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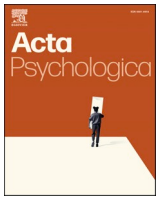

Bridging the psychological and policy gaps: Enhancing farmer access to agricultural credit in India

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ABSTRACT

Majority of the farmers in India remain marginalized in accessing essential financial resources despite well-intentioned agricultural credit policies. This shows there is a significant gap in their implementation and execution. This study explores the disconnect between policy frameworks and real world application, highlighting the need for transformative agricultural credit policies. It also emphasizes addressing psychological barriers in farmers' perceptions of credit access. Through qualitative research methodology, seven focus group discussions were conducted across Dakshina Kannada district in India with participants including farmers, bankers, government officials, and NGO representatives. Each discussions comprised average of 9-12 participants based on their expertise and experience in agricultural finance. The discussions revealed several themes which includes key challenges such as poor accessibility, lack of inclusivity, and limited adoption of digital innovations that persist. The study underscores the necessity for tailored credit schemes, farmer training programs, and streamlined digital technologies to address the gaps in policy execution. Moreover, it emphasizes the need for further policy interventions like a single-window credit system, holistic evaluation methods, and incentives for sustainable farming practices. Additionally, it calls for a more rigorous focus on execution at the grassroots level, including the implementation of soil testing programs to promote long-term sustainability. While acknowledging regional limitations, this research highlights the urgency of addressing the disconnect between policy and practice, offering actionable insights to improve agricultural credit systems that better serve smallholder farmers and to support in achieving global sustainability goals.

1. Introduction

India's agricultural sector is employing nearly half the population and contributing 15.11 % to GDP (2021−22) has long relied on credit as a catalyst for productivity and rural livelihood enhancement. Historically, institutional credit systems evolved from cooperative movements in the early 20th century to post-independence reforms like bank nationalization (1969) and priority sector lending (1974) which mandated banks to allocate 18 % of loans to agriculture (Desai, 2021). Even though government implemented several agricultural credit policies, majority of the farmers face barriers in accessing the agricultural credit in India where only 33 % of farmers have access to credit facilities (Ramasamy & Malaiarasan, 2023). This indicates inefficient credit distribution system that excludes a majority of farmers. In this context, the gap between policy intentions and practical outcomes becomes even more critical. Therefore, the need for effective sustainable agricultural credit policies should be given paramount importance where agriculture forms the backbone of the economy and sustains the livelihood of millions in a developing country like India.

Many studies explored and concluded that access to agricultural credit is essential for rural development and allows farmers to make investments that increase productivity and income (Benson & Faguet, 2023; Ogundeji et al., 2018; Sekyi et al., 2017). Studies show that credit boosts productivity by 24 % and reduces downside risk by 16 % (Birthal et al., 2025). Further, a study by (Sher et al., 2024) referred that sustainable finance policies such as interest-free credit, has been shown to improve smallholders' marketing decisions, producer prices, and technological progress, leading to increased sustainable supply response and farmers' income. Such timely interventions proven to be more impactful in agricultural development. In particular, researchers propound that the different types of policy interventions such as influencing income diversification (Saqib et al., 2016), doubling of agricultural credit (Manoharan & Varkey, 2022) to farmers is crucial for economic development and socio-economic transformation, as it can lead to improved

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farm production and rural prosperity.

Farmers require credit for investment, short-term crop production, and consumption, which are essential for family sustenance (Assouto & Houngbeme, 2023; Jia et al., 2015). (Martey et al., 2019) argued that credit may help farmers adopt more efficient production technologies and cope with income variation. Furthermore, credit support will motivate farmers to employ various techniques such as crop rotation, cover crops, agroforestry, organic farming, carbon sequestration, decreased tillage, water management strategies, and precision agriculture to preserve environmental sustainability. Economic management with environmental, and social sustainability concepts at the farm level can improve farms' resilience, profitability, and long-term viability while reducing adverse environmental effects (Bi et al., 2024; Darnhofer et al., 2010). Existing studies also provide insights into the adoption of sustainable practices, financial advantages of conservation agriculture, and the impact of sustainable practices on household food security (Boix-Fayos & De Vente, 2023; Dönmez et al., 2024; Pham et al., 2021). Hence, payments for ecosystem services are hoped to encourage and promote sustainable practices through financial incentives.

