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Institutional Barriers and Policy Constraints to Credit Access Among Smallholder Dairy Farmers in Kenya: A Best Worst Scaling Approach

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Abstract
This study aimed to identify and prioritize institutional barriers and policy constraints affecting access to credit among smallholder dairy farmers in Kenya. The research was conducted in Rongai sub-county of Nakuru County, targeting smallholder dairy farmers who play a central role in the country's milk production. Primary data were collected from 298 farmers using semi-structured questionnaires, while secondary data were obtained from relevant literature. A multistage sampling technique was employed, and the Best-Worst Scaling (BWS) Case 1 approach was applied to systematically rank the most and least limiting institutional and policy-related constraints. The findings revealed that high interest rates, collateral requirements, and inflexible repayment terms were the most critical barriers limiting farmers' access to credit, while documentation and proximity to financial institutions were less constraining. The study concludes that institutional and policy-related challenges significantly impede smallholder farmers' participation in formal credit markets. It recommends adopting flexible collateral options, digitizing and simplifying loan application processes, and investing in rural financial infrastructure and literacy to enhance credit accessibility. These findings provide valuable insights for policymakers, financial institutions, and farmer organizations to design inclusive financial systems tailored to smallholder needs.
Keywords: Credit access, institutional barriers, policy constraints, best-worst scaling, smallholder dairy farmer.
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1. Introduction

Agriculture remains a critical pillar of Kenya's economy, contributing substantially to national GDP, rural employment, and household food security (Yılmaz & Njora, 2021). Within this sector, dairy farming occupies a central role, accounting for approximately 12% of agricultural GDP, 4% of the national GDP and serving as a vital source of nutrition and income for millions of rural households (Otieno, 2022). Despite its dominance, the dairy sector is dominated by smallholder dairy farmers who account for 80% of total milk production in the country (King'ori, 2022). These smallholder dairy farmers often operate under resource-constrained conditions and face challenges such as insufficient quantity and quality of feeds, limited access to breeding services, prevalence of diseases, poor access to output markets and restricted access to credit facilities (Odero, 2017).

Access to credit has been widely recognized as a crucial enabler of agricultural transformation (Nasereldin *et al*., 2023). Credit access facilitates investment in improved breeds, quality feeds, veterinary services, and modern production systems, thereby enhancing productivity and profitability (Nasereldin *et al.,* 2023; Wilkes *et al*., 2018). However, credit uptake in the dairy subsector remains significantly low compared to its potential due to the absence of fixed assets and the inability to meet loan requirements among smallholder farmers (Mwanyika & Koori, 2020). This mismatch between demand and supply of financial services signals persistent barriers that hinder farmers from effectively accessing credit.

The existing body of literature has documented many challenges that small-scale farmers encounter when seeking loans from various credit sources. Commonly cited obstacles include high interest rates, proximity to

lending institutions, complex application processes, collateral requirements by financial institutions, the flexibility of loan repayment conditions, limited access to credit information, credit scoring system and personal factors such as age, gender, education level, farm income and experience (Falola *et al.,* 2022; Khan *et al.,* 2024; Kiros & Meshesha, 2022).

The factors limiting smallholder dairy farmers' access to loans can be classified into socio-economic factors, as well as institutional and policy-related factors. These factors influence a farmer's ability to meet the requirements of financial institutions and access the necessary credit for their operations (Ongwech *et al.,*2020). Socio-economic challenges include variables such as age, gender, household size, off-farm income, education level, farming experience, borrowing experience and borrower and lender distance (M'Muruku *et al.,* 2023).

On the other hand, institutional and policy-related factors include factors such as high interest rates, collateral requirements, complicated application processes, credit history and scoring systems, inflexible loan terms and conditions, as well as limited access to financial services in rural areas (Katabaro & Magasi, 2024). The institutional and policy-related factors are generally considered more restrictive than socio-economic factors (Linh *et al.,* 2019). These factors not only create immediate challenges for accessing credit but also contribute to long-term financial exclusion, particularly in rural and underserved areas.

Although numerous studies have investigated determinants of credit access in Kenyan agriculture, most have employed regression analysis, descriptive statistics, or case study approaches to identify general factors influencing borrowing behavior (Odhiambo & Upadhyaya, 2021; Ongwech *et al.,*2020). While informative, these approaches often fall short in systematically quantifying the relative importance of institutional and policy barriers from the perspective of the farmers themselves. This creates a knowledge gap where policymakers and financial institutions lack evidence of which barriers matter most, and therefore where interventions should be prioritized.

To address this gap, the present study employs a Best-Worst Scaling (BWS) approach. BWS is a stated preference method that allows respondents to make trade-offs among a set of items by identifying the most and least important factors within subsets of attributes (Finn & Louviere, 1992). Unlike conventional ranking methods, BWS involves presenting respondents with a minimum of three mutually exclusive options and asking them to identify both the best and worst options (Rogers *et al.,* 2021). This approach allows for a more comprehensive ranking of options. Its application in agricultural finance provides an opportunity to systematically rank institutional and policy constraints to credit access, thus offering nuanced insights for decision-makers.

The main objective of the study is to identify and prioritize institutional barriers and policy constraints affecting access to credit among smallholder dairy farmers in Kenya. This study makes both practical and methodological contributions. Practically, it generates evidence to guide policymakers, financial institutions, and farmer organizations in designing interventions that target the most binding constraints to dairy farmers' credit access. Methodologically, it expands the application of Best-Worst Scaling in agricultural economics, particularly in the context of livestock finance where its use remains limited.

