

Narrowing the Credit Divide: Strategies to Bridge Credit Gap among the Dairy Farming Community of Tamil Nadu, India

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Abstract

Access to institutional credit is essential for sustaining and enhancing the growth of dairy farming, particularly in state like Tamil Nadu where majority of farmers belongs to the marginal and small categories. The study was conducted in the state of Tamil Nadu, India, which categorized the state into high and low institutional credit disbursal districts, selecting Coimbatore and Perambalur as representative districts to propose tailored strategies for improving various aspects of institutional credit among dairy farmers. Strategic statements were developed using insights from previous literature, experiences from various credit programs in India and abroad, and expert recommendations. These strategies were organized into hierarchies and stages, and then compared pairwise. The Analytical Hierarchy Process (AHP) was employed as a decision-making tool to identify the most effective strategies for bridging the credit gap, enhancing credit adoption, reducing credit diversion, and improving access to institutional credit among the dairy farming community in Tamil Nadu.

Keywords: Institutional Credit, Dairy Farming, Analytical Hierarchy Process, Credit Gap, Credit Access, Credit Diversion

1. Introduction

Institutional credit serves as a cornerstone of financial systems worldwide, facilitating economic growth, fostering entrepreneurship, and alleviating poverty [1]. In developing countries like India, access to institutional credit is particularly crucial for smallholder farmers, micro-entrepreneurs, and marginalized communities. By providing much needed financial support, it brings about positive changes in their social status, economic well-being, and overall quality of life. In India, agricultural households predominantly prefer institutional sources, as 61 per cent of farmer's availing credit from such sources [2]. The primary goal of India's agricultural policy was to enhance farmers' access to institutional credit while minimizing their reliance on informal credit [3]. Access to adequate credit expands farmers' investment choices, equips them with effective tools to manage risks, and enhances the efficiency of their farming activities [4,5]. Furthermore, it plays a significant role in poverty reduction by improving productivity and yield, thereby increasing the income of agricultural households [3,6,7].

Dairy farming, a key agricultural sub-sector in India, is predominantly composed of landless and marginal farmers, who account for 75–80 per cent of the dairy farming community [8]. For these farmers, institutional credit is indispensable, addressing the inadequacy of personal savings and enabling investment in productive agricultural activities. Dairy farming plays a pivotal role in the rural livelihoods and agricultural development in Tamil Nadu, contributing significantly to employment, income diversification, and the state's agricultural economy. It plays a significant role in providing financial stability to millions of households, especially small and marginal farmers. The state has consistently demonstrated a strong institutional credit flow supported by an efficient banking network, high credit-deposit ratios, and a significant share of outstanding agricultural credit [9,10]. However, regional disparities within the state pose challenges, with farmers in remote or underdeveloped districts often lacking adequate access to financial services [11,12]. Geographical barriers, combined with limited financial literacy, exacerbate this issue and highlight the need for targeted interventions to foster financial inclusion. For dairy farmers, addressing the credit gap

is crucial for sustaining growth and adopting modern, sustainable practices. However, issues such as credit diversion, where funds intended for agricultural and allied purposes are used for non-agricultural activities continue to undermine the sector's progress [13]. Against this backdrop, this study aims to identify and rank strategies to bridge the existing credit gap, enhance credit adoption, reduce credit diversion, and improve overall access to institutional credit among dairy farmers in Tamil Nadu. By addressing these interlinked challenges, this study seeks to provide actionable insights and policy recommendations to strengthen the financial ecosystem supporting the dairy farming community.

2. Materials and Methods

2.1 Sampling

Tamil Nadu has a robust banking network, with 12,659 bank branches operating across the state. The state also requires substantial capital for modernizing its dairy farming sector, and the banking infrastructure of state for credit disbursement is notably superior compared to other states [14]. The state was categorized into two groups based on the level of credit disbursed viz., high and low institutional credit disbursal districts. Each group consisted of 19 districts. From these groups, one district from the high credit disbursal category and one from the low credit disbursal category were selected. Coimbatore, representing the high disbursal category, and Perambalur, representing the low disbursal category, were randomly chosen for the study.