However, the performance of agricultural credit disbursement in India has been less satisfactory in terms of both the allocation of credit to agriculture and target attainment. Reports state that informal credit serves as a significant portion of the total agricultural credit requirements in India, accounting for 40 % (Kumar & Pathak, 2024). This is problematic due to the high interest rates which influence the borrowing behavior of farmers, with interest rate elasticity affecting their credit constraints (Key, 2020; Ölkers & Mußhoff, 2024). This will ultimately worsen the economic well-being of farmers. Other significant sources of agricultural credit include money lenders, shopkeepers, relatives or friends, and co-operative societies. Despite the growth in institutional credit, a significant number of farmers still rely on non-institutional sources, such as moneylenders, which often charge exorbitant interest rates (RL & Mishra, 2022). This reliance is particularly high among smallholders. According to Ruml and Parlasca (2022) and Khan et al., (2024), the primary challenges that farmers encounter in the context of agricultural credit include a lack of access to formal credit is due to unclear land records, a skewed ratio between short-term and long-term agricultural credit, and insufficient access to crop insurance.

Moreover, small-scale farmers face challenges accessing credit due to higher transaction costs, complicated procedures, and the inability to provide tangible collaterals (Jiang et al., 2024). Tenants and share-croppers face difficulties in accessing credit due to lack of land ownership (Behera & Behera, 2022; Bhanot et al., 2024). Farmers' access to credit is also influenced by factors such as engagement in off-farm income-generating activities, farm size, and perception of operational modalities (Amponsah et al., 2023). These credit constraints will negatively impact farmers' welfare and income. Additionally, (Bilal & Baig, 2019) state that agricultural credit systems struggle with poor risk mitigation mechanisms, especially in the wake of crop failures, leading to non-performing assets and loss to lending banks. Therefore, the development of effective credit systems for small and medium-sized agricultural operations are crucial, with the need for targeted long-term and medium-term loans and guarantees to cover risks associated with agricultural activities. On the other hand, financial institutions perceive high credit risk in rural and agricultural markets due to vulnerability to climatic shocks and commodity price volatility (Liu et al., 2024). This perception leads to a disconnection between the financial system and the agricultural sector, hindering access to agricultural finance.

Additionally, the major psychological barriers that farmers face when accessing credit include information asymmetry, risk aversion, and financial illiteracy. These barriers impact farmers' ability to access credit by creating mutual distrust between lending institutions and borrowers (Khan et al., 2024), leading to a lack of definitive descriptive information about either party. Moreover, risk aversion and financial illiteracy among borrowers affect credit-rationing of smallholder agricultural households (Balana et al., 2022; Boucher et al., 2008). The impact of these psychological barriers on farmers' decision-making in seeking credit is evident in the negative association between constraints to credit and educational attainments of the farmers, family members, and high off-farming income (Dey & Singh, 2023). These demand-side factors are as significant as supply-side constraints in limiting credit access.

Therefore, re-orienting agricultural credit systems through government policies towards more decoupled forms of support is essential to improve economic efficiency and environmental performance. Thus, this study explores the disconnect between policy frameworks and real-world application. It also highlights the need for transformative agricultural credit policies and provide inferences to policymakers to undertake further improvised policy implementation after considering the views from all the stakeholders.

2. Materials and methods

2.1. Study design

This study adopted qualitative research design using the focus group discussion (FGDs) method to collect data. This method facilitates discussions to elicit views and lay theories about the individual topic, allowing participants to disclose their thoughts, feelings, perceptions and their experience about a particular issue with the least bias possible (Lauri, 2019). FGDs allow for in-depth exploration of social issues and interactions among group members, providing accounts that are more akin to regular conversation than those obtained through individual interviews. A guide is prepared that outlines the topics and questions to be discussed during the FGD. The main questions were,

- How can agriculture credit policies be designed to enhance accessibility and inclusivity while promoting sustainable development in the Indian agricultural sector?
- What roles do digital technologies and platforms play in improving credit access for farmers while promoting environmental sustainability?
- What policy interventions are needed to align agriculture credit frameworks with sustainable development goals, and how can stakeholders collaborate to implement these solutions effectively?

