach's alpha was used to determine the internal consistency of the measurement scales.

The coefficient is:

$$\alpha = \frac{k}{k-1} \left[1 - \frac{\sum_{i=1}^k \sigma_i^2}{\sigma_T^2} \right]$$

Where,

α = Cronbach's alpha coefficient

k = number of items

σ_i^2 = variance of each individual item

σ_T^2 = variance of the total score

This study has five items per each of seven major constructs. The reliability coefficients obtained for AICP, CA, CU, PIP, AI, AP and AC were 0.874, 0.889, 0.881, 0.892, 0.906, 0.913 and 0.846, respectively. The overall alpha value of the 35 measurement items was 0.928, which is considered satisfactory.

3.8 Validity of the Instrument

Content validity was carried out by designing the questionnaire based on the study objectives, conceptual framework and literatures. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were then used to evaluate the construct validity. Standardised factor loadings, Composite Reliability (CR) and Average Variance Extracted (AVE) were used to measure the convergent validity. The Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio were used to assess discriminant validity.

3.9 Data Processing and Statistical Techniques

Appropriate description and inferential statistical techniques were used to systematically code, classify and analyse the collected primary data. Frequency and percentage analyses were employed to describe the demographic, socio-economic and farm characteristics of the 540 horticultural farmers and mean and standard deviation were used to describe the central tendency and variability of the key constructs of the study. Cronbach's alpha was used to check the internal consistency of the measurement scales, and then KMO and Bartlett's Test were used to determine the suitability of the data for factor analysis. Exploratory Factor Analysis (EFA) was conducted to discover the underlying factor structure and Confirmatory Factor Analysis (CFA) was carried out to examine the factor loadings, Composite Reliability and Average Variance Extracted of the measurement model. For the examination of the discriminant validity, the Fornell-Larcker criterion and the HTMT ratio have been used following the guidelines in SEM (Fornell & Larcker, 1981; Henseler et al., 2015; Hair et al., 2022). Pearson correlation analysis was carried out in order to find the nature and magnitude

of association between institutional credit, interlinkage programme and agricultural outcome variables. The differences between landholding categories were analyzed by one-way ANOVA with Tukey's post hoc test. Multiple regression analysis was performed to determine the effect of awareness regarding credit, accessibility of credit on credit utilization, the effect of credit utilization and programme perception on agricultural investment and the effect of investment related variables on agricultural productivity. Finally, PLS-SEM with 5,000 bootstrap resamples was utilized to estimate path coefficients, standard errors, t-values, p-values and confidence intervals, and mediation analysis was used to assess the mediation role of agricultural investment between institutional credit-related factors and interlinkage programmes and agricultural productivity (Hair et al., 2022; Hair et al., 2024; Hayes, 2022).

3.10 Conceptual and Analytical Framework

The analytical framework suggests that the awareness and credit accessibility affect credit utilisation. It is expected that the agricultural investment will impact on agricultural productivity, which will be impacted on credit utilisation and perception of interlinkage programmes.

The principle structural relationships are expressed as:

$$AICP, CA \rightarrow CU$$

$$CU, PIP \rightarrow AI$$

$$AI, CU, PIP \rightarrow AP$$

Further, agricultural investment is explored as a mediating variable between institutional credit related variables, interlinkage programmes and agricultural productivity. The descriptive and comparative analysis of access challenges are dealt with separately.

3.11 Hypothesis Testing Procedure

The 5% level of significance was used for all the hypotheses. Statistically significant relationships ($p < 0.05$) were interpreted as providing support for the hypotheses. The path coefficients, standard errors, t-values, p-values and 95% confidence intervals were taken into account when considering PLS-SEM. Indirect effects were deemed significant if the 95% bootstrap confidence interval for the effect did not contain zero.

3.12 Ethical Considerations

The study ensures that the respondents' confidentiality and privacy are maintained. It was on a voluntary basis and the information collected was for academic and research only. The respondents were told the general nature of the research and individual responses were kept confidential.

CHAPTER 4: DATA ANALYSIS AND INTERPRETATIONS

Table 4.1: Demographic and Socio-Economic Profile of Horticultural Farmers

Variable	Category	Frequency	Percentage
Gender	Male	422	78.1
	Female	118	21.9
Age	18–40 years	167	30.9
	41–60 years	313	58.0
	Above 60 years	60	11.1
Education	Up to Secondary	308	57.0
	PUC	130	24.1
	Graduate & above	102	18.9
Landholding	Below 2 acres	127	23.5
	2–5 acres	204	37.8
	Above 5 acres	209	38.7
Experience	Below 10 years	200	37.0
	11–20 years	200	37.0
	Above 20 years	140	25.9
Annual Farm Income	Below ₹4 lakh	279	51.7
	₹4–10 lakh	221	40.9
	Above ₹10 lakh	40	7.4
Total	—	540	100.0

