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Agricultural Loan Management by Mobile Banking: Opportunities and Challenges

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ABSTRACT

In Bangladesh, agriculture is not merely an economic activity, it is the backbone of rural life. Yet, traditional agricultural loan systems often leave farmers disadvantaged due to long processing times, excessive paperwork, and limited access to financial institutions. This study aims to evaluate the effectiveness of a digitized agricultural loan system powered by Mobile Financial Services (MFS) and electronic Know Your Customer (e-KYC) processes in overcoming these barriers. Using survey responses from 111 professionals engaged in agricultural loan management, the study compares traditional loan practices with a proposed automated model. The findings reveal that the digital system reduces loan approval time by an average of 62%, cuts operational costs by approximately 45%, and significantly improves accessibility and transparency. While the model promises transformative benefits, constraints such as inadequate rural internet infrastructure, low digital literacy among farmers, and the lack of digitized land and identity records pose challenges. Therefore, the study recommends coordinated efforts from policymakers, banks, telecom operators, and agricultural agencies to expand rural connectivity, simplify user interfaces, digitize essential documents, and provide digital training for farmers. By implementing these strategies, Bangladesh can modernize its agricultural finance ecosystem, promote financial inclusion, and enhance rural resilience.

INTRODUCTION

Agriculture is considered backbone economy of Bangladesh, contributing both directly and indirectly to national development. In recent years, this sector has played an increasingly vital role in ensuring food security, creating employment, and driving GDP growth. According to Bangladesh Bank, agriculture contributed 11.38% and 11.04% to the gross domestic product (GDP) during the fiscal years 2022–2023 and 2023–2024, respectively (BBS, 2023, 2025). Beyond its direct contribution, agriculture supports the growth of the industrial and service sectors by supplying raw materials and labor. As per the Labor Force Survey conducted in 2022, approximately 45.40% of the employed population in Bangladesh are engaged in agricultural activities, emphasizing its significance in the country's labor market (BBS, 2022). The agricultural sector is crucial in helping communities adapt to climate change, ensuring we have enough food, and protecting livelihoods in rural areas. It also plays a vital role in achieving the United Nations' SDGs, including ending hunger, reducing poverty, and promoting decent work. To make progress on these goals, it's important to provide timely support to farmers. Agricultural loans are one way to ensure they have the resources they need to grow their crops, improve productivity, and secure a better future (UN, 2024). In Bangladesh, agricultural loans are small, low-interest loans provided to farmers for crop cultivation. In the 2023-2024 fiscal year, the target was set at BDT 35,000 crore, but scheduled banks disbursed BDT 37,153.90 crore, benefiting 3.7 million farmers. The Bangladesh Rural Development Board (BRDB) also supported rural farmers, with a target of BDT 1,423 crore. These loans are part of the Agricultural and Rural Credit Policy, overseen by Bangladesh Bank (Bangladesh Bank, 2024). Despite efforts to improve, Bangladesh's agricultural loan system remains outdated and inefficient. The process is still largely manual, causing delays in loan disbursement. Farmers often struggle to get loans on time due to lengthy procedures and required in-person visits, especially during the planting season. This delay reduces the effectiveness of the loans, impacting agricultural productivity and the economy (Thakur, 2024). A major challenge is the inaccessibility of bank branches, which are mostly located in urban areas, while many farmers live 8 to 10 kilometers away in rural areas. To access a small loan of less than BDT 50,000, a farmer spends around BDT 2,500 on travel, which is 5% of the loan amount. Including repayment, the total cost of loan management rises to 10-15%. The process can take 5 to 10 days, leading to significant opportunity costs for farmers who lose valuable time from their farming work (Ahmed, 2024). The documentation process is a hassle for farmers, as they have to visit multiple offices for document verification. While some documents, like National IDs and land records, are online, key documents like title deeds still need manual checks, slowing down loan processing. This highlights the need for a fully automated agricultural loan system in today's tech-driven world (NirvikBD, 2025). Getting a farm loan is still a hassle. Farmers often have to run between offices like the Union Land Office and Upazila Parishad for document checks. While some records, like National IDs and land ownership, are online, key papers like title deeds still need manual verification. This slows everything down. In today's digital world, it's clear we