2.2. Data collection

The purposive sampling and snowball technique was used in this study as it contributes to the credibility, transferability, dependability, and confirmability of the study, thus addressing the aspects of rigor and trustworthiness. Purposive sampling helps in uncovering multiple realities and diverse perspectives, which is essential for qualitative research aiming to explore various dimensions of human experiences and behavior (Wan, 2019). The latter increase the diversity of the sample, which can lead to more comprehensive and varied data (Kirchherr & Charles, 2018). Both allows for selecting participants based on the study's purpose, ensuring that each participant provides unique and rich information of value to the study, thereby enhancing the validity and reliability of the research.

Dakshina Kannada district was selected for this study due to its unique agricultural landscape and the challenges farmers face in accessing credit. The district is home to 116 Primary Agricultural Credit Cooperatives (PACS), which play a crucial role in providing financial services to farmers. Despite the presence of these cooperatives, many farmers in Dakshina Kannada continue to encounter difficulties in obtaining timely and adequate credit. A study by (Lokesha & Hawaldar, 2019) states that demographic, agricultural, and credit-related factors influence the utilization of agricultural credit in Dakshina Kannada district. Furthermore, the district's diverse agricultural practices, including the cultivation of various cash crops, necessitate tailored

financial products and services. However, the existing credit infrastructure often falls short in meeting these specific needs, leading to suboptimal utilization of available credit facilities. By focusing on Dakshina Kannada, this study aims to identify the specific barriers to credit access faced by farmers and to develop targeted interventions that can enhance financial inclusion and support sustainable agricultural development in the region.

A total of 72 participants were selected, with each cluster comprising 9 to 12 individuals, including bankers, farmers, and other stakeholders. When selecting participants (P), it was ensured that participants had prior experience with the agricultural loan approval process in some capacity. Moreover, farmers and bank officials from rural branches from each clusters were well-versed in current agricultural credit systems among the selected participants.

Data collection took place in various settings, such as work premises and homes, ensuring contextual relevance. In all clusters, non-participants were present, potentially influencing discussions and providing additional insights. To enhance data reliability, structured interview guides were used, and all sessions were audio/video recorded alongside detailed field notes. The duration of discussions ranged from 45 min to 1 h 20 min, allowing for a thorough exploration of key themes.

Following data collection, each transcript was summarized to facilitate thematic analysis. This comprehensive study design enables a deeper understanding of both psychological and structural barriers to credit access. The insights gathered will contribute to policy recommendations, focusing on improving financial literacy, streamlining credit procedures, and enhancing digital financial inclusion to make agricultural credit more accessible and efficient.

2.3. Data analysis

The FGDs are conducted in a comfortable and private setting. The moderator introduced the topic and questions, encouraged participation, and ensured that all participants have an opportunity to speak. The FGDs are recorded using audio and video equipment. This allows for accurate transcription and analysis of the data. The audio and video recordings of the FGDs, which were originally in the local language (Kannada), are subsequently translated and transcribed into written text in English. This process facilitated the analysis and interpretation of the data. The data collected from the FGDs is filtered to select the most relevant and informative data for analysis. The selected information are analysed using thematic analysis as elaborated by (Braun & Clarke, 2006; Naeem et al., 2023). Summary of study design has been described in Table 1:.

3. Results

Three dimensions were identified during the analysis of the study's findings. At first, discussion of psychological barriers in accessing credit and to overcome those barriers were discussed. It involved the informant's perspective on the methods to improve the overall inclusivity and accessibility of agricultural credit, followed by the importance of integrating digital innovation into agricultural credit systems, and finally, the role of policymakers in enhancing the impact of agricultural credit systems.

3.1. Theme 1: factors that enhance accessibility and inclusivity

The participants' perspectives on the factors that improve accessibility and inclusivity reveal a few aspects (Table 2), including the need for training and awareness on the various credit schemes available to them, the need for a single identification system as a farmer, and the need for targeted credit schemes based on the crop grown and/or their geographical area.