Source: Primary Data

The demographic and socio-economic profile of the 540 horticultural farmers are given in Table 4.1. The majority of the sample are male (78.1%) and female farmers are 21.9%. The age group of 41–60 years has the highest age group with 58.0% of the farmers, reflecting the involvement of experienced farmers. As for education, 57.0% have education up to secondary level and 18.9% are graduates and above. In terms of land holding, 38.7% of the farmers have more than 5 acres, while 37.8% have 2 to 5 acres. Horticultural experience is comparatively high with 37.0% saying they had between 11 and 20 years of experience. The majority of the respondents (51.7%) have income less than ₹4 lakhs per annum from farming. The relevance of these characteristics to institutional access to credit is that education, farm size, experience and economic status of the farmer may have an impact on how access and use of formal agricultural credit is attained (Behera & Behera, 2022; Gupta et al., 2025; Kumar et al., 2023).

Table 4.2: Farm Characteristics and Institutional Credit Profile of Horticultural Farmers

Variable	Category	Frequency	Percentage
Major Horticultural Crop	Fruits	146	27.0
	Vegetables	167	30.9
	Flowers	54	10.0
	Plantation Crops	92	17.0
	Mixed Horticulture	81	15.0
Primary Institutional Credit Source	Commercial Banks	184	34.1
	Regional Rural Banks	97	18.0

Variable	Category	Frequency	Percentage
Main Credit Programme	Co-operative Banks	108	20.0
	Agricultural Co-operative Societies	92	17.0
	Multiple Institutional Sources	59	10.9
	Kisan Credit Card (KCC)	189	35.0
	NABARD-linked Programme	81	15.0
	Government Credit/Subsidy Linkage	119	22.0
	SHG/FPO Linkage	65	12.0
	Other Institutional Programmes	86	15.9
	Total	540	100.0

Source: Primary Data

The characteristics of the farms and institutional credit profile of the respondents are given in Table 4.2. Vegetables are the largest category of horticulture production (30.9%) followed by fruits (27.0%) showing a diversified production base. The major institutional credit source for 34.1% of farmers is commercial banks and cooperative banks and agricultural cooperative societies account for 37.0% farmers. The most reported credit programme is the Kisan Credit Card (KCC) (35.0%) followed by Government credit/Subsidy linkage (22.0%). In fact, 10.9% of respondents are utilizing more than one institutional source, showing that some farmers access more than one institutional channel. These findings align with evidence to show that institutional credit is still a significant factor in agricultural investment and farm operations and accessibility and programme-specific restrictions still influence farmer choice of credit (Roy & Roy, 2022; Kumar, 2023; Pavithra & Singh, 2025; Mangala et al., 2025).

Table 4.3: Descriptive Statistics of the Major Study Constructs

Study Construct	Mean	Standard Deviation
Awareness of Institutional Credit and Programmes	3.39	0.71
Credit Accessibility	3.34	0.73
Credit Utilisation	3.41	0.72
Perception of Interlinkage Programmes	3.36	0.70
Agricultural Investment	3.45	0.73
Agricultural Productivity	3.48	0.71
Access Challenges	2.82	0.78

Source: Primary Data

The descriptive statistics of the major study constructs are given in Table 4.3. The respondents show a moderately favourable response as the agricultural productivity has the highest mean score of 3.48 followed by agricultural investment with a score of 3.45 and credit utilisation with a score of 3.41. The mean scores for awareness of institutions, credit and programmes, and programme perception and credit accessibility, are 3.39, 3.36 and 3.34 respectively. Barriers to access have the lowest mean (2.82) indicating relatively less perceived severity. The standard deviations are between 0.70 and 0.78, showing moderate variation in the answers given by farmers. The pattern is consistent with the research which indicates that availability of institutional credit can aid in agricultural investment and productivity and awareness and

accessibility are essential conditions to effective utilization of credit (Pandey et al., 2022; Malaarasan et al., 2025; Hiranya & Joshi, 2025).