2. Literature review

2.1 Credit provision trends among smallholder farmers in Kenya.

Credit provision and access among smallholder farmers in Kenya have evolved significantly over the years, becoming a crucial tool in addressing financial barriers and fostering agricultural productivity (Nambiro, 2024). Historically, formal credit to smallholder farmers was mainly provided through Agricultural Finance Corporation (AFC), established in 1963 to support agricultural development by offering loans to farmers countrywide at subsidized rates of 10% per annum (Nambiro, 2024). According to Agricultural Finance Corporation strategic plan (2018-2022), the amount of loan which is provided to farmers range from KES 50,000 to KES 200 million with maturities of a few months to seven years. Additionally, between 2012 and 2017 the Agricultural Finance Corporation (AFC) disbursed a total of KES 11.3 billion in loans to over 17,000 smallholder farmers (Odhiambo & Upadhyaya, 2021).

Relatedly, commercial banks and microfinance institutions have designed a range of agricultural credit products specifically tailored to meet the unique requirements of smallholder farmers (Okeyo, 2023). Despite these efforts,

the agricultural sector continues to receive insufficient loan amount. According to the Kenya Bankers Association report of 2018, only 4% of the total loan portfolio was directed to the agriculture sector between 2005 and 2016. This financing challenge stems from the perception among financial institutions that agriculture is a high-risk venture. As a result, they impose stringent requirements to mitigate potential risks (Wanzala *et al.,* 2024).

The Central Bank of Kenya's 2023 Annual Supervision Report highlighted that, the total gross loans allocated to agricultural sector by December 2023 was KSH 145.7 billion, representing 3.5% of the total gross loans. In contrast, the largest shares of loans went to the personal and household sector (25.9%), trade (18.2%), manufacturing (15.1%), and real estate (12.1%). Moreover, the report further revealed that only 4.9% of non-performing loans (NPLs) were attributed to the agriculture sector. On top of that, small proportion of agricultural loans were directed to dairy sector due to perceived risks and challenges in repayment (Kaviku *et al.,*2024).

2.2 *Institutional and policy-related impediments to credit access among small holder dairy farmers*

Institutional impediments are the challenges stemming from the structures, practices, and regulations of financial institutions that restrict individuals or businesses from accessing credit (FAO, 2019). These include high-interest rates, complex application processes, collateral requirements, flexibility of loan repayment, credit scoring system and limited financial services in rural areas (Khan *et al.,* 2024; Kiros, & Meshesha, 2022). Institutional and policy-related factors often limit farmers' access to formal credit sources, while socio-economic factors impede their access to informal loans (Ali *et al.,* 2017).

Ali *et al.* (2017) studied the effects of interest rate on farmers' access to agro credit in Kaduna state, Nigeria. They defined interest rate as the cost paid by borrower to lender for obtaining and using funds over a specific period of time. The study further revealed that interest rate is a significant barrier to credit access as it contributes to increasing cost of borrowing. Maximum likelihood estimates of logistic regression were used by Mwonge and Naho (2021) to study the determinants of credit demand by smallholder farmers in Morogoro, Tanzania. Their findings revealed that interest rates have significant negative influence on smallholder farmers' decision to demand and access agricultural credit. In addition, Lakhan *et al.* (2020) highlighted the religious factor in explaining the role of interest rate in credit access in Pakistan, noting that Muslim farmers are often unwilling to take loans with interest as it is against their religious beliefs.

As mentioned earlier, collateral requirement is among the significant institutional challenges in accessing agricultural credit for smallholder farmers (Chen *et al.,* 2023). The demand for collateral arises due to information asymmetry regarding borrowers' loan repayment capacity. As a result, providing collateral serves as a crucial guarantee for loan repayment and essential in credit application process (Akotey & Pendame, 2023). Financial institutions typically prefer fixed assets such as land and building due to their stable and enduring value (Gherghina *et al.,* 2020). As per traditional land tenure system, the majority of individuals lack well-defined titles to establish legal ownership (Nzuki, 2023). The absence of these titles limits smallholder farmers' capacity to provide adequate collateral, thereby undermines their ability to secure loans from financial institutions (Domeher *et el*., 2018).

Moroko (2023) observed that majority of smallholder farmers in South Africa avoid bank credit due to the fear of losing their collateral in case of default. According to Anang & Kabore (2021) highlighted that, collateral requirement by financial institutions presents a significant barrier in credit access for small-scale farmers in the Sunyani West district of the Bono region, Ghana. Their study findings indicate that 86% of 100 randomly selected farmers accessed loans from informal credit sources due to the lack of collateral assets. Conversely, Mwonge and Naho (2021) noted that the demand for loans among smallholder farmers with collateral is generally low, as these farmers possess more assets and are capable of self-financing their production activities without relying on borrowing.

Moreover, complex application procedure and extensive documentation requirements present significant barrier obstructing smallholder farmers from accessing formal loans (Irshad *et al.,* 2024; Men *et al.,* 2024). Ali and Gillani (2023) examined the credit barriers to bank lending in Pakistan's agricultural sector and identified bureaucratic loan application processes as a major recurring obstacle in accessing formal loans. Their study highlighted that unnecessary paperwork and documentation requirements often delay loan disbursement even for eligible borrowers. Consequently, many farmers rely on informal lending channels to circumvent these challenges. The

findings underscore the need to streamline loan application procedures to enhance credit accessibility, as recommended by the study.

The previous study conducted by Henning *et al.* (2019) on factors influencing the success of agricultural loan application focusing on a south African credit provider, the principal component and logistic regression were employed to assess the influence of various factors considered by formal credit institutions in evaluating loan application and their likelihood of influencing loan application outcome. The findings revealed that, the key criteria used by financial credit providers to classify agricultural loan application as successful included farmer's years as a client of the credit provider, satisfactory credit history, number of diversified enterprises on the farm, adequate collateral, the loan amount requested, purpose of the loan, account standing, and other personal factors.