Table 2
Factors that enhance accessibility and inclusivity.

Themes	Supporting Statements
Training and Awareness	*"Awareness reduces barriers in accessing formal credit and financial services" (P 9)* *"Financial literacy programs will help farmers boost confidence in managing the credit effectively" (P 23)* *"Training promotes understanding of more sustainable agricultural practices." (P 14)*
Farmer Identification System	*"It is important to implement systems which will ensure that credit reaches the right farmers effectively." (P 11)* *"Similar to Adhaar Card, the government can provide to identify a farmer" (P 23)*
Tailored credit schemes	*"Flexible loan terms align with seasonal incomes will ease farmers' financial burdens" (P 32)* *"… and to support sustainable agricultural practices, customized loans are necessary which meet unique farmer needs" (P 41)* *"Alternative collateral options will widen access to credit for smallholders." (P 5)*

Table 1
Study design.

Particulars	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Sampling	Purposive & Snowball	Purposive & Snowball	Purposive & Snowball	Purposive & Snowball	Purposive & Snowball	Purposive & Snowball	Purposive & Snowball
Approach	T & F-F	T & F-F	T & F-F	T & F-F	T & F-F	T & F-F	T & F-F
Sample Size	11	10	09	10	11	9	12
Setting of Data Collection	WP	H	H	WP	WP	WP	WP
Presence of Non-Participants	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Description of Sample	B = 3 F = 5 O = 3	B = 2 F = 6 O = 2	B = 2 F = 4 O = 3	B = 2 F = 5 O = 3	B = 3 F = 5 O = 2	B = 2 F = 4 O = 3	B = 3 F = 6 O = 3
Interview Guide	P	P	P	P	P	P	P
Audio/Visual Recording	Y	Y	Y	Y	Y	Y	Y
Field Notes	Y	Y	Y	Y	Y	Y	Y
Duration	1:00 h	1.00 h	1.20 h	0.52 h	0. 50 h	0.45 h	0.45 h
Summarise the transcript	Y	Y	Y	Y	Y	Y	Y

Note: T = Telephone, F-F = Face to Face, E-m = Email.
WP – Workplace, H – Home.
Y = Yes, N = No; P = Provided.
B = Bankers, F = Farmers, O = Other Occupations including the representative from NGOs.

3.1.1. Training and awareness

The participants stressed about the need of comprehensive programs to educate farmers about credit options, loan management and financial planning. They stated that increasing awareness among farmers about the availability and benefits of institutional credit can empower them to make informed decisions and access financial services more effectively.

> *"Simple guidance on filling out loan applications and understanding eligibility criteria is crucial. More training programs would help every farmer access formal credit more easily" (P 9).*

Another farmer responded that training sessions should be a community effort.

> *"Training isn't just for individual farmers—it can be a community effort. Local leaders and successful farmers can share their experiences in simple training sessions, creating a support network that helps everyone understand the credit process better and negotiate with banks on better terms" (P 24).*

3.1.2. Farmer identification system

The stakeholders opined that implementing uniform farmer identification systems will enable smallholders to access the credit easily. It will also simplify the application process and ensure transparency and accountability in lending. They are of the opinion that this system reduces the risk of exclusion and enhances trust between farmers and financial institutions.

A farmer opined that, *"With a proper identification system, it's easier to prove that I'm a genuine farmer. This helps banks quickly recognize my eligibility for loans, making the process smoother and more transparent" (P 15).*

Additionally, they also stated that it will reduce the chances of fraud activity.

> *"This system reduces the chance of fraud by ensuring that only true farmers get access to credit. Still, there's a need for more training so that every farmer understands how to use it effectively and benefits from formal credit channels." (P 46).*

On the other hand, bank managers were also supporting the single identification system which they believed will increase the trust between farmers and finance service providers. Furthermore, they propounded that this collaborative ecosystem is a greater step for financial inclusion.