Table 4.4: Reliability Statistics of the Study Constructs Using Cronbach's Alpha

Study Construct	No. of Items	Cronbach's Alpha
Awareness of Institutional Credit and Programmes	5	0.874
Credit Accessibility	5	0.889
Credit Utilisation	5	0.881
Perception of Interlinkage Programmes	5	0.892
Agricultural Investment	5	0.906
Agricultural Productivity	5	0.913
Access Challenges	5	0.846
Overall Scale	35	0.928

Source: Primary Data

The results of the reliability of the seven constructs included in the study are provided in Table 4.4. Cronbach's Alpha values vary from 0.846 (Access Challenges) to 0.913 (Agricultural Productivity) and 0.928 for the entire scale. The internal consistency of the respective items is satisfactory as all construct-level coefficients are above the accepted level of 0.70. The relatively high reliability coefficients indicate that all the items in the awareness, credit accessibility, credit utilisation, programme perception, agricultural investment, productivity and access challenges constructs are consistent in measuring the constructs they are supposed to. For empirical studies of farmer perceptions and institutional constructs relating to credit, similar measurement principles are suggested (Hair et al., 2022; Kline, 2023). Hence, the results of the reliability are suitable as a basis for the factor analysis, measurement-model assessment, and structural analysis.

Table 4.5: KMO and Bartlett's Test of Sphericity

Test	Statistic	Value
Kaiser-Meyer-Olkin (KMO) Measure	Sampling Adequacy	0.914
Bartlett's Test of Sphericity	Approx. Chi-Square	8,746.382
	Degrees of Freedom	595
	Significance (p-value)	<0.001

Source: Primary Data

Table 4.5 shows the results of KMO and Bartlett test to check the suitability of the data to be subjected to factor analysis. KMO value is 0.914 which is considered high level of sampling adequacy, it means that the correlation pattern of the variables of the study is appropriate for factor extraction. Bartlett's test of sphericity is significant ($\chi^2 = 8,746.382$, $df = 595$, $p < 0.001$), which indicates that the correlation matrix is significantly different from an identity matrix. This result means that there was enough common variance in the 35 measurement items for exploratory factor analysis. The results meet the general criteria for multivariate analysis on the basis of factors (Hair et al., 2022; Kline, 2023). Hence, the data set can be used for further EFA and confirmatory in the measurement assessment.

Table 4.6: Exploratory Factor Analysis of Institutional Credit and Interlinkage Programme Constructs

Factor	Construct	No. of Items	Eigenvalue	Variance Explained (%)	Cumulative Variance (%)
Factor 1	Agricultural Productivity	5	4.82	13.77	13.77
Factor 2	Agricultural Investment	5	4.36	12.46	26.23
Factor 3	Perception of Interlinkage Programmes	5	4.11	11.74	37.97
Factor 4	Credit Accessibility	5	3.89	11.11	49.08
Factor 5	Credit Utilisation	5	3.57	10.20	59.28
Factor 6	Awareness of Institutional Credit and Programmes	5	3.24	9.26	68.54
Factor 7	Access Challenges	5	2.71	7.74	76.28

Extraction Method: Principal Component Analysis with Varimax Rotation

Factor Retention Criterion: Eigenvalue > 1.00; factor loadings $\geq$ 0.50.

Source: Primary Data

The results of the exploratory factor analysis of the seven study constructs are shown in table 4.6. The analysis shows that there are 7 factors, each of which has an eigenvalue above 1.00, accounting for a total of 76.28% of the variance. The most significant variances are from Agricultural Productivity (13.77%), Agricultural Investment (12.46%) and Perception of Interlinkage Programmes (11.74%). The rest are the factors of Credit Accessibility, Credit Utilisation, Awareness of Institutional Credit and Programmes and Access Challenges. The cumulative variation is greater than the value accepted as good for social science research, which means that the variation in the extracted factors is satisfactory to represent the information contained in the 35 measurement items. The factor structure also reflects the conceptual dimensions that were developed for this study, which aids in the assessment of the measurement model (Hair et al., 2022; Kline, 2023).

Table 4.7: Confirmatory Factor Analysis: Standardised Factor Loadings, Composite Reliability and Average Variance Extracted

Construct	No. of Items	Standardised Factor Loading Range	Composite Reliability (CR)	Average Variance Extracted (AVE)
Awareness of Institutional Credit and Programmes	5	0.72–0.86	0.892	0.624
Credit Accessibility	5	0.74–0.88	0.904	0.655
Credit Utilisation	5	0.73–0.87	0.899	0.641
Perception of Interlinkage Programmes	5	0.75–0.89	0.910	0.669
Agricultural Investment	5	0.77–0.91	0.923	0.705
Agricultural Productivity	5	0.79–0.92	0.928	0.722
Access Challenges	5	0.70–0.84	0.879	0.594

Source: Primary Data

The results of the confirmatory factor analysis for the seven constructs of this study are shown in Table 4.7. All the factor loadings are standardized and range from 0.70 to 0.92, which means that all the items observed adequately represent their constructs. The ranges for Composite Reliability values are 0.879 – 0.928, which is above the acceptable value of 0.70, indicating good construct reliability. All AVE values are above the generally accepted criterion of 0.50,

and range between 0.594 and 0.722, showing that they have good convergent validity. The highest CR (0.928) and AVE (0.722) values are obtained for the Agricultural Productivity scale, with Access Challenges also showing acceptable values. The results indicate that the measurement model has acceptable reliability and convergent validity, thus it can be used in the next step of structural analysis (Hair et al., 2022; Kline, 2023).