Traditional credit scoring methods and credit risk evaluation often exclude a significant number of smallholder farmers from accessing credit (Guo *et al*, 2024; Kumar, 2022). Credit scoring is typically performed by a lender such as commercial banks, insurance companies, the agricultural finance corporation and some civil society organization to evaluate the creditworthiness of a borrower in determining whether to approve or deny a loan (Okeyo, 2023). Farmers with low credit scores are automatically disqualified from accessing loans through financial institutions (Kumar, 2022). Machikape and Oluwadele (2024) suggested that alternative data sources and innovative credit scoring techniques should be adopted in assessing the creditworthiness of farmers with limited credit history. Okeyo (2023) explored how geospatial technology can be used to leverage farm credit scoring for the benefit of smallholder farmers in Migori county, Kenya. The study found that the traditional credit scoring approach disqualified over 40% of 320 smallholder farmers from obtaining loans.

Furthermore, numerous reviewed studies have identified a range of institutional and policy-related factors that restrict credit access for smallholder farmers. These factors include high interest rates, stringent collateral requirements, complex application processes, and credit scoring systems. However, limited research has been conducted to prioritize these factors and determine their relative impact. Specifically, there is a lack of systematic evaluation to rank these factors in terms of severity and their influence on credit uptake. Understanding which factors are most restrictive can provide a basis for targeted policy interventions and institutional reforms.

3. Methodology

3.1 Study area

The study was conducted in Nakuru county located in the central part of Kenya's great valley covering an area of approximately 7504.9 km^2. Nakuru county is divided into 11 sub counties that are Molo, Njoro, Naivasha, Gilgil, Kuresoi south, Kuresoi north, Subukia, Rongai, Bahati, Nakuru west and Nakuru east. The specific focus of this study was smallholder dairy farmers in Rongai sub-County. The county was purposively selected in this study due to its significant role in country's milk production. Also, the dairy sector in Nakuru county is characterized by a high concentration of smallholder dairy farmers with herd size of 3 to 10 cows. Additionally, according to county integrated development plan 2023 – 2027, Nakuru county faces challenges in livestock productivity and marketing due to inadequate access to quality feeds, poor animal breeds, prevalent livestock diseases and limited access to veterinary services. However, the report highlighted expansion of affordable credit as a strategy for major development problems.

3.2 Sample size and sampling procedure

A multistage sampling technique was used to select dairy farmers for this study. In the first stage, Nakuru County was purposively selected due to its significant role in Kenya's milk production and the prominence of dairy farming as a key agricultural activity. In the second stage, Rongai sub-county was also purposively selected due to high concentration of smallholder dairy farmers. Also, Rongai subcounty is relatively well served by financial institutions including banks, microfinance institutions, Savings and Credit Co-operative Society (SACCOS). Lastly, simple random sampling was used to select respondents from each of five wards of Rongai Sub-County including Visoi, Mosop, Menengai West, Soin, and Solai as shown in Table 1.

Table 1; Distribution of number of respondents in five wards of Rongai subcounty

Ward	Frequency	Percent
Visoi	94	31.54
Mosop	66	22.15
Menengai west	60	20.13
Soin	13	4.36
Solai	65	21.81
Total	**298**	**100**

3.3 Analytical framework

The key variables for this study include institutional and policy-related factors to credit access, which was measured based on farmers' preferences and rankings. In evaluating individual preferences, several methods have been developed ranging from simple rating scales to more complex forms of preference valuation such as conjoint evaluation (Cheung *et al*., 2016). Among these, the widely used approach is the Discrete Choice Experiments (DCE) where participants are asked to choose one alternative among the competing number of multi-profile options.

Best-Worst Scaling (BWS) as another type of conjoint evaluation differs from traditional DCE in its ability to elicit additional information on the least preferred option (Finn & Louviere, 1992). BWS involves presenting respondents with a minimum of three mutually exclusive options and asking them to identify both the best and worst options. This approach allows for a more comprehensive ranking of preferences. DCE involves selecting one option between alternatives and not directly ranking them and hence provides one piece of information per question while BWS essentially aims to provide more choice information without having to ask additional questions (Rogers *et al.,* 2021).

BWS consists of three distinct cases, each varying in the nature and complexity of the items being evaluated: Case 1 (object case), Case 2 (profile case), and Case 3 (multi-profile case) (Flynn & Huynh, 2015). In Case 1, the choice set is presented to respondents to obtain the best and worst option data. This allows for a deeper understanding of trade-offs made between different institutional and policy-related factors affecting credit access (Flynn & Marley, 2014). This study applied case 1 of BWS in determining the preferences of smallholder dairy farmers concerning the institutional and policy related factors in credit access by asking respondents to select the most limiting and least limiting institutional factors from the series of scenario presented. The analysis focused on the following key institutional and policy related factors as shown in Table 2 below.