> *"A comprehensive farmer identification system lays the foundation for a collaborative ecosystem among banks, government agencies, and financial service providers and farmers. This synergy can drive innovation in tailored financial products for farmers, while also ensuring that the system is responsive to on-ground challenges. For us, it represents a step towards greater financial inclusion" (P 30).*

3.1.3. Tailored credit schemes

Considering the diversified agricultural system in India, participants stated that customized financial credit schemes that align with cycles of different farming communities and their geographical location, crop-specific loan will have a marked improvement in credit uptake. This approach ensures that the credit schemes are relevant and beneficial for farmers unique circumstances.

> *"As a farmer, I often feel overwhelmed by the complex paperwork and rigid loan processes of traditional banks. A tailored credit scheme that considers our seasonal income patterns and simplifies documentation would make a huge difference. It shows that the system is built for us, reducing our fears and building trust. This approach makes it easier to apply for and secure affordable credit, which is exactly what we need" (P 15).*

Furthermore, stakeholders believed that alternative collateral options with tailored credit schemes helps reduce the psychological stress associated with rigid, high-stakes collateral demands.

> *"I look forward to a time when banks understand our farming realities. Instead of demanding our most valuable asset, they could accept alternative collateral such as harvest pledges or community-backed guarantees, making loan approval less stressful and more farmer-friendly." (P 5).*

3.2. Theme 2: role of digitalization in access to credit

Stakeholders were also asked regarding the impact and role of digitalization of loan approval process for better outcome. While few initiatives will directly impact farming community, few other initiatives will enable financial institutions to supply agricultural credit to farmers more effectively and with reduced risk. Participants have provided 4 major aspects in this regard (Table 3): digitalization of loans, literacy programs, land mapping and integrated program.

3.2.1. Digitalization of loan

According to the informants, the digitalization of loans will streamline the credit application and approval process. Digitalization also reduces processing time and costs which makes it easier for farmers to access credit when they need it the most.

An NGO representative who also own farms, shared opinion on this regard which illustrates how digitalization of loan approval process will ease in overcoming psychological barriers.

> *"Digitalizing the loan approval process makes every step visible and predictable, which helps to ease farmers' fears of hidden biases or unfair practices. When farmers can track their loan application in real time, it reduces uncertainty and builds trust in formal systems. This transparency, along with clear, digital guidance, effectively lowers the psychological barriers that have long kept many farmers from accessing credit" (P 54).*

Stakeholders are of the opinion that innovative loan processes are emerging as effective tools to break down the mental barriers that have traditionally kept farmers from accessing formal credit.

> *"Digital loan approvals mean I no longer have to travel long distances or wait in long queues. I can apply for a loan from my smartphone and receive updates in real time, which makes managing my farm finances much simpler" (P 10).*
>
> *With online loan tracking, I will have better clarity about my application status. This transparency gives me confidence to invest in new farming techniques, as I know exactly when to expect financial support" (P 18).*

Table 3
Digital Impact in access to credit.

Themes	Supporting Statements
Digitalization of Loan	*"Online applications reduce barriers for rural farmers seeking financial support" (P 35)* *"Loans through digital tools enhance transparency and reduce processing time" (P 18)*
Literacy Program	*"Understanding digital technology helps farmers use banking platforms" (P 17)* *"It is very difficult for farmers in rural areas to navigate through digital tools" (P 64)*
Land Mapping	*"Mapping technologies ensure equitable credit allocation to deserving farmers" (P 5)* *"Land data enhances farmers' credibility and access to financial resources" (P 13)*
Integrated Platform	*"One-stop platforms make it easier for farmers to apply for and deal with loans." (P 25)* *"Unified platforms connect farmers to essential resources and information" (P 34)* *"There should be a platform where farmers should be able to share their insights on their outperforming crops" (P 38)*

3.2.2. Literacy programs

Further, stakeholders highlighted the need for digital awareness programs to empower farmers to effectively use digital platforms and tools as many farmers lack the skills needed to navigate digital interfaces. This programs can enhance their ability to access credit digitally. Informants stressed the importance of literacy programs, including training farmers basic digital skills for financial transactions and communications, offering continuous assistance and troubleshooting to ensure farmers remain confident and capable digital users.