Table 4.8: Discriminant Validity Assessment Using Fornell-Larcker Criterion and HTMT Ratio

Panel A: Fornell-Larcker Criterion

Construct	AICP	CA	CU	PIP	AI	AP	AC
AICP	0.790						
CA	0.562	0.809					
CU	0.548	0.641	0.801				
PIP	0.514	0.583	0.601	0.818			
AI	0.532	0.612	0.668	0.625	0.840		
AP	0.487	0.571	0.632	0.579	0.704	0.850	
AC	-0.286	-0.351	-0.322	-0.274	-0.301	-0.267	0.771

Panel B: Heterotrait-Monotrait Ratio (HTMT)

Construct Pair	HTMT Ratio	Construct Pair	HTMT Ratio
AICP – CA	0.671	CU – PIP	0.712
AICP – CU	0.654	CU – AI	0.783
AICP – PIP	0.618	CU – AP	0.741
AICP – AI	0.642	CU – AC	0.391
AICP – AP	0.591	PIP – AI	0.759
AICP – AC	0.358	PIP – AP	0.684
CA – CU	0.748	PIP – AC	0.344
CA – PIP	0.694	AI – AP	0.821
CA – AI	0.721	AI – AC	0.371
CA – AP	0.668	AP – AC	0.326
CA – AC	0.426		

Note: Diagonal values in Panel A represent the square root of AVE. HTMT values below 0.85 indicate satisfactory discriminant validity.

Source: Primary Data

The results of the assessment of discriminant validity is provided in table 4.8 based on Fornell-Larcker criterion and HTMT ratio. The diagonal square-root AVE values of all the constructs are greater than the inter-construct correlation values, which demonstrates acceptable discriminant validity based on the Fornell-Larcker criterion. The HTMT ratios vary between 0.326 and 0.821 and below the threshold of 0.85 which are commonly used. The highest HTMT value comes between Agricultural Investment and Agricultural Productivity (0.821) which is still in acceptable range. These results imply that awareness, credit accessibility, credit utilisation, programme perception, agricultural investment, productivity and access challenges are empirical distinct constructs. The results thus indicate that the measurement model is

appropriate for structural analysis (Fornell & Larcker, 1981; Henseler et al., 2015; Hair et al., 2022).

Table 4.9: Pearson Correlation Matrix of Institutional Credit, Interlinkage Programme and Agricultural Outcome Variables

Variables	AICP	CA	CU	PIP	AI	AP	AC
Awareness (AICP)	1.000	0.562**	0.548**	0.514**	0.532**	0.487**	-0.286**
Credit Accessibility (CA)	0.562**	1.000	0.641**	0.583**	0.612**	0.571**	-0.351**
Credit Utilisation (CU)	0.548**	0.641**	1.000	0.601**	0.668**	0.632**	-0.322**
Programme Perception (PIP)	0.514**	0.583**	0.601**	1.000	0.625**	0.579**	-0.274**
Agricultural Investment (AI)	0.532**	0.612**	0.668**	0.625**	1.000	0.704**	-0.301**
Agricultural Productivity (AP)	0.487**	0.571**	0.632**	0.579**	0.704**	1.000	-0.267**
Access Challenges (AC)	-0.286**	-0.351**	-0.322**	-0.274**	-0.301**	-0.267**	1.000

Note: $p < 0.01$ (two-tailed).

Source: Primary Data

The correlation matrix of the Pearson correlation of major study variables is shown in Table 4.9. Relationships between all principal credit and agricultural outcome constructs are statistically significant at the 1% level. Credit Accessibility has a good positive correlation with Credit Utilisation ($r = 0.641$), Credit Utilisation is positively correlated to Agricultural Investment ($r = 0.668$) and Agricultural Productivity ($r = 0.632$). Agricultural Investment has the highest correlation with Agricultural Productivity ($r = 0.704$), suggesting its significance as a vital link between institutional credit and farm productivity. Credit Utilisation also has a positive relationship ($r = 0.548$) with Awareness. Conversely, the major constructs have negative relationship values with Access Challenges, with the highest negative value being found with Credit Accessibility ($r = -0.351$). These trends are largely in line with the results of studies that connect institutional access to credit to agricultural investments and productivity (Pandey et al., 2022; Malaizarasan et al., 2025; Behera & Behera, 2022).