Table 2; List of institutional and policy related constraints and description

Constraints	Description
Collateral requirements	Kind of assets financial institutions demand as collateral during loan application i.e. land title, livestock, machinery/equipment, guarantor, saving deposit etc.
Interest rate	Borrowing cost/ interest rate charged by credit providers
Complex application procedures	Time taken from application to approval in days and Number of documents required in loan application process i.e. Loan application form, Collateral documents, National ID card/ passport, KRA PIN certificate, Bank statements/ payslips, Employment contract/letter from employer, Business statements/business registration documents etc.
Accessibility	Distance to the nearest lending institutions in km
Inflexible loan terms	Rigid repayment schedules, short grace periods, restructuring options and loan conditions that do not align with farmers' income cycles.
Credit score	Number of previous loans taken in the previous 12 months and loan repayment behavior
Perceived risk	Farmer's risk perception in case of default/inability to pay when loan is received

The maximum difference (maxdiff) method was utilized to model the best worst choice (Marley & Louviere, 2005). Let S with $|S| \geq 2$ represent a finite set of potentially available options, X is the subset of S such that $|X| \geq 2$, $P_X(x)$ denotes the probability that option x will be chosen as most limiting in X and $P_X(y)$ is the probability that y will be chosen as least limiting alternative in X. Therefore, the joint probability that x is the most limiting alternative and y is the least limiting alternative in X can be expressed as,

$$P(x, y|X) = \frac{e^{v_x}}{\sum_{z \epsilon X} e^{v_z}} \times \frac{e^{-v_y}}{\sum_{w \epsilon X} e^{-v_w}}$$

Where V_x and V_y represent the utility functions associated with the institutional factors.

4. Results and discussion

4.1 Credit source categories used in the study

This study categorizes credit sources into three main groups: formal, informal, and digital sources. Formal sources include banks, microfinance institutions, and cooperatives that provide structured loans under established regulations. Informal sources consist of family, friends, traders, and moneylenders who offer credit based on trust and social relations, often without collateral or formal agreements. Digital sources represent emerging credit channels facilitated through mobile money platforms and digital financial service providers that leverage technology to increase accessibility and convenience such as KCB M-pesa, M-shwari and AgriKOPA.

4.2 Distribution of farmers across credit categories/combinations

The smallholder dairy farmers were distributed in six categories based on credit combinations they have used as shown in Table 3. Credit combinations include digital only (D), formal only (F), a combination of formal and informal credit (FI), a combination of formal, informal, and digital credit (FID), informal only (I), and those who did not access any credit at all (N). The findings show that the largest proportion of farmers, 36.24% (108), did not use any form of credit. This highlights a significant level of credit exclusion among smallholder dairy farmers. The reasons behind this may include lack of awareness, limited eligibility, perceived risks of dairy sector by lenders, high interest rates, or lack of collaterals. The high percentage of non-users suggests the need for targeted interventions to enhance credit accessibility and financial inclusion of smallholder dairy farmers.

The next largest group was composed of farmers who relied on informal credit sources, accounting for 28.19% (84). This suggests that informal credit remains a critical financing option for many smallholders dairy farmers in Rongai subcounty. This result is supported by the previous study carried out by Ali *et al.* (2017), who reported that majority of the farmers obtained their credit more from informal sources than formal sources because informal lenders are often more flexible, accessible, and less bureaucratic than formal financial institutions. Moreover, while informal credit is valued for its flexibility and ease of access, it often comes with significantly higher interest rates compared to formal credit institutions (Mpofu & Sibindi, 2022). Recovery measures in informal sector are typically non-regulated and may involve seizure of personal assets in case of default.

Additionally, only 11.41% (34) of farmers accessed formal credit exclusively, highlighting the limited penetration of formal financial services in rural dairy farming systems. This may reflect barriers such as collateral requirements, documentation, and stringent eligibility criteria. Similarly, only 9.06% (27) used digital credit option exclusively, showing that although digital platforms are emerging, their uptake remains relatively low. This could be due to low digital literacy or fear of mobile fraud. However, digital credit platforms, though convenient and fast, are often associated with high interest rates and punitive recovery mechanisms like automated mobile money deductions. These factors may discourage some farmers from adopting digital credit options, despite their availability.

The uptake of combined credit options (more than one credit source) was relatively low. About 8.39% (25) of respondents used both formal and informal credit sources, while only 6.71% (20) used a combination of formal, informal, and digital credit (FID). This small proportion of multiple-credit sources users could indicate that farmers prefer to avoid overlapping debt obligations.

Table 3; Tabulation of farmers distribution across credit categories/combinations

Credit options	Freq.	Percent
D	27	9.06
F	34	11.41
FI	25	8.39
FID	20	6.71
I	84	28.19
N	108	36.24
Total	298	100.00

4.3 Count analysis

The results of a Best-Worst Scaling (BWS) analysis assessing smallholder dairy farmers' preferences regarding institutional and policy-related factors to accessing agricultural credit are as presented in Table 4. The attributes evaluated include interest rates, risk of default, repayment terms, collateral requirements, documentation and approval time, credit history requirements, and distance to financial institutions. These attributes were ranked based on their perceived level of limitation, with standard scores, best-worst (BW) scores, and ratio scale indices provided.

The attributes with the highest scores are considered as the most limiting factors to credit access and those with the lowest scores have a below average limitation. Attributes such as percentage of interest rate charged, probability of default/inability to pay when loan is received, repayment period and restructuring options, as well as type of collateral required had the highest scores suggesting that they are the most limiting factors in accessing accredit from various credit sources by smallholder dairy farmers. These findings are consistent with those of Ingutia and Sumelius (2024), who, in their study on the role of cooperative membership in enhancing credit access for women farmers in rural Kenya, reported that 78% of respondents did not apply for credit due to high interest rates and risk-averse behaviour, while 60% cited lack of collateral as the main barrier to credit application. Low scores were exhibited by documentation of loan application and time taken for loan approval, credit history requirement, and distance to nearest financial institution since they have relatively the highest least-limiting scores.