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need a fully automated system to make agricultural loans faster and easier (Abdullah, 2025; Arifuzzaman & Islam, 2024). Mobile financial services like Nagad, Bikash and Rocket are already part of daily life in rural Bangladesh. By connecting these platforms to the agricultural loan system, farmers could apply for loans, get funds, and make repayments all from their phones. It's a smart way to cut down on bank visits and make the process faster and easier (Prodhan *et al*., 2024; Yesmin *et al*., 2019). A key requirement for this transformation is the execution of electronic Know Your Customer (e-KYC) protocols. E-KYC allows individuals to open a bank account using their National ID card by submitting a selfie and a photo of the ID through a mobile phone. The system verifies the provided information in real time using the national ID database (BFIU, 2019). Once verified, the account becomes fully operational. By combining e-KYC with MFS and online document verification, an end-to-end automated loan management process can be developed. This system must be user-friendly, especially considering that many farmers have limited digital literacy (BFIU, 2019; World Bank, 2017). As industries worldwide go digital, it's time for agriculture in Bangladesh to catch up. Automating the agricultural loan process using mobile financial services (MFS) can make borrowing quicker, cheaper, and more accessible for farmers. This research aims to identify the challenges in the current system and propose a digital, MFS-based loan framework that is cost-effective, legally sound, and scalable. The goal is to reduce loan delays, cut transaction costs, and give farmers timely access to credit empowering them and boosting the agricultural economy.

LITERATURE REVIEW

Agriculture is vital to Bangladesh's economy, contributing 11.02% to GDP in FY 2023–24. It also supports industrial and service sectors and employs 44.41% of the workforce (Labor Force Survey, 2023). Agriculture plays a significant role in food production, exports, employment generation, and resilience against climate change. Technological advancement in agriculture is essential for food security, poverty reduction, and rural welfare. Therefore, the government formulates agricultural loan policies annually to ensure adequate financial support (Bangladesh Bank, 2025a). Agricultural loans are available for genuine farmers and individuals engaged in income-generating rural activities. Special priority is given to landless, marginal, and small farmers (less than 2.47 acres of land). Sharecroppers can also access loans upon verifying their involvement in production and residency within the bank's operational area, with NID and landowner certification (Bangladesh Bank, 2025a). Banks are expected to simplify loan forms for easy understanding by farmers. Instructions must be clear and comprehensive. Crop loan applications should be processed within 10 working days, and disbursement should occur at least 15 days before the crop season begins. Rejected applications must be documented with reasons for audit and verification. Crop collateral is acceptable for up to 5 acres of cultivation. Larger loans may require traditional collateral depending on the bank-customer relationship. Loans up to BDT 500,000 for income-generating rural activities can be disbursed without collateral (Bangladesh Bank, 2025a). Banks can verify NID and smart card data online through the Bangladesh NID Application System. This digital verification ensures authenticity and transparency in financial services (Economy, 2015). The e-KYC system allows digital identity verification and is used to open bank or MFS accounts using an NID and smartphone. It ensures legal digital transactions (BFIU, 2019). Bangladesh has digitized its land records, maps, and registrations to improve transparency and reduce corruption. This initiative helps modernize agricultural documentation (Issue-I, 2025). The Credit Information Bureau (CIB) database provides borrower history, including outstanding and closed loans. For loans below BDT 50,000, CIB reports are not mandatory (New Age, 2024). Land certificates (Porcha), mutation documents, and rent receipts now include QR codes. These can be verified online to detect forgeries easily (bdnews24.com, 2022b). Land ownership and mortgage data can be accessed through Bangladesh's mortgage databank, Ministry of Land portals, and GIS tools (bdnews24.com, 2022a). MFS has become an essential part of financial inclusion, especially in rural areas. As of June 2024, 21.82% rural and 18.75% urban populations had MFS accounts. Monthly transactions reached BDT 1.45 trillion in September 2024, showing a 33.85% increase from 2023. MFS bridges formal banking with informal economies, expanding financial access nationwide (Zaman, 2024). By January 2025, around 12,000 bank branches operated in Bangladesh, with only 5,700 in rural areas. Conventional systems remain manual and labor-intensive, though many support services are now digital. Challenges include poor internet connectivity and insufficient digitization (Bangladesh Bank, 2025b). However, based on the overall procedure the proposed system is app-based. Farmers will open an account using e-KY. Link MFS numbers for disbursement and repayment. Choose loan schemes and submit details. Upload collateral and required documents. Bank officers will verify submissions and communicate approval or rejection. Disbursement and recovery will be entirely via MFS, reducing processing time to under 3 hours for farmers and 1 hour for bankers. This system aims to eliminate queues, delays, and dissatisfied clients.