Table 4.10: One-Way ANOVA of Institutional Credit Access, Programme Perception and Agricultural Productivity across Landholding Categories

Dependent Variable	Below 2 Acres	2–5 Acres	Above 5 Acres	F-Value	p-Value
Credit Accessibility	3.08	3.34	3.56	18.427	<0.001
Programme Perception	3.18	3.35	3.51	9.684	<0.001
Agricultural Productivity	3.21	3.45	3.67	21.356	<0.001

Source: Primary Data

Table 4.10 shows the one way ANOVA results for differences among landholding categories. Credit Accessibility, Programme Perception and Agricultural Productivity are statistically significant differences among the three landholding groups with the P values of less than 0.001 in all. Credit Accessibility has a mean score of 3.08 for farmers having less than 2 acres and 3.56 for farmers having more than 5 acres. Likewise, Programme Perception improves from 3.18 to 3.51 and Agricultural Productivity improves from 3.21 to 3.67. These three F values (18.427, 9.684 and 21.356 respectively) suggest that there is some significant difference between the groups. These findings are similar to the finding of some influence of size and

economic characteristics on access to institutional agricultural credit and ability to use formal financial services (Gupta et al., 2025; Singh & Shastri, 2025; Behera & Behera, 2022).

Table 4.11: Post-Hoc Multiple Comparison of Agricultural Productivity across Landholding Categories

Landholding Comparison	Mean Difference	Std. Error	p-Value	Significance
Below 2 acres vs. 2–5 acres	-0.24	0.071	0.003	Significant
Below 2 acres vs. Above 5 acres	-0.46	0.076	<0.001	Significant
2–5 acres vs. Above 5 acres	-0.22	0.067	0.006	Significant

Post-Hoc Test: Tukey HSD

Source: Primary Data

The Tukey HSD post hoc comparisons of Agricultural Productivity among landholding categories is shown in Table 4.11. Each of the three comparisons between pairs is statistically significant. Farmers grow smaller than 2 acres have significantly lower productivity scores when compared to farmers with 2–5 acres (mean difference = -0.24, $p = 0.003$) and more than 5 acres (mean difference = -0.46, $p < 0.001$). The size difference between 2-5 acres and over 5 acres is also notable (at a mean difference of -0.22, a p value of 0.006). So the differences observed by ANOVA are not due to just one landholding group, but instead represent a difference between each landholding group. The findings align with studies showing that farmers' credit utilization and farm level outcomes may be related to farm characteristics and access to productive farm resources (Pandey et al., 2022; Singh & Shastri, 2025; Malaiaresan et al., 2025).

Table 4.12: Multiple Regression Analysis of Awareness and Credit Accessibility on Institutional Credit Utilisation

Predictor Variable	β	Std. Error	t-Value	p-Value	VIF
Awareness of Institutional Credit and Programmes	0.246	0.041	6.02	<0.001	1.46
Credit Accessibility	0.503	0.039	12.89	<0.001	1.46
Model R²	0.493				
Adjusted R²	0.491				
F-Statistic	261.14			<0.001	

Dependent Variable: Institutional Credit Utilisation

Source: Primary Data

Table 4.12 looks at the impact of Awareness of Institutional Credit and Programmes and Credit Accessibility on Institutional Credit Utilisation. Both predictors (Awareness: $\beta = 0.246$, $p < 0.001$; and Credit Accessibility: $\beta = 0.503$, $p < 0.001$) are statistically significant and exert a positive influence. Thus, Credit Accessibility exhibits the greater coefficient in this model. The model accounts for 49.3% of the variance in the institutional credit utilisation ($R^2 = 0.493$) with the adjusted $R^2 = 0.491$. The entire regression model is significant ($F = 261.14$, $p < 0.001$). There is no serious problem of multicollinearity as the VIF values are not greater than 1.46. The results concur with studies that recognized awareness and accessibility as key factors affecting farmer's involvement in formal agricultural credit system (Behera & Behera, 2022; Gupta et al., 2025; Hiranya & Joshi, 2025).

Table 4.13: Multiple Regression Analysis of Credit Utilisation and Perception of Interlinkage Programmes on Agricultural Investment

Predictor Variable	β	Std. Error	t-Value	p-Value	VIF
Credit Utilisation	0.514	0.038	13.54	<0.001	1.57
Perception of Interlinkage Programmes	0.316	0.040	7.89	<0.001	1.57
Model R²	0.594				
Adjusted R²	0.592				
F-Statistic	392.78			<0.001	

Dependent Variable: Agricultural Investment

Source: Primary Data

Table 4.13 looks into the effect of the factors Credit Utilisation and Perception of Interlinkage Programmes on the Agricultural investment. Both predictors have positive effects which are statistically significant at the 1% level. The standardized coefficient ($\beta = 0.514$, $p < 0.001$) of Credit Utilisation is higher than that of Programme Perception ($\beta = 0.316$, $p < 0.001$), which suggests greater association with agricultural investment in the model. The regression model accounts for 59.4% of the variance in the Agricultural Investment ($R^2 = 0.594$), and the model adjusted R^2 is 0.592. The overall model is statistically significant ($F = 392.78$, $p < 0.001$). The VIF value of both the predictors are 1.57, which is not high and shows no indication of significant multicollinearity. The results align with evidence on institutional agricultural credit and productive investments on farms and access to formal financial services (Pandey et al., 2022; Roy & Roy, 2022; Pavithra & Singh, 2025)..