Table 4; Count analysis

Attributes	Most limiting	Least limiting	Standard scores	Analytical BW	Ratio scale	Index
Percentage of interest rate charged	458	136	322	0.21	1.84	100
Probability of default/inability to pay when loan is received	501	159	342	0.23	1.78	96.73
Repayment period, restructuring options	353	204	149	0.08	1.32	71.68
Type of collateral required	389	243	146	0.08	1.27	68.95
Documentation of loan application and time taken for loan approval	198	411	-213	-0.07	0.70	38.29
Credit history requirement	157	318	-161	-0.10	0.69	37.82
Distance to nearest financial institution	41	615	-574	-0.27	0.26	14.07

From the count scores of the attributes, probability of default/inability to pay when loan is received had the highest most-limiting score (501), followed by percentage of interest rate charged and type of collateral required by 458 and 389 respectively suggesting that they are the most limiting factors in accessing credit. In this study, the average interest rates across credit types were reported as 10.25% for formal credit, 10.85% for informal credit, and 13.63% for digital credit. These rates were generally perceived by respondents as high, particularly in relation to their unstable and seasonal income flows. On the other hand, distance to nearest financial institution had the highest least-limiting score (615) positing a least limiting factors in accessing credit among dairy farmers.

Other attributes with highest least-limiting scores are documentation of loan application and time taken for loan approval followed by credit history requirement by 411 and 318 respectively.

Generally, with an index value of 100, percentage of interest rate charged by financial institutions is top ranked and perceived as the most limiting factor in accessing agricultural loan. This finding reflects widespread concerns among smallholder dairy farmers about the affordability of loans. High interest rates raise the cost of borrowing, making many farmers hesitant or unable to take credit especially those with low and uncertain farm incomes. This aligns with existing literature that identifies high loan interest as a major deterrent for smallholder credit uptake (Ingutia and Sumelius, 2024; Lakhan *et al.,* 2020). However, the previous study carried by Ali *et al.* (2017) on the effects of interest rates on access to agro credit by farmers in Kaduna State Nigeria, interest rate was ranked as second limiting challenge in credit access while complicated loan application procedures was ranked as first.

Following the interest rates, the probability of default or inability to repay loan was also ranked as the second most limiting factor with an index value of 96.73. This suggests that farmers are aware of the financial risks involved in taking loans and therefore become risk averse (Ali *et al.,* 2017; Ingutia and Sumelius, 2024). The repayment period and restructuring options ranked third, with an index value of 71.68. Farmers expressed concern over the rigid nature of loan repayment schedules, which may not align with dairy production cycles or income flow. In some cases, farmers reported diverting credit funds to non-productive uses such as household expenses or emergencies, further complicating their ability to repay loans. Moreover, unforeseen events such as livestock disease outbreaks, delayed milk payments, or price fluctuations often arise during the repayment period, making the ability to renegotiate loan terms essential (Shee *et al.,* 2015). However, most credit arrangements lacked flexibility for such renegotiation.

Additionally, the type of collateral required was ranked as the fourth major constraint with an index value of 68.95. Many smallholder farmers lack land title deeds or other acceptable forms of collateral, which are often a prerequisite for formal credit access. This is supported by Pandey (2022), who cited that high-value collateral demand by financial institutions as the major reason for lower credit expansion in rural areas. In contrast, the documentation of loan application and time taken for loan approval was viewed as less constraining factor in credit access among dairy farmers with a lower index value of 38.29. This is followed by credit history requirement and distance to the nearest financial institution with an index value of 37.82 and 14.07 respectively. This could be attributed to the rise of mobile banking and digital credit platforms, which reduce the need for physical visits to bank branches.

4.4 Average preference scores

The results of the average best-worst scores denoted the average number of times an attribute is selected as most or least limiting. Table 5 presents the average best-worst (BW) scores for various institutional and policy-related factors affecting access to agricultural credit among smallholder dairy farmers. The average BW scores reflect the perceived severity of each factor as a limitation to credit access. Practically, higher average preference scores indicate that farmers frequently identified the factor as one of the most limiting barriers to credit access. Lower average preference scores suggest that the factor was not a significant barrier or often perceived as least limiting among farmers. The ranking helps to highlight which attributes farmers consider most and least problematic in their pursuit of financial services.

Table 5; Average preferences scores

Attributes	BW scores			Average BW scores	Ranking	Standard weight
	1	2	3			
Percentage of interest rate charged	100	100	100	100	1	23.39
Probability of default/inability to pay when loan is received	85.84	100	100	95.28	2	22.63
Repayment period, restructuring options	100	73.14	62.41	78.52	3	16.77
Type of collateral required	61.22	100	62.22	74.48	4	16.13
Documentation of loan application and time taken for loan approval	26.47	42.99	40.52	36.66	5	8.96
Credit history requirement	30.61	44.93	24.41	33.31	6	8.85
Distance to nearest financial institution	8.52	10.59	9.73	9.61	7	3.29

The results reveal that the percentage of interest rate charged is ranked as the most limiting factor, with a consistent average BW score of 100, and a high standard weight of 23.39. This underscores farmers' concerns about the high cost of borrowing, which is likely to limit many from seeking credit. This finding is consistent with the earlier count analysis (Table 4), reaffirming that interest rates are a primary barrier to accessing loans, especially for farmers with low profit margins or irregular income flows.

The second most limiting factor is the probability of default or inability to repay loans, with an average BW score of 95.28 and a standard weight of 22.63. This result indicates that farmers are highly risk-averse, fearing consequences of repayment failure such as asset seizure or social embarrassment (Ingutia and Sumelius, 2024). Such concerns may stem from the unpredictable nature of dairy farming incomes, which are sensitive to price fluctuations, animal health issues, and seasonal variations.