Although other sectors in Bangladesh have undergone successful digital transformation, agricultural loan management remains manual. With available infrastructure, rules, and cloud technology, there's a unique opportunity to develop a fully automated, cost-effective, and lawful system. The paper highlights this void in automation as a key research gap that, if addressed, can significantly enhance agricultural productivity and GDP.

Research Questions

Given the background, here are the key questions this

research aims to explore

1. How does the mobile financial service (MFS) based automated loan management systems influence loan management costs compared to conventional loan management system management in agricultural loan management?
2. What is the effect of mobile financial services (MFS) based automated loan management systems on the time taken for loan sanction and disbursement in agricultural loan management?
3. To what extent is the mobile financial service (MFS) based automated loan management system more convenient than the conventional loan management system in agricultural loan management?

Objectives

The several objectives of this study are given below:

1. To examine the impact of mobile financial service (MFS) based automated loan management systems on loan management costs in agricultural loan management.
2. To assess the effect of mobile financial service (MFS) based automated agricultural loan management systems on loan sanction and disbursement time compared to the conventional agricultural loan management system.
3. To evaluate the convenience of mobile financial service (MFS) based automated loan management systems in agricultural loan management.

MATERIALS AND METHODS

To explore how Mobile Financial Services (MFS) can improve agricultural loan management in Bangladesh, this study employed a quantitative approach using a structured questionnaire survey of 111 professional including bankers, loan officers, and IT staff—from both public and private banks. Participants were selected through purposive sampling to ensure relevant experience in agricultural loan processing, and the sample size was justified based on accessibility and comparable studies suggesting 100+ respondents are adequate for Likert-scale analysis. The questionnaire, developed through literature review and expert input, focused on three key areas: cost, time, and convenience of the loan process, with items rated on a 5-point Likert scale. A pilot test involving 10 participants was conducted to refine question clarity and content validity. Data analysis was carried out using SPSS, employing descriptive statistics to identify trends, Cronbach's Alpha to confirm internal reliability (0.77 for the conventional system, 0.79 for the automated system), and paired sample t-tests to examine significant differences between systems, alongside correlation analysis to explore inter-variable relationships. While the findings offer meaningful insights into the advantages of digitization, the study recognizes limitations such as potential self-reporting bias, selection bias due to purposive sampling, and limited generalizability, highlighting the need for future studies to incorporate randomized sampling and operational data for broader validation.

Align to the objectives following hypotheses were developed

H_1: The automated agricultural loan management system using mobile financial services (MFS) significantly reduces the cost of managing loans compared to the conventional system.

H_2: The automated system significantly reduces the time needed to approve and disburse loans.

H_3: The automated system is more convenient than the traditional method of managing agricultural loans.

All three hypotheses were tested using statistical tools. The results showed strong evidence that switching to an automated, MFS-based system reduces costs saves time, and makes the whole process more convenient for both bankers and farmers.

RESULTS AND DISCUSSION

Demographics analysis

This part of the study highlights the main results and present the findings from the research, focusing on the demographic characteristics of respondents and the operational effectiveness of conventional versus automated agricultural loan management systems in agricultural loan management. The following discussion highlights key insights derived from the data and addresses the impact of automation on efficiency, cost, and convenience in the sector.

Table 1: Age of Respondent

Age	Frequency	Percent	Cumulative Percent
Below 25 years	2	1.80	1.80
26 to 35 years	43	38.70	40.50
36 to 45 years	55	49.50	90.10
46 to 55 years	11	9.90	100.00
Total	111	100.00	

Table 1 indicates age distribution and shows that most respondents (49.50%) are aged 36 to 45 years, followed by 38.70% in the 26 to 35 years group. Only 9.90% fall in the 46 to 55 years range, and a minimal 1.80% are below 25 years. This suggests a workforce primarily in mid-career stages, with younger employees being significantly underrepresented. The cumulative percentage confirms that the majority (90.10%) are between 26 and 45 years (Table 1).