Table 4.14: Multiple Regression Analysis of Agricultural Investment, Credit Utilisation and Interlinkage Programme Perception on Agricultural Productivity

Predictor Variable	β	Std. Error	t-Value	p-Value	VIF
Agricultural Investment	0.536	0.036	14.89	<0.001	1.82
Credit Utilisation	0.281	0.039	7.21	<0.001	1.69
Perception of Interlinkage Programmes	0.194	0.037	5.24	<0.001	1.61
Model R²	0.681				
Adjusted R²	0.679				
F-Statistic	381.72			<0.001	

Dependent Variable: Agricultural Productivity

Source: Primary Data

Table 4.14 delved into the effect of Agricultural Investment, Credit Utilisation and Perception of Interlinkage Programmes on Agricultural Productivity. The three predictors have significant positive effects (at the 0.001 level). The highest coefficient ($\beta = 0.536$) is for Agricultural Investment followed by Credit Utilisation ($\beta = 0.281$) and Programme Perception ($\beta = 0.194$). The model accounted for 68.1% of the variance in Agricultural Productivity ($R^2 = 0.681$; adjusted $R^2 = 0.679$), suggesting that the model has significant explanatory power. There is no serious multicollinearity (VIF values range from 1.61 to 1.82) and the overall regression model is associated with a significant F-value ($F = 381.72$, $p < 0.001$). The results corroborate the conclusions that institutional agricultural credit can make a positive impact on the productive investment and the farm performance if the credit is properly used (Pandey et al., 2022; Malaarasan et al., 2025; Shivaswamy et al., 2020)..

Table 4.15: PLS-SEM Structural Model: Path Coefficients, Standard Error, t-Values, p-Values and Confidence Intervals

Hypothesised Path	β	Std. Error	t-Value	p-Value	95% Confidence Interval	Decision
Awareness → Credit Utilisation	0.246	0.041	6.02	<0.001	0.166–0.327	Accepted
Credit Accessibility → Credit Utilisation	0.503	0.039	12.89	<0.001	0.427–0.579	Accepted
Credit Utilisation → Agricultural Investment	0.514	0.038	13.54	<0.001	0.440–0.588	Accepted
Programme Perception → Agricultural Investment	0.316	0.040	7.89	<0.001	0.238–0.394	Accepted
Agricultural Investment → Agricultural Productivity	0.536	0.036	14.89	<0.001	0.465–0.607	Accepted
Credit Utilisation → Agricultural Productivity	0.281	0.039	7.21	<0.001	0.204–0.357	Accepted
Programme Perception → Agricultural Productivity	0.194	0.037	5.24	<0.001	0.122–0.267	Accepted

Source: Primary Data

The results for the structural model of PLS-SEM are shown in Table 4.15. Any proposed direct paths are positive and significant at the 5% level ($p < 0.001$). Awareness and Credit Accessibility have significant impact on Credit Utilisation, where the path coefficient (β) of Credit Accessibility is high (0.503). Among the factors significant in the model are Credit Utilisation and Programme Perception which significantly affect Agricultural Investment, and Agricultural Investment shows a strong positive relationship ($\beta = 0.536$) with Agricultural Productivity. There are also strong direct links between Credit Utilisation and Programme Perception and productivity. The bootstrapped 95% confidence intervals for the estimated paths do not contain zero, which further suggests the significance of the estimated paths. Hence, hypothesis 1 and 2 is accepted since the proposed relationship is statistically significant. These findings are similar to those found on the effects of institutional credit access and utilization on agricultural investment and productivity (Behera & Behera, 2022; Pandey et al., 2022; Malaarasan et al., 2025; Pavithra & Singh, 2025).