> *"What should happen is a collaborative, community-based rollout of digital literacy programs that are tailor-made for rural farmers. Banks, NGOs, and government agencies need to work together to create hands-on training modules—delivered in local languages—that demystify the digital loan approval process. These initiatives should not only provide clear, step-by-step guidance on how to use online banking platforms but also offer continuous technical support" (P 55).*

3.2.3. Land mapping

When discussing the role of land mapping before disbursing the credit to farmers, stakeholders stated that effectively implementing robust land mapping initiatives shall be a cornerstone of our rural development strategy. It helps in creating secure land tenure, facilitates targeted policy interventions, and ultimately drives sustainable economic growth by ensuring that land resources are accurately valued and managed.

> *"Accurate land mapping gives us clear property records, which means we can prove our ownership easily. This clarity not only secures our rights but also makes it easier for us to access loans and other support services" (P 33).*

Further, stakeholders opined that land mapping ensures that credit assessments are based on reliable data, reducing risks for lenders and improving access for farmers.

> *"Reliable land mapping is crucial for risk assessment. With precise land records, we can verify collateral more effectively, reducing fraud and enabling us to extend credit more confidently and responsibly" (P 37).*

3.2.4. Integrated platform

Participants pointed out that integrated programs which should offer a comprehensive platform that includes credit applications, financial management tools, market information and advisory services will provide farmers with the tools they need to succeed in a digital economy.

> *"Innovative, integrated solutions that merge credit access with financial management and market information are key to transforming agricultural practices in the digital age" (P 19).*

Additionally, informants mentioned that such platforms shall streamline the credit application process, making it more efficient and accessible to those who reside in the remote areas.

> *"When I can access everything I need—loan applications, financial management, market information, and expert advice—from one digital platform, it removes the confusion and empowers me to plan my farming activities more effectively" (P 33).*

> *"If we had a unified platform that offered integrated financial services, market intelligence, and tailored advisory support, it would greatly reduce the complexity of managing farm finances and open up new opportunities for growth" (P 57).*

3.3. Theme 3: Policy interventions

In addition, the study sought how policymakers can implement better agricultural credit policies that foster access to credit to farmers based on transparency and accountability. The informants focused on four areas with a multifaceted approach (Table 4): single window system, holistic evaluation and feedback systems, incentive schemes, and soil testing.

3.3.1. Single window system

Participants believe that introducing single window systems is crucial, integrating various government departments of the agriculture sector, financial and service provides, and simplifying the procedures for loan applications, approvals and disbursements. This policy intervention will enhance farmers ability to access credit in a timely and efficient manner during the critical phases of agricultural production.

> *"A one-stop integrated platform will be transformative, making it easier for marginalized farmers to navigate the bureaucracy and secure the credit required for sustainable agricultural development" (P 25).*

> *"Integrating various government and financial services into one platform will not only simplify loan procedures but also enhance transparency and accountability, leading to improved credit management and better outcomes for farmers" (P 63).*

3.3.2. Holistic evaluation

Stakeholders are advocating for a holistic evaluation system that integrates financial, agronomic, and socio-economic indicators to create a more accurate and equitable assessment of farmer potential.

> *"A comprehensive evaluation system that goes beyond traditional financial metrics is essential for recognizing the diverse strengths and challenges of rural farmers. This approach can empower underserved communities by providing them with tailored financial support and opportunities for growth" (P 29).*

> *"Integrating various data points—ranging from land records and crop performance to market trends—into a holistic evaluation system allows us to better understand a farmer's creditworthiness and manage risk more effectively, leading to more confident lending decisions" (P 48).*

According to the participants, this approach shall also include assessing farmers' agricultural practices, income potential and risk management strategies. They ascertain that, *"by recognizing the value of sustainable practices and innovative farming techniques, financial institutions can better assess the creditworthiness of farmers who lack formal*

Table 4
Policy interventions suggested by participants.