Table 2: Gender of the Despondences

Gender	Frequency	Percent	Cumulative Percent
Male	96	86.50	86.50
Female	15	13.50	100.00
Total	111	100.00	

Table 2 reveals the he genders distribution and indicates a significant male dominance, with 86.50% of respondents being male and only 13.50% female. This suggests a gender imbalance in the surveyed population, potentially reflecting industry trends. The cumulative percentage shows that females make up a small fraction.

Table 3: Designation of Respondent

Official designation	Frequency	Percent	Cumulative Percent
Assistant General Manager and above	27	24.30	24.30
Deputy General Manager	1	.90	25.20
Job seeker	1	.90	26.10
Loan Applicant (Borrower)	1	.90	27.00
Officer / Senior officer	31	27.90	55.00
Principal Officer	27	24.30	79.30
Senior Principal Officer	23	20.70	100.00
Total	111	100.00	

The table 3 illustrates designation distribution and reveals that the largest group comprises officers/senior officers (27.90%), followed closely by assistant general managers and principal Officers, both at 24.30%. Senior principal officers make up 20.70%, while deputy general managers, job seekers, and loan applicants each account for a minimal 0.90%. The data suggests a workforce primarily composed of mid-to-senior-level professionals, with relatively fewer individuals at entry-level or job-seeking stages.

Table 4: Banking Experience of Respondent

Duration of Experience	Frequency	Percent	Cumulative Percent
Below 5 years	20	18.00	18.00
06 to 10 years	34	30.60	48.60
11 to 15 years	41	36.90	85.60
16 to 20 years	14	12.60	98.20
Above20 years	2	1.80	100.00
Total	111	100.00	

In the meantime, Table 4 shows that a majority of respondents (36.90%) have 11 to 15 years of banking experience, with another 30.60% having worked in the sector for 6 to 10 years.

A smaller portion (12.60%) has 16 to 20 years of experience, while only 1.80% have over 20 years. Notably, 18% have less than 5 years of experience. This suggests a workforce primarily composed of mid-career professionals, with fewer employees at senior levels.

Table 5: Respondent Experience in Agriculture Loan Management

Experience in Agriculture Loan Management	Frequency	Percent	Cumulative Percent
Below 05 years	69	62.20	62.20
06 to 10 years	33	29.70	91.90
11 to 15 years	6	5.40	97.30
16 to 20 years	2	1.80	99.10
Above 20 years	1	.90	100.00
Total	111	100.00	

On the other hand, Table 4 depicts the experience distribution in agriculture loan management shows that a majority (62.20%) have less than 5 years of experience, followed by 29.70% with 6 to 10 years. Only 7.20% have more than 10 years of experience, with just 0.90% having over 20 years. This indicates that most respondents are

relatively new in this field, with a limited number of highly experienced professionals, suggesting a workforce in its early to mid- career stages. Agricultural loan management system isa very easy. More than 1 year experience is enough to provide excellent service for these types of loan.

Table 6: Respondent Key Responsibility in Agricultural Loan Management

Key Responsibility	Frequency	Percent	Cumulative Percent
Cash	1	.90	.90
Loan Committee Member	20	18.00	18.90
Dealing Officer	37	33.30	52.30
ICTD	1	.90	53.20
IT security	1	.90	54.10
N/A	10	9.00	63.10
Other	1	.90	64.00
Recovery Officer/Legal Officer	10	9.00	73.00
Sanctioning Authority	29	26.10	99.10
Supervising	1	0.90	100.0
Total	111	100.00	

Table 6 illustrates the key responsibilities in AGM are primarily held by dealing officers (33.30%) and sanctioning authorities (26.10%), indicating their significant roles in the process. Loan credit committee members account for 18.00%, while recovery and legal officers make up 9.00%. A notable 9.00% marked "N/A," possibly indicating indirect involvement. Who are not working in this sector. Other roles, such as IT security, ICTD, and cash handling, are minimal. This suggests that most respondents are actively engaged in loan approval and processing functions. Most of the respondents are directly involved with loan sanctions and disbursement, so we find most realistic data.

Reliability analysis

Cronbach's Alpha measures the reliability of a scale. An alpha of 0.9 or higher is excellent, 0.8 to 0.9 is good, 0.7 to 0.8 is acceptable, and 0.6 to 0.7 is questionable. Below 0.6 indicates poor reliability. Generally, an alpha above 0.7 is considered reliable for most research (Cheung *et al.*, 2024).