Repayment period and restructuring options and type of collateral required are ranked as third and fourth most credit constraint, scoring 78.52 and 74.48 respectively. These findings suggest that farmers are also discouraged by inflexible repayment schedules and stringent collateral requirements. Many smallholder farmers lack formal land titles or acceptable assets, limiting their ability to qualify for loans especially from formal credit institutions (Chen *et al.,* 2023; Gherghina *et al.,* 2020). The high scores emphasize the need for credit packages tailored to the agricultural cycle and the realities of small-scale production systems.

On the other hand, documentation and loan processing time, credit history requirement, and distance to the nearest financial institution scored the lowest average BW scores (36.66, 33.31, and 9.61 respectively), with standard weights of 8.95, 8.85 and 3.29 respectively. These findings suggest that those three attributes/ factors are minor challenges in accessing agricultural loan among dairy farmers. This may reflect the growing adoption of digital platforms and mobile banking solutions that reduce the need for physical visits and lengthy paperwork.

4.5 Heterogeneity in the preferences of credit constraining factors

The results in Table 6 show the heterogeneity analysis in preferences regarding the choices of credit constraining factors/attributes made by individual dairy farmers. The attributes were evaluated based on their mean preference scores, variance, standard deviation (SD), and the ratio of SD to the mean, which indicates the relative heterogeneity of farmers' opinions.

Table 6; Heterogeneity effects for the preference of attributes

Attributes	Mean	Variance	SD	Ratio analysis (SD/mean)
Percentage of interest rate charged	1.08	1.15	1.43	1.32
Probability of default/inability to pay when loan is received	1.15	1.43	1.95	1.70
Repayment period, restructuring options	0.50	1.49	1.99	3.98
Type of collateral required	0.49	1.25	1.74	3.55
Documentation of loan application and time taken for loan approval	-0.54	1.39	1.42	-2.63
Credit history requirement	-0.72	1.21	1.24	-1.72
Distance to nearest financial institution	-1.93	1.48	1.53	-0.79

The attributes with low coefficient of variations (Low ratio) indicates low variations in heterogeneity among respondents. The results show that the attributes with the highest heterogeneity meaning farmers differed widely in how limiting they perceived them. For example, repayment period/restructuring options and type of collateral required, with SD/mean ratios of 3.98 and 3.55 respectively shows highest heterogeneity. This implies that while some farmers view these as serious constraints to accessing credit, others may not consider them problematic, possibly due to differences in financial resilience, prior credit experience, or the types of lenders they interact with. Similarly, the probability of default or inability to repay the loan had a high SD/mean ratio of 1.70, indicating a considerable variation in how farmers perceive credit repayment and loan default risk. This suggests that while some farmers are confident in their ability to repay loans possibly due to stable incomes others are more risk-averse due to either market uncertainties or unstable production levels.

On the other hand, percentage of interest rate charged had a relatively lower SD/mean ratio of 1.33, though still above 1, implying moderate heterogeneity. This reflects a more consistent concern among farmers that high interest rates are a barrier to credit access, as also seen in previous tables. In contrast, documentation of loan application and time taken for approval, credit history requirement, and distance to financial institutions had negative mean values and negative SD/mean ratios, indicating that these attributes were generally perceived as less limiting and had relatively lower variability in preferences among dairy farmers. This may be due to increased familiarity with simplified digital credit systems or reduced reliance on physical bank visits. Generally, positive ratios indicate the most limiting attributes while the negative ratios indicate the least limiting attributes.

5. Conclusion

The aim of this study was to identify and prioritize institutional barriers and policy constraints affecting access to credit among smallholder dairy farmers in Kenya. The study found that institutional and policy-related constraints are the most significant barriers to credit access among smallholder dairy farmers. Among these, high interest rates, stringent collateral requirements, and complex application procedures were identified as the most limiting factors. These factors not only reduce the chances of credit approval but also discourage farmers from applying in the first place due to the perceived difficulty and cost involved. The ranking of these barriers using Best-Worst Scaling (BWS) provided an insight to policy makers on which factors need the most urgent policy attention.

6. Recommendation

Firstly, financial institutions and credit providers should accept alternative collaterals to increase credit eligibility. To address the widespread lack of titled assets among smallholders, lenders should recognize alternative forms of collateral such as livestock, group guarantees through cooperatives or future milk deliveries. This will expand access to formal credit among underserved farmers.

Secondly, to digitize and simplify credit access procedures. Financial institutions and informal lenders should leverage technology to streamline loan application processes, minimize paperwork, and reduce bureaucratic delays. Mobile platforms can be used to offer easy, real-time loan access and status tracking, especially in rural areas.

Lastly, to invest in rural financial infrastructure and literacy in order to expand the reach of banks, mobile money

agents and microfinance institutions in underserved rural areas. Simultaneously, targeted financial literacy programs should be established to equip farmers with financial knowledge to make informed credit decisions, manage loans effectively, and avoid over indebtedness.

References

Ali, B. M., Agbo, F. U., Ukwuaba, I. C., & Chiemela, C. J. (2017). The effects of interest rates on access to agro-credit by farmers in Kaduna State, Nigeria. *African Journal of Agricultural Research*, *12*(43), 3160-3168. https://doi.org/10.5897/AJAR2015.9571

Ali, Z., & Gillani, S. U. A. (2023). Assessing the Challenges and Impact of Access to Agricultural Credit in Southern Punjab (Pakistan): A Qualitative Study. *Pakistan Journal of Humanities and Social Sciences*, *11*(3), 3242-3254. https://doi.org/10.52131/pjhss.2023.1103.0608

Anang, S. A., & Kabore, A. A. (2021). Factors influencing credit access among small-scale poultry farmers in the Sunyani West District of the Bono region, Ghana. *Journal of Agricultural Extension and Rural Development*, *13*(1), 23-33. https://doi.org/10.5897/JAERD2020.1198

Chen, C., Liu, B., & Wang, Z. (2023). Can land transfer relax credit constraints? Evidence from China. *Economic Modelling*, *122*, e106248. https://doi.org/10.1016/j.econmod.2023.106248

Cheung, K. L., Wijnen, B. F., Hollin, I. L., Janssen, E. M., Bridges, J. F., Evers, S. M., & Hiligsmann, M. (2016). Using best–worst scaling to investigate preferences in health care. *Pharmacoeconomics*, *34*, 1195-1209. https://doi.org/10.1007/s40273-016-0429-5

Domeher, D., Yeboah, E., & Ellis, F. (2018). Formal property titles or more? Perspectives from Ghana's financial institutions. *African Review of Economics and Finance*, *10*(1), 243-273.