Themes	Supporting Statements
Single Window System	*"Why can't they integrate all agricultural departments into centralized platforms…?" (P 42)* *"It is necessary to combine all agricultural sections into one which will lower the obstacles of bureaucracy, so making credit more accessible to smallholder farmers." (P 35)*
Holistic Evaluation	*"Popular Schemes may not always be successful < … > hence evaluation and feedback systems are required" (P 51)* *"Incorporating environmental and social factors for more responsible lending is required" (P 46)* *"Evaluation promotes sustainable practices by evaluating broader impacts on communities." (P 17)*
Incentive Schemes for Sustainable practices	*"If they reward farmers for adopting eco-friendly technologies and methods, then they will embrace such activities" (P 46)* *"We will incur loss if we don't get support for sustainable practices" (P 60)* *"Farmers will adopt environment friendly practices if they are financially benefited" (P 55)*
Soil Testing	*"Banks should consider informed credit decisions based on accurate soil health assessments" (P 33)* *"Soil testing guides sustainable investments for long-term agricultural health" (P 17)*

assets" (P 17).

3.3.3. Incentive schemes for sustainable practices

Stakeholders indicated that incentive schemes should be designed to promote sustainable agricultural practices which will positively impact both credit accessibility and environmental outcomes. They also mentioned few ways to incentivize. For example, *"government should announce schemes that offer financial rewards, lower interest rates and grant to farmers who adapt practices such as organic farming and water conservation" (P 9).*

3.3.4. Soil testing

Stakeholders also stressed upon the implementation of mandatory soil testing program. It will provide insights into soil health enabling them to make informed decisions about fertilizer use and crop selection. Participants raised concerns on the issue.

> *"The cultivation of crops that produce a higher yield in other regions will not be the same in this region. Individuals are unaware of this and consequently incur losses in their investments" (P 25).*

They suggested that financial institutions should incorporate soil test results into the credit evaluation process to acknowledge the significance of soil health in determining agricultural productivity.

> *"For financial institutions like us, reliable soil health data enhances risk assessment and informs loan decisions. It ensures that investments in agriculture are backed by scientifically validated land quality information" (P 56).*

> *"Implementing compulsory soil testing is a strategic step toward evidence-based policymaking. It enables to monitor land health nationwide, tailor agricultural subsidies effectively, and promote sustainable farming practices" (P 60).*

4. Discussion

The results suggest that the agricultural credit systems must be transformed in order to improve the agricultural sector's resilience, sustainability, and productivity. To address global challenges such as climate change, food security, and rural poverty, it is necessary to establish innovative credit frameworks that prioritise inclusivity, technological advancements, and strategic policy interventions. Therefore, the discussion's outcome synthesises the key findings and insights from recent literature, providing a nuanced understanding of how agricultural credit can be in accordance with sustainable development goals.

The analysis and results indicate that financial literacy and training programs are crucial for overcoming the knowledge and psychological gap that restricts farmers' access to financial institutions. As participants have indicated, these programs are crucial in improving farmers' awareness of financial services, thereby enabling them to confidently navigate credit systems and make informed financial decisions. This is crucial, as Lusardi and Mitchell (2014) have highlighted. Further, acknowledging the diverse needs of the farming community, tailored credit schemes that are proposed by the participants are as essential mechanisms to provide them flexible loan terms, alternative collateral options, and targeted support for marginalized groups in agriculture. Even studies by (Tetteh et al., 2022; Thilmany et al., 2022) underline that farmers can invest more wisely in sustainable practices and technologies when credit products are tailored to fit the particular cash flow patterns and risk connected with agricultural activities, thereby increasing production and resilience.

Digital technologies have increasingly influenced the accessibility of agricultural credit, as evidenced by recent advancements in the digitalisation of financial services. The discussion on the digitalisation of financial services for farmers reveals that it will considerably reduce processing time and transaction costs, thereby increasing the accessibility of credit to farmers in remote areas. This is in line with (Sarfo et al., 2021; Y. Wang et al., 2023) who state that digital financial services provide a scalable solution to geographical and logistical barriers, enabling farmers to access credit more efficiently through mobile banking and digital wallets. Moreover, integrated digital platforms as suggested by participants that provide comprehensive solutions for financial management, market information and advisory services will empower farmers to make data-driven decisions (Ayre et al., 2019; Bhaskara & Bawa, 2021; Borrero & Mariscal, 2022). Nevertheless, the efficacy of digital intervention is dependent upon the level of digital literacy among farmers. Programs that are designed to enhance digital skills are essential for ensuring that farmers are capable of utilising digital tools and platforms effectively. Ultimately, this necessitates the creation of a digital ecosystem that is inclusive and user-friendly and that is tailored to the diverse needs of the agricultural community, through the collaboration of government agencies, financial institutions, and technology providers.