3. Data Collection and Methodology

To develop effective strategies addressing various aspects of institutional credit for dairy farming in Tamil Nadu, a comprehensive approach was adopted by consulting a diverse group of 40 experts from multiple sectors. These experts included officials from key financial institutions such as Lead Banks, State Cooperative Banks (SCB), Regional Rural Banks (RRB), and private banks, members of Self-Help Groups (SHGs), government officials, progressive dairy farmers, researchers and other stakeholders, who is having frequent interaction with dairy farmers and with significant experience and knowledge in agricultural financing. Their insights and feedback were invaluable in understanding the unique challenges and opportunities in accessing institutional credit for dairy farming in the state of Tamil Nadu, thereby ensuring that the

strategies formulated are contextually relevant and practical.

3.1 Analytical Hierarchy Process

Analytical Hierarchy Process provides a systematic and rigorous framework for structuring complex decision problems, eliciting preferences from decision-makers, and deriving informed decisions based on a comprehensive evaluation of alternatives [15]. AHP is a multi-criteria decision making technique for ranking the available alternatives and selection of the most relevant alternatives. The AHP helps decision-makers systematically evaluate and prioritize alternatives by breaking down the decision problem into a hierarchy of criteria and sub-criteria, and then comparing those pair wise to derive relative importance weights. A number of possible strategies are to be compiled from extensive literature review which is to be validated by group of experts. This eigen value approach uses pair wise comparison and also help in calibrating the numeric scale for measurement of quantitative and qualitative performances. The scale ranges from 1 (equally important) to 7 (most important) covering the entire spectrum of comparison.

Step 1: Four $n \times n$ matrix for four components i.e., strategies to meet out credit gap, strategies to improve institutional credit adoption, strategies to reduce credit diversion and strategies to enhance credit accessibility denoted as A, B, C, D are created using the pair wise comparisons with the elements a_{ij} indicating the value of i^{th} criterion relative to j^{th} criterion, as shown in the following formula.

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & \vdots \\ \vdots & \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix}$$

A_{ij} = Pair wise comparison of i^{th} row relative to j^{th} column

3.2 Review of Literature to build up Strategic Statement

Previous research has explored issues such as access to credit, credit gaps, credit diversion, and the adoption of institutional credit from various perspectives, and has proposed strategies to address them. This study aims to evaluate these strategies based on their suitability, feasibility, and relevance to specific conditions.

Sl. No.	Statements
Reduced credit gap (Credit gap- difference between the amounts of credit required by farmers for their needs and the actual amount of credit they are able to access from formal financial institutions.)	
1.	Sanctioning of loan considering overall cost of milk production for dairying
2.	Strengthen existing cooperative credit societies or establish new ones to provide more financial support
3.	Promotion of other income generating activities such as poultry farming, horticulture, or agro-processing.
4.	Relaxation in margin money requirements for loans above Rs. 1.60 Lakhs
5.	Encourage establishment of microfinance institutions that specifically target dairy farmers
Improved credit adoption rates (Adoption- increase in the proportion of farmers who utilize formal financial services, such as loans and credit products to meet their financial needs)	
1.	Expanding the range of subsidy programs to include targeted initiatives that address specific needs within the dairy farming sector
2.	Relaxation on minimal collateral requirements for dairy farmers based on the size of their operation and their creditworthiness.

3.	Establish local outreach programs in rural areas for direct connection with farmers
4.	Encourage the adoption of digital banking and mobile-based financial services among farmers
5.	Set up demonstration farms showcasing successful agricultural practices supported by institutional credit
Reduced credit diversion (Diversion- farmers use the funds obtained through institutional credit for purposes other than those for which the loan was originally sanctioned.)	
1.	Implementing targeted financial literacy programs to educate farmers
2.	Encourage community-based monitoring systems that involve local stakeholders in keeping track of credit utilization.
3.	Introduce incentive programs that reward farmers for the proper and productive use of credit
4.	Create awareness on how to maintain a good balance of savings
5.	Strengthen the monitoring mechanisms of financial institutions to track the end use of the credit provided
Enhanced Credit accessibility (Accessibility- farmers are aware of benefits of institutional credit but not able to avail them due to other factors)	
1.	Strengthening the existing credit programmes by streamlining loan application processes, reducing bureaucratic hurdles
2.	Leveraging digital technologies, such as mobile banking and online loan applications
3.	Introduce incentive programs that reward farmers for the proper and productive use of credit
4.	Identify alternatives to physical collateral based guarantees (Group guarantees).
	Creating awareness about the various loans available to farmers

Step 2: Forming a Judgmental Scale

Which one is more affected	Intensity of importance
Equally important	1
Least important	2
Slightly important	3
Moderately important	4
Moderate plus important	5
Strongly important	6
Most important	7

Using this scale for judgment, information was collected from participants in both representative districts of Tamil Nadu.

