BANK CREDIT ACCESSIBILITY AND SUSTAINABILITY OF SMALLHOLDER DAIRY FARMERS IN RWANDA

A CASE STUDY: NYAGATARE DISTRICT IN KARUSHUGA COOPERATIVE

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DECLARATION

This dissertation titled"**Bank Credit Accessibility and Sustainability of Smallholder Dairy Farmers in Rwanda"**is my original work, it has never been submitted before for any other degree award to any other University.

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APPROVAL

This dissertation titled "**Bank Credit Accessibility and Sustainability of Smallholder Dairy Farmers in Rwanda"** has been done under my (our) supervision and submitted for examination with my (our) approval.

Name: Professor Dr. George OkelloCandiyaBongomin

Sign: _____ Date: _____

DEDICATION

I dedicate my research to my beloved parents and my beloved brothers and sisters.

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I acknowledge this project to the glory of Almighty God, the Lord of Universe for giving me the grace and for making it possible for me to successfully complete this project.

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MUHAWENIMANA Olive

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LIST OF ACRONYMS AND ABBREVIATION

ANOVA **:** Analysis of Variance

BCA **:**Bank credit accessibility

DBR **:** Development Bank of Rwanda

GDP **:** Gross Development Product

GS **:**Government Support

MINAGRI **:**Ministry of Agriculture and Animal Resources

M **:** Mean

MBA **:** Masters of Business Administration

NBR **:** National Bank of Rwanda

SD **:** Standard Deviation

SPSS **:** Statistical Product and Service Solutions

SUS **:**Sustainability

ULK **:** Kigali Independent University

ABSTRACT

The general objective of this study was to assess the effect of bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, specifically in Karushuga cooperative, with government support as a moderator. This study had the following objectives, to assess the impact of bank credit accessibility on sustainability of smallholders' dairyfarmers in Karushuga cooperative, to examine the impact of government support on the sustainability of smallholders' dairy farmers in Karushuga cooperative, and to establish the moderate effect of government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative. This Study was supported by the Financial Intermediation Theory, Theory of Information Asymmetry and Financial Sustainability Model. This research was census research design, and the study population comprise 198 dairy farmers members of the Cooperative Karushuga, sampled using simple random sampling technique. The researcher used primary data in this study. A closed end questionnaire was utilized. Descriptive research design and correlation analysis were utilized to assess the data and results generalized for the entire population, while multiple regression was used to test hypotheses. To compute and analyze the data in this study, available statistical product for service solution (SPSS 27) was used. The regression model 1 revealed that the variables Bank credit accessibility contribute 62.6% to the sustainability of smallholder dairy farmers. The ANOVAindicate that the overall model was significant shown by F statistic of 62.454 and p-value calculated =.004 is less than Critical p-value =0.05 level of significant. Regression model 2 revealed that the variable government support contribute 77.3% on sustainability of smallholder dairy farmers. Findings in ANOVA, show that the overall model was significant asF statistic was 62.454 and p-value calculated =.001 is less than Critical p-