Falola, A., Mukaila, R., & Abdulhamid, K. O. (2022). Informal finance: its drivers and contributions to farm investment among rural farmers in Northcentral Nigeria. *Agricultural Finance Review*, *82*(5), 942-959. https://doi.org/10.1108/AFR-08-2021-0116

FAO (2019). *Women's access to rural finance: challenges and opportunities*. Rome, Licence: CC BY-NC-SA 3.0 IGO

Finn, A., & Louviere, J. J. (1992). Determining the appropriate response to evidence of public concern: the case of food safety. *Journal of Public Policy & Marketing*, *11*(2), 12-25. https://doi.org/10.1177/074391569201100202

Flynn, T. N., & Huynh, E. (2015). BWS profile case application: preferences for quality of life in Australia. In J.J. Louviere (Ed.) *Best-Worst Scaling. Theory, methods and applications* (pp. 240-262) Cambridge University Press. https://doi.org/10.1017/CBO9781107337855.013

Flynn, T. N., & Marley, A. A. (2014). Best-worst scaling: theory and methods. In S. Hess & A. Daly (Eds.), *Handbook of choice modelling* (pp. 178-201). Edward Elgar Publishing. https://doi.org/10.4337/9781800375635.00014

Gherghina, Ș. C., Botezatu, M. A., Hosszu, A., & Simionescu, L. N. (2020). Small and medium-sized enterprises (SMEs): The engine of economic growth through investments and innovation. *Sustainability*, *12*(1), e347. https://doi.org/10.3390/su12010347

Guo, S., Niu, R., & Zhao, Y. (2024). Credit evaluation and rating system for farmers' loans in the context of agricultural supply chain financing based on AHP-ELECTRE III. *Agricultural Economics (Zemědělská ekonomika)*, *70*(11), 541-555. https://doi.10.17221/434/2023-AGRICECON.

Henning, J. I., Bougard, D. A., Jordaan, H., & Matthews, N. (2019). Factors affecting successful agricultural loan applications: the case of a South African credit provider. *Agriculture*, *9*(11), e243. https://doi.org/10.3390/agriculture9110243

Ingutia, R., & Sumelius, J. (2024). Does cooperative membership facilitate access to credit for women farmers in rural Kenya?. *Journal of Agriculture and Food Research*, *18*, e101425. https://doi.org/10.1016/j.jafr.2024.101425

Irshad, M. B., Imran, M., Saleem, M. A., & Wadood, A. (2024). Factors Affecting Agricultural Credit Access to Farmers in The South Punjab Region Of Pakistan. *Journal of Business and Management Research*, *3*(3), 320-332.

Katabaro, J., & Magasi, C. (2024). Promoting Sustainable Livelihoods: Effect of Credit Access from Financial Institutions on Small-Scale Rice Farming. *Asian Journal of Management, Entrepreneurship and Social Science*, *4*(03), 71-91. https://doi.org/10.98765/ajmesc.v4i03.764

Kaviku, A. M., Muraya, M. M., Muchiri, J. M., & Ireri, D. M. (2024). Determinants of microfinance credit uptake and the amount of credit by smallholder dairy cattle farmers in Maara sub-county, Tharaka Nithi County, Kenya. *World Journal of Advanced Research and Reviews*, *21*(3), 1953-1960.

https://doi.org/10.30574/wjarr.2024.21.3.0887

Khan, F. U., Nouman, M., Negrut, L., Abban, J., Cismas, L. M., & Siddiqi, M. F. (2024). Constraints to agricultural finance in underdeveloped and developing countries: a systematic literature review. *International Journal of Agricultural Sustainability*, *22*(1), e2329388. https://doi.org/10.1080/14735903.2024.2329388

King'ori, S. (2022). Factors affecting dairy production among dairy cooperative societies in Kenya. A critical literature review. *American Journal of Livestock Policy*, *1*(1), 8-19. https://doi.org/10.47941/ijlp.843

Kiros, S., & Meshesha, G. B. (2022). Factors affecting farmers' access to formal financial credit in Basona Worana district, North Showa zone, Amhara regional state, Ethiopia. *Cogent Economics & Finance*,*10*(1), e2035043. https://doi.org/10.1080/23322039.2022.2035043

Kumar, J. A. (2022) Role of Fintech and Alternative Credit Scoring Methods in Accelerating the Financial Inclusion of Smallholder Farmers in India. *Indian Journal of Natural Sciences,13*(71), 41330-41342.