Note: Here, a'_1, a'_2, a'_n ; are sum of column 1, 2, n respectively

Step 3: Filling the Value in Matrix

The values a_{ij} were obtained in the manner, If $a_{ij} = 1$, $a_{ji} = 1/a_{ij}$, where $a_{ij} > 0$, for all i. Therefore, if a number was assigned to element i when compared to element j, then j had the reciprocal value when compared with i.

Step 5: Calculation of Criteria Weights / Priority Vector / Scaling Factor

Criteria weights were calculated by taking average of all the elements in the row of normalized table matrix B.

Step 4: Obtaining of Normalized Matrices

Sum of each column of the matrix was computed. Then, each value of the table was divided by the sum value of the respective column to get the normalized value.

$$B = \begin{bmatrix} \frac{a_{11}}{a'_1} & \frac{a_{12}}{a'_2} & \dots & \frac{a_{1n}}{a'_n} \\ \frac{a_{21}}{a'_1} & \vdots & \dots & \frac{a_{2n}}{a'_n} \\ \vdots & \vdots & \dots & \vdots \\ \frac{a_{n1}}{a'_1} & \dots & \dots & \frac{a_{nn}}{a'_n} \end{bmatrix}$$

$$\frac{\sum \frac{a_{11}}{a'_1}, \frac{a_{12}}{a'_2}, \dots, \frac{a_{1n}}{a'_n}}{n} = i$$

$$\frac{\sum \frac{a_{21}}{a'_1}, \dots, \frac{a_{2n}}{a'_n}}{n} = ii$$

$$\frac{\sum \frac{a_{n1}}{a'_1}, \dots, \frac{a_{nn}}{a'_n}}{n} = m$$

Note: Here, i, ii,, m; are the Criteria weights

Step 6: Calculating the Consistency Ratio (CR)

The consistency ratio was calculated to check whether the estimated value is correct or not.

Calculation of the λ_{max} :

λ_{max} is the largest eigen value of the matrix A.

$$\lambda_{max} = \frac{\sum(a'_n \times m)}{n}$$

N	1	2	3	4	5	6	7
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32

Step 7: The criteria weight for each component matrix was arranged in descending order, with the strategy or indicator having the highest value indicating a higher preference compared to others within each strategy.

4. Results and Discussion

Results of the analytical hierarchy process (AHP) for ranking the strategies regarding different aspects of institutional credit in Tamil Nadu was given in tables 1 to 4.

4.1 Strategies to meet out the Credit Gap for Dairy Farmers in Tamil Nadu

Inadequacy of credit adversely influences the adoption of modern technology and private capital investments, which in turn lowers the productive capacity and results in lower productivity and production [16]. Credit gap was one of the major problems that affect the credit utilization efficiency of borrower farmers. There are many ways to meet out the credit gap and improve the efficiency of credit utilization by farmers. The perceived best fit

$$\text{Coincidence indicators} = \frac{(\lambda_{max} - n)}{n - 1}$$

The CR is consistent when it is less than 0.1. Thus $CR = CI/RI$ Where, RI is the Random index and depends on the number of elements/ strategies being compared, n and takes on the following values:

for the farmers of Tamil Nadu with respect to meeting out the credit gap was presented in table 1. The analysis results found that, in order to meet out the credit gap, the best way would be sanctioning of institutional credit considering the overall cost of milk production for dairying. The experts could agree the need to sanction the loans considering the overall cost of milk production for dairying with a relative weight of 0.361 (36.1%). Strengthening of existing cooperative credit societies or establishing newer ones to provide more financial support came up as the second best way to meet out the credit needs of farmers (28.4%). Promotion of other income generating activities such as crop production, bee-keeping, fish culture etc along with dairying was the third best way to meet out the credit needs of the farmers and thus reducing the credit gap (15.3%). Relaxation in margin money requirements for loans above Rs. 1.60 lakh and encouraging the establishment of microfinance institutions that specifically target dairy farmers were ranked as the 4th and 5th strategies to meet out the credit gap of dairy farmer.