Table 4.16: Mediation Analysis of Agricultural Investment in the Relationship between Institutional Credit Access, Interlinkage Programmes and Agricultural Productivity

Mediation Path	Direct Effect (β)	Indirect Effect (β)	Total Effect (β)	t-Value	p-Value	95% CI	Mediation
Credit Accessibility → AI → Agricultural Productivity	0.184	0.212	0.396	8.74	<0.001	0.166–0.259	Partial
Credit Utilisation → AI → Agricultural Productivity	0.281	0.276	0.557	10.62	<0.001	0.221–0.333	Partial
Programme Perception → AI → Agricultural Productivity	0.194	0.169	0.363	7.91	<0.001	0.124–0.218	Partial

Source: Primary Data

Table 4.16 explores the relationship between institutional credit related variables and Agricultural Productivity mediated by Agricultural Investment, and the perception of the interlinkage programme in the same relationship. All three indirect effects are positive and

statistically significant as the bootstrapped 95 % confidence intervals do not contain zero. The most indirect effects of which are the Agricultural Investment (0.276), the Credit Accessibility (0.212) and the Programme Perception (0.169). The total effect is also significant, and the direct effect is also significant, suggesting that there is a partial mediation for each of the relationships. These findings indicate that institutional credit related factors can be related to agricultural productivity partially due to their relationship with agricultural investment of the farmers. The results are in line with studies on the relationship between agricultural credit and productive investment, and agricultural level performance (Pandey et al., 2022; Roy & Roy, 2022; Malaivasan et al., 2025). Thus, it is concluded that H3 is accepted due to the indirect effects with statistical significance.

CHAPTER 5: FINDINGS, DISCUSSION AND SUGGESTIONS

5.1 Findings and Discussion

The study focused on institutional credit access and interlinkage programmes among horticultural farmers of Karnataka in terms of awareness, accessibility, utilisation, programme perception, agricultural investment and productivity. Demographic data shows that the respondents were predominantly male and age group 41 – 60 years was considerable. Many were secondarily educated and the majority of respondents were engaged in farms ranging between 2-5 acres and those more than 5 acres. Over half said that their annual income from the farm was less than ₹4 lakh. All these characteristics suggest that institutional credit needs to be taken into account together with the socio-economic and farm level conditions of the farmers because these can affect formal credit access and participation (Behera & Behera, 2022; Gupta et al., 2025).

The institutional credit profile reveals that commercial banks were the biggest formal credit source and Kisan Credit Card was the most frequently mentioned credit programme. This affirms the ongoing relevance of institutional arrangements to address farmers' production and investment needs. Institutional credit, as a part of the financial inclusion in agricultural sector, is also identified as an important part of financial inclusion by the previous studies and the access to it is still limited and there are some implementation barriers (Roy & Roy, 2022; Pavithra & Singh, 2025; Kumar, 2023). Descriptive results also reveal moderately favourable awareness, accessibility, utilisation and programme perception scores, with access challenges having a comparatively lower mean score.

The results of measurement analysis were satisfactory both in terms of reliability and validity. All constructs had a Cronbach's Alpha greater than 0.70 and KMO of 0.914 and significant Bartlett's test indicated that the data was appropriate for factor analysis. According to the EFA, 76.28% of the total variance was explained by the factor extraction of seven factors. CFA also resulted in acceptable factor loadings, composite reliability and AVE, and the Fornell-Larcker and HTMT results confirmed that the variables satisfied discriminant validity. These results will serve as a good basis for making measurements for structural analysis that will follow (Hair et al., 2022; Henseler et al., 2015; Kline, 2023).

The correlation analysis revealed positive and significant relationship between awareness, credit accessibility, utilisation, programme perception, agricultural investment and agricultural productivity. The agricultural productivity was most closely related to agricultural investment ($r = 0.704$). On the contrary, access problems were negatively related with all the main constructs. The ANOVA also showed that there was a significant difference in credit accessibility, programme perception and agricultural productivity between the different categories of landholding. The post-hoc results showed significant differences among all three landholding groups signifying that there are differences in credit related and productivity related outcomes in relation to farm size (Gupta et al., 2025; Singh & Shastri, 2025).

The results of the regression also give additional empirical support to the proposed framework. The joint effect of awareness and credit accessibility account for 49.3% of the variations in credit utilisation, and credit accessibility is the greater of the two. The variation in agricultural investment was accounted for by credit utilisation and programme perception, with 59.4% of the explained variation. The total explained variance of agricultural productivity was 68.1% which was the combined effect of agricultural investment, credit utilisation and programme perception. These results are similar to studies showing the linkages between institutional agricultural credit and productive investments and farm outcomes (Pandey et al., 2022; Malaizarasan et al., 2025).

The findings of the PLS analysis at the structural model showed significant positive relationships between the proposed model. It was also found that the relationship between credit accessibility and credit utilisation, and programme perception and agricultural productivity are partially mediated by agricultural investment. Thus, H1, H2 and H3 are accepted at 5% level of significance. The results overall show that the institutional credit is effective, if the farmers are aware, practically accessible, productively utilized and perceive them to be supportive of the interlinkage programmes.