Table 7: Reliability Statistics

Cronbach's Alpha	Number of Items
0.791	3

Table 7 shows that Cronbach's Alpha values for the conventional agricultural loan management system (0.77) and automated agricultural loan management system (0.79) indicate good internal consistency for both variables. Since both values are above 0.70, the measurement scales for these systems are considered reliable. The slightly higher alpha for the automated system suggests marginally better consistency in responses compared to the conventional system.

Hypothesis testing

The findings delineated in Table 8 elucidate whether the posited paths achieve statistical significance, adhering to a conventional significance threshold of $p < 0.05$ (Roohafza *et al.*, 2016)

Table 7: Hypothesis Testing

Hypothesis	Standard Deviation (SD)	P Values	Results
H1: The automated agricultural loan management system using mobile financial services (MFS) significantly reduces the cost of managing loans compared to the conventional system.	0.080	0.038	Supported
H2: The automated system significantly reduces the time needed to approve and disburse loans.	0.126	0.024	Supported
H3: The automated system is more convenient than the traditional method of managing agricultural loans.	0.090	0.002	Supported

H_1 highlights that the automated system significantly cuts the cost of managing loans, with SD = 0.080, $p < 0.038$, meaning the reduction in costs is statistically significant. H_2 demonstrates that the automated system also speeds up the process of loan approval and disbursement, with SD = 0.126, $p < 0.024$, proving a substantial decrease in

processing time. Finally, H3 confirms that the automated system is much more convenient than the old method, with SD = 0.090, $p < 0.002$, showing clear evidence of its ease of use. These findings highlight that the automated system significantly improves cost-efficiency, time management, and overall convenience for both farmers and banks (Table 8).

Proposed Automated Agricultural Loan Management Model

Convert conventional agricultural loan management system to automated agricultural loan management system we considered a lot thing. After analyze survey result and face to face interview we drown a model (flow diagram) of automated agricultural loan management system. In this model, the loan applicant and the bankers are meet only when the charge documents will sign.

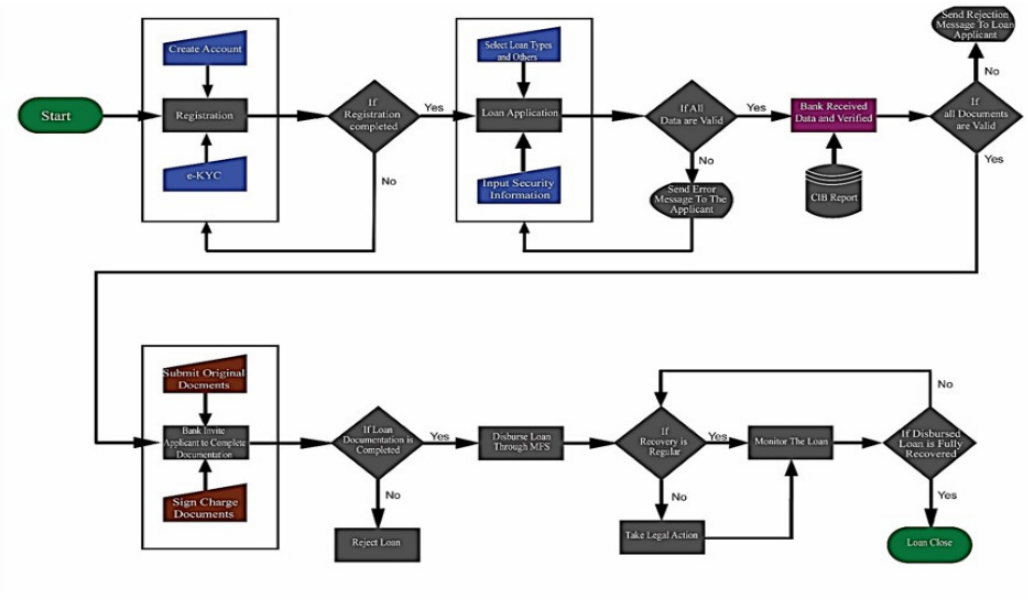

Figure 1: The Proposed Model

Previously loan applicant will compile his/her applications and banker are verified all documents through existing online. If all documents are valid and loan applicant fully compliance the loans application conditions then bank will approved & sanction loan. Then bank will invite the loan applicant for sign charge documents and to submit required documents to bank. After charged documents signed and bank received required original documents from loan applicant, bank disburse loan through mobile financial service. Finally, bank will monitor & recovery the loan until the loan is liquated through mobile financial service (MFS). To complete all thing (From loan applicant registration to loan disburse) required not more than two hours (Figure 1).