Participants identified a few policy interventions that necessitate comprehensive strategies for future implementation. They prioritized on three aspects: 1. Sustainability. 2. Inclusivity and 3. Innovation. There is a consensus among participants that a centralized platform should be established to facilitate the application for credit and the acquisition of information in all agricultural domains. This system would simplify the process of accessing credit-related services. This single system window system shall reduce administrative barriers, enhance transparency, and improve the efficiency of credit delivery (F. Wang, 2018). Further, holistic evaluation approaches that incorporate environmental, social and economic criteria into credit assessments as mentioned by participants will be vital for promoting sustainable agricultural practices. This also align with the recommendations provided by Reserve Bank of India (2019). These approaches encourage financial institutions to consider long - term impacts and risks in their lending decisions, fostering investments to consider that contribute to environmental conservations and social well-being. Additionally, incentive schemes as proposed by informants will also motivate farmers to adopt environmentally friendly practices. Moreover, as (O'Neill et al., 2021) stated, soil testing provides critical insights into physical, chemical, and biological qualities of soil aiding in sustainable land use and environmental management. The participants suggestion of incorporating soil testing into credit risk assessments can provide critical insights into the sustainability of farming operations, thereby enabling more informed credit decisions that support the long-term resilience of the agricultural sector (Mahdi et al., 2017). In general, the findings of the study is consistent with the existing literature and offer comprehensive solutions to tackle various policy and psychological gaps in agricultural credit systems.

This study is subject to specific limitations. Even though, this research provided valuable insights into transforming agricultural credit systems, the agricultural practices and challenges differ among regions due to variations in climatic conditions, socio-economic conditions, and the availability of infrastructure. Hence, the study's limitation to a specific geographical area may fail to encompass these aspects by limiting the applicability of its recommendations to specific regions. Future research should focus on conducting field studies, pilot programs, and case studies to gather empirical evidence on the effectiveness of these interventions in various contexts. Furthermore, future research can expand on this study to create more focused and influential approaches for improving agricultural credit systems.

5. Implications and conclusion

The study aimed to gain insight into the perspectives of stakeholders in the agricultural credit system to formulate more effective policy interventions. The farming community can effectively utilize credit to achieve agricultural growth through environmental sustainability in various ways. Unfortunately, farmers have difficulties securing the loans they need from banks due to the complicated application processes and

strict collateral requirements associated with traditional credit systems. The present research emphasizes the necessity of credit policies that are more inclusive and adaptable as they must respond to the unique obstacles encountered by farmers. Although financial institutions frequently regard agriculture as a high-risk sector, there is a significant opportunity to effectively access and mitigate risks using technology. Financial institutions can facilitate the development of innovative solutions that satisfy both financial and environmental objectives by collaborating with technology providers. Policymakers can provide diversified credit products suitable for the agricultural sector by emphasizing different segments and considering and prioritizing sustainability development goals. In addition, promoting financial literacy is essential for enabling farmers to access and utilize credit effectively. These measures will help alleviate the psychological obstacles that have long hindered farmers from accessing credit. The efforts of non-governmental organizations and development agencies are vital in this regard.

Overall, sustainable and transformative agricultural credit policies have the potential to significantly enhance agricultural productivity, environmental sustainability, and the rural economy. In order to formulate policies that are both environmentally sustainable and financially viable, it is essential to employ collaborative approaches that incorporate the perspectives of various stakeholders, including farmers, financial institutions, policymakers, and NGOs. This will establish a more resilient and inclusive agricultural sector that facilitates the growth of a nation.

CRediT authorship contribution statement

Jayadeva Hiranya: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Harish G. Joshi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Declaration of competing interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Data availability

Data will be made available on request.

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