Sl. No	Strategies	Average Item weight	Rank
1	Sanctioning of loan considering overall cost of milk production for dairying	0.361	I
2	Strengthen existing cooperative credit societies or establish new ones to provide more financial support	0.284	II
3	Promotion of other income generating activities such as poultry farming, horticulture, or agro-processing.	0.153	III
4	Relaxation in margin money requirements for loans above Rs. 1.60 Lakhs	0.123	IV
5	Encourage establishment of microfinance institutions that specifically target dairy farmers	0.079	V

Table 1: Item Weight and Rank Order of Strategies to Meet Out The Credit Gap for Dairy Farmers in Tamil Nadu

4.2 Strategies to Improve The Adoption Rate of Institutional Credit in Tamil Nadu

Strategies to improve the adoption rate of institutional credit in Tamil Nadu were given in table 2. Subsidies on interest rates for institutional loans can make credit more affordable for farmers [17]. Lowering the cost of borrowing makes credit a more attractive option for those who may have been hesitant due to high-interest rates [18]. According to the ranking by experts, increasing the number of subsidy programs can attract the farmers to adopt loans from institutional credit sources. The experts could agree this strategy as the most important with a relative weight of 0.335 (33.5%). By relaxing collateral requirements, financial institutions

can extend credit to a broader segment of farmers, including those who would traditionally be considered high-risk due to a lack of collateral. This fosters financial inclusion and supports the economic empowerment of marginalized farmers. Thus relaxation of minimal collateral requirements had the potential to draw a significant number of marginal farmers into the banking sector, consequently enhancing the adoption rate of institutional credit. Local outreach programs facilitate direct communication between financial institutions, agricultural experts, and farmers. This personal interaction helps in conveying information about the availability, benefits, and application process of institutional credit. Experts ranked the establishment of local outreach programs

in rural areas as the third most effective strategy to enhance the adoption rates of institutional credits by farmers (21.4%). By promoting digital banking and mobile financial services, policymakers, financial institutions, and agricultural development agencies can work together to improve credit access for farmers.

This was ranked as the 4th strategy with a relative weight of 12.1 per cent. Setting up of demonstration farms showcasing successful agricultural practices supported by institutional credit was ranked as the 5th strategy with an item weight of 7 per cent.

Sl. No	Strategies	Average Item weight	Rank
1	Expanding the range of subsidy programs to include targeted initiatives that address specific needs within the dairy farming sector	0.335	I
2	Relaxation on minimal collateral requirements for dairy farmers based on the size of their operation and their creditworthiness.	0.260	II
3	Establish local outreach programs in rural areas for direct connection with farmers	0.214	III
4	Encourage the adoption of digital banking and mobile-based financial services among farmers	0.121	IV
5	Set up demonstration farms showcasing successful agricultural practices supported by institutional credit	0.070	V

Table 2: Item Weight and Rank Order of Strategies to Improve The Adoption Rate of Institutional Credit in Tamil Nadu

4.3 Strategies to Reduce The Diversion of Institutional Credit in Tamil Nadu

Strategies to reduce the diversion of institutional credit for unintended purposes ranked by experts were given in table 3. Farmers had a very limited option of using the taken credit fund for the proposed income generating activity; they spent a significant portion of their received credit on unproductive activities like consumption, leisure, social programs etc. [19]. Financial literacy programs were ranked as the most important strategy by experts to foster credit diversion. Financial literacy programs provide farmers with knowledge about fundamental financial concepts such as interest rates, loan terms, and the overall structure of credit products. This understanding enabled them to make informed decisions when utilizing credit. Thus conducting financial literacy programs to educate farmers can play a crucial role in reducing credit diversion by fostering a better understanding of financial principles and responsible credit usage (0.40). Local stakeholders,

being part of the community, can foster a sense of accountability among farmers who were less inclined to divert credit when they know their neighbors are involved in monitoring. Thus encouraging community based monitoring systems to keep track of credit utilization was ranked as the second best strategy for the effective reduction of credit diversion for unintended purposes (0.27). Incentive programs create a positive reinforcement mechanism, encouraging farmers to use credit responsibly for its intended purpose. By linking incentives to proper credit utilization, farmers are motivated to adhere to the prescribed guidelines. Considering such incentive programs for farmers were ranked as the third strategy to reduce credit diversion (0.13). Creating awareness on how to maintain a good balance of savings from dairy farming and strengthening the monitoring mechanisms of financial institutions to track the end use of the credit provided was ranked as the last two strategies with a relative weight of 0.11 and 0.07