Findings

Based on the results the findings are as follows

1. The majority of respondents (49.50%) are aged between 36 to 45 years, followed by 38.70% in the 26 to 35 years group. Only 9.90% are aged between 46 to 55 years, and a minimal 1.80% are below 25 years. This indicates that the workforce is primarily composed of mid-career professionals.

2. A significant gender imbalance exists, with 86.50% of respondents being male and only 13.50% female. This suggests a male-dominated workforce in agricultural loan management.

3. The largest group comprises officers/senior officers (27.90%), followed closely by assistant general managers and principal officers, each at 24.30%. This indicates that most respondents hold positions with significant involvement in loan processing.

4. Most respondents (36.90%) have between 11 to 15 years of banking experience, followed by 30.60% with 6 to 10 years. This suggests that a majority of the respondents have substantial experience in the banking sector.

5. The majority (62.20%) have less than 5 years of experience in agricultural loan management, with only a small portion (5.40%) having more than 10 years. This shows that many respondents are relatively new in this specific field

6. Most respondents are involved in loan processing and sanctioning. The largest group consists of dealing officers (33.30%) and sanctioning authorities (26.10%), indicating that a significant portion of the respondents is directly responsible for loan approval and disbursement.

7. It is also found that the help automation system decreases cost of loan management ($p < 0.038$), shortens the lead time of loan approval and disbursement ($p < 0.024$) and improves users' convenience ($p < 0.002$). Such

statistically significant findings imply beneficial gains in the cost-effectiveness, time-saving and user-friendliness of the new model, which is advantageous for farmers as well as for the banks.

Recommendations

Based on what the study found about using mobile financial services (MFS) to automate agricultural loan management in Bangladesh, here are some practical suggestions to make the system more effective and farmer-friendly:

1. As the workforce mainly consists of the professionals between 36 and 45 years old, such training programs may concentrate on the upgrading this group to become more efficient in agricultural loan management.
2. This striking gender imbalance emphasizes the importance of policies and programs aimed at increasing the number of women in agricultural finance.
3. As they already have a large number of experienced bankers, the banks have to introduce mentor programs to enlighten the less experienced staff members about the agricultural lending procedures.
4. Since the duration of working experience is less than 5 years for most of the staff, special training and updating programs need to be implemented to enhance their level of skill.
5. Since a substantial majority of the respondents perform the actual work of loan processing as well as sanctioning, clear operational instructions, accountability and performance rewards should be introduced to minimize both time and incorrect decision.
6. The demonstrated advantages of automation in terms of cost, time to approval, and user convenience, tell us that banks are to consider investing into or scaling up the use of automated applications in agricultural credit processing.
7. Moreover, farmers, especially smallholder farmers, need easy to use digital tools for loan applications and tracking to increase adoption and satisfaction.
8. The tools of automation and the capacity of the workforce to deliver services and support policy must be continuously monitored to ensure these are improving over time.

Limitations

This study has a few limitations to keep in mind. With 111 respondents, it might not capture the full picture especially for entry-level workers in agricultural loan management. Since the research focused on specific areas, its findings might not apply well where internet or mobile coverage is weak. Also, because the data came from self-reporting, there's a chance of some bias or inaccuracies. We do not yet know how well the automated system performs over the long term. Legal issues like data privacy weren't fully explored, and the views of important groups like policymakers or tech providers were missing. Still, despite these gaps, the study offers helpful insights into how automation could improve agricultural loan management.

CONCLUSION

This study shows that moving to a mobile financial service (MFS)-based system can make agricultural loans faster, cheaper, and easier for farmers in Bangladesh. Instead of spending days traveling to banks and dealing with paperwork, farmers can now apply, receive, and repay loans right from their phones. It saves time, cuts costs, and makes the whole process more convenient for everyone involved. But to make this work for all farmers, especially in rural areas, there's still work to do. Many farmers need better internet access and support to use digital tools confidently. Key documents like land records also need to be fully digital for the system to run smoothly. In short, automating agricultural loan management isn't just a tech upgrade, it's a step toward empowering farmers, boosting productivity, and building a stronger agricultural sector. With the right support and investment, this change can create lasting benefits for both rural communities and the broader economy.

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