Lakhan, G. R., Channa, S. A., Magsi, H., Koondher, M. A., Wang, J., & Channa, N. A. (2020). Credit constraints and rural farmers' welfare in an agrarian economy. *Heliyon*, *6*(10). e05252. https://doi.org/10.1016/j.heliyon.2020.e05252

Linh, T. N., Long, H. T., Chi, L. V., Tam, L. T., & Lebailly, P. (2019). Access to rural credit markets in developing countries, the case of Vietnam: A literature review. *Sustainability*, *11*(5), e1468. https://doi.org/10.3390/su11051468

Machikape, K., & Oluwadele, D. (2024). The Role of Alternative Credit Scoring. In K. Hinkelman & H. Smuts (Eds.) *Society 5. 0: 4th International Conference, Moka, Mauritius. 2173*, e229. Springer Nature. https://doi.org/10.1007/987-3-031-71412-2

Marley, A. A., & Louviere, J. J. (2005). Some probabilistic models of best, worst, and best–worst choices. *Journal of mathematical psychology*, *49*(6), 464-480. https://doi.org/10.1016/j.jmp.2005.05.003

Men, P., Hok, L., Seeniang, P., Middendorf, B. J., & Dokmaithes, R. (2024). Identifying credit accessibility mechanisms for conservation agriculture farmers in Cambodia. *Agriculture*, *14*(6), e917. https://doi.org/10.3390/agriculture14060917

M'Muruku, S. M., Kingori, G. G., & Mwirigi, R. N. (2023). Effect of Borrower's Socio-Economic Profile on Agribusiness Loans Default Rate in Agricultural Finance Corporation, Mount Kenya Region. *Journal of Economics, Management and Trade, 29*(8), 24-40. https://doi.org/10.9734/JEMT/2023/v29i81112

Moroko, J. (2023*). Establishing a Movable Collateral Assets Registry in South Africa to Benefit Smallholder Farmers and Other Small Businesses in Obtaining Bank Credit*. the fletcher school, 39-42.

Mpofu, O., & Sibindi, A. B. (2022). Informal finance: a boon or bane for African SMEs?. *Journal of Risk and Financial Management*, *15*(6), e270. https://doi.org/10.3390/jrfm15060270

Mwonge, L. A., & Naho, A. (2021). Determinants of credit demand by smallholder farmers in Morogoro, Tanzania. *African Journal of Agricultural Research*, *17*(8), 1068-1080. https://doi.org/10.5897/AJAR2020.15382

Mwanyika, N. T., & Koori, J. (2020). Credit accessibility and performance of small scale farms in Taita Taveta County, Kenya. *International Academic Journal of Economics and Finance*, *3*(5), 220-237.

Nambiro, D. E. (2024). *flexible loan products and financial performance of agricultural enterprises in Mount Kenya region* [doctoral dissertation, Kenyatta university].

Nasereldin, Y. A., Chandio, A. A., Osewe, M., Abdullah, M., & Ji, Y. (2023). The credit accessibility and adoption of new agricultural inputs nexus: Assessing the role of financial institutions in Sudan. *Sustainability*, *15*(2), e1297. https://doi.org/10.3390/su15021297

Nzuki, P. M. (2023). *Analysis of the Use of Land as Collateral for Financing in Rural Kenya a Case Study of Kivani Location, Machakos County* [Doctoral dissertation, University of Nairobi].

Odero-Waitituh, J. A. (2017). Smallholder dairy production in Kenya; a review. *Livestock Research for Rural Development*, *29*(7), e139.

Odhiambo, F. O., & Upadhyaya, R. (2021). Flexible loans and access to agricultural credit for smallholder farmers in Kenya. *Agricultural Finance Review*, *81*(3), 328-359. https://doi.org/10.1108/AFR-05-2020-0072

Okeyo, S. A. (2023). *Leveraging Geospatial Technology for Improved Smallholder Farmer Credit Scoring* [Doctoral dissertation, University of Nairobi].

Ongwech, W. L., Obel-Gor, C., & Otiende, M. A. (2020). Determinants of credit access among smallholder dairy farmers in Kinangop sub-county, Kenya. *International Journal of Agriculture and Rural Economic Research (ARER), 8*(5), 1-11. https://doi.org/10.36713/epra0813

Otieno, G. O. (2022). Transformational Assessment of Emerging Issues in the Kenyan Dairy Sector. *J Fisheries*

Livest Prod, *10*(3), e334.

Pandey, A. (2022). Credit and financial access in Nepalese agriculture: prospects and challenges. *Journal of Agriculture and Environment*, *23*(1),56-70. https://doi.org/10.3126/aej.v23i1.46868

Pendame, S., & Akotey, J. O. (2023). The effect of a moveable collateral registry on MSME access to finance: Evidence from Malawi. *Cogent Economics & Finance*, *11*(1), e2163873. https://doi.org/10.1080/23322039.2022.2163873

Rogers, H. J., Marshman, Z., Rodd, H., & Rowen, D. (2021). Discrete choice experiments or best-worst scaling? A qualitative study to determine the suitability of preference elicitation tasks in research with children and young people. *Journal of patient-reported outcomes*, *5*, 1-11. https://doi.org/10.1186/s41687-021-00302-4

Shee, A., Turvey, C. G., & Woodard, J. (2015). A field study for assessing risk-contingent credit for Kenyan pastoralists and dairy farmers. *Agricultural Finance Review*, *75*(3), 330-348. https://doi.org/10.1108/AFR-07-2015-0030

Wanzala, R. W., Marwa, N., & Lwanga, E. N. (2024). Impact of agricultural credit on coffee productivity in Kenya. *World Development Sustainability*, *5*, e100166. https://doi.org/10.1016/j.wds.2024.100166

Wilkes, A., Odhong, C., Ndonga, S., Sing'ora, B., & Kenyanito, L. (2018). Access to and supply of finance for enhancing dairy productivity. *CCAFS Working Paper*.

Yılmaz, H., & Njora, B. (2021). Analysis of the impact of agricultural policies on food security in Kenya. *Eurasian Journal of Agricultural Research*, *5*(2), 66-83.