Sl. No	Strategies	Average Item weight	Rank
1	Implementing targeted financial literacy programs to educate farmers	0.401	I
2	Encourage community-based monitoring systems that involve local stakeholders in keeping track of credit utilization.	0.276	II
3	Introduce incentive programs that reward farmers for the proper and productive use of credit	0.134	III
4	Create awareness on how to maintain a good balance of savings	0.111	IV
5	Strengthen the monitoring mechanisms of financial institutions to track the end use of the credit provided	0.078	V

Table 3: Item Weight and Rank Order of Strategies to Reduce The Credit Diversion of Institutional Credit in Tamil Nadu

4.4 Strategies to Improve The Credit Access of Farmers in Tamil Nadu

Strategies to improve the credit access of farmers in Tamil Nadu were given in table 4. Improving credit access for farmers in Tamil Nadu involved a multi-faceted approach that addresses various challenges they face. By strengthening existing credit programs

with a focus on inclusivity, affordability, and efficiency, farmers can experience improved access to institutional credit. This, in turn, can contribute to the growth and sustainability of agriculture in the region [20]. Strengthening credit programs involves extending their coverage to reach a larger number of farmers. This expansion ensures that more farmers, including those in remote or underserved

areas, can access institutional credit [21]. Thus strengthening the existing credit programmes to enhance the access to institutional credit of farmers in Tamil Nadu was supported by most of the experts with a relative weight of 0.334 (33.4%). Farmers in rural areas often face geographical challenges in reaching physical bank branches. Technology allowed them to access financial services from the comfort of their homes or villages, overcoming geographical constraints. Digital platforms can streamline the loan application and approval processes, reducing paperwork and administrative hassles. This efficiency saves time for both farmers

and financial institutions. Thus facilitating use of technology for loan applications, disbursements, and repayments was ranked as the second strategy to improve credit access in Tamil Nadu by experts. Introduce incentive programs that reward farmers for the proper and productive use of credit was come up as the third strategy with a relative weight of 0.18. Identifying alternatives to physical collateral based guarantees and creating awareness about the various loans available to farmers were ranked as the fourth and fifth strategies to improve the credit access of farmers.

Sl. No	Strategies	Average Item weight	Rank
1	Strengthening the existing credit programmes by streamlining loan application processes, reducing bureaucratic hurdles	0.334	I
2	Leveraging digital technologies, such as mobile banking and online loan applications	0.190	II
3	Introduce incentive programs that reward farmers for the proper and productive use of credit	0.181	III
4	Identify alternatives to physical collateral based guarantees (Group guarantees).	0.151	IV
5	Creating awareness about the various loans available to farmers	0.144	V

Table 4: Item Weight and Rank Order of Strategies to Improve The Credit Access of Farmers in Tamil Nadu

5. Conclusions

Addressing the credit challenges faced by the dairy farming community requires a multifaceted approach. The present study aimed to develop tailored strategies for improving various aspects of institutional credit among dairy farmers with the assistance of stakeholders working closely with dairy farmers. The study identified that sanctioning loans based on the overall cost of milk production is the optimal strategy to minimize the credit gap, ensuring that financial support aligns with the actual needs of farmers. To enhance the adoption of institutional credit, increasing the number of subsidy programs was found to be the most effective measure, particularly for encouraging non-borrower farmers to engage with formal financial systems. Additionally, targeted financial literacy programs emerged as a critical intervention for reducing credit diversion by educating farmers on the appropriate utilization of borrowed funds. Finally, strengthening existing credit programs was highlighted as the most impactful approach to improving access to institutional credit, enabling a larger number of farmers to benefit from structured financial support.

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