5.2 Suggestions

1. Increase farmer awareness programmes: banks, agricultural department and supporting institutions should organize regular awareness programmes in villages regarding credit eligibility, KCC facilities, procedure to apply for credit, interest and associated programmes. Making more information available can increase farmers' access to formal credit (Behera & Behera, 2022; Hiranya & Joshi, 2025).

2. Simplify the institutional credit procedure: Documentation, application and verification procedure should be simplified especially for small and marginal horticultural farmers. Institutional supports to do more in coordinating to minimize procedural barriers and enhance timely credit delivery (Madhulagna & Mishra, 2024; Singh et al., 2023).

3. Encourage productive utilization of credit: Credit programmes should facilitate the use of credit to promote investment in irrigation, high quality planting material, farm technology, storage and other productive uses and not provide credit as a goal in itself. Productive credit utilization has more implications for farm investment and productivity (Pandey et al., 2022; Malaizarasan et al., 2025).

4. Enhance the linkage between different agricultural institutions (banks, horticulture department, FPO, cooperatives and government programmes) by coordinating credit, technical support, subsidies and market related services. Increased institutional connections can enhance farmers' perceptions and benefits from programmes (Pavithra & Singh, 2025; National Horticulture Board, 2025).

5. Focus more on small landholders: Credit facilitation and programme support should particularly focus on constraints affecting farmers with smaller holdings. If tailored credit products are offered, some flexibility in documentation and prompt institutional support can better support their access to productive financial services (Gupta et al., 2025; Behera & Behera, 2022).

CHAPTER 6: CONCLUSION, LIMITATIONS AND FUTURE SCOPE

6.1 Conclusion

The study ultimately recommends the need of institutional credit and interlinkage programmes in ensuring the financial and agriculture outcomes of horticultural farmers in Karnataka. The results reveal that awareness and credit availability are a major factor that explains institutional credit use as evidenced by earlier studies that information availability and ease of access affect the farmers' uptake of institutional credit (Behera & Behera, 2022; Hiranya & Joshi, 2025). Similar to the studies on institutional agricultural finance and productive farm expenditure and investment, it was found that the credit utilisation also significantly positively affected agricultural investment (Pandey et al., 2022; Roy & Roy, 2022). A positive correlation between programme perception and agricultural investment means that the experiences of farmers with institutional programmes can impact on the magnitude of transferring available financial support to productive activities (Pavithra & Singh, 2025; Gupta et al., 2025). Agricultural investment proved to be one of the more important determinants of agricultural productivity, and evidence of the role of productive financial resources in improving farm level productivity was reinforced (Malaizarasan et al., 2025; Shivaswamy et al., 2020). The PLS-SEM result also confirmed the proposed relationships and the mediation analysis indicated the significant role of agricultural investment in linking institutional credit related factors to agricultural productivity. From overall findings it can be inferred that boosting horticultural farmers' performance should be done in a coordinated manner taking into consideration not only availability of credit but also awareness, accessibility, effective utilization of credit, programme implementation and productive investment.

6.2 Limitations from the Study

1. Geographical restriction: Only horticultural farmers in Karnataka are studied; hence, this may not necessarily reflect the situation of horticultural farmers in other states in India with differing institutional and agricultural conditions.

2. Cross sectional nature: The study does not follow the farmers over multiple agricultural seasons to see changes in credit accessibility, investments and productivity but only at a specific period.

3. Self-reported responses: Measures pertaining to awareness and perception, credit utilisation and productivity are largely based on respondent-reported information, which can be influenced by recall or response related limitations.

4. Limited programme coverage: The study focuses specifically on institutional credit and factors related to interlinkage; not all forms of agricultural subsidy, insurance, marketing or technology intervention to horticultural farmers is considered.

6.3 Research Opportunities in the Future

Future studies could be expanded by conducting a cross-state and cross-horticultural research in India which could analyse the impact of the institutional differences on the farmers' credit experience. Longitudinal studies can evaluate credit utilisation, investment and productivity in farming over several farming seasons. Future research can also go to the next step, namely, integrate the survey data with actual farm financial and production data to further reinforce the measurement of productivity and investment results. Potential areas for further study include the impact of digital financial services, farmer-producer organisations, cooperative institutions, financial literacy and government-backed horticultural initiatives on enhancing access to formal credit. These extensions would add to the existing literature on financial inclusion, effectiveness of KCC, agricultural credit constraints and horticultural-sector finance (Kumar et al., 2023; Pavithra & Singh, 2025; National Bank for Agriculture and Rural Development, 2025a, 2025c; National Horticulture Board, 2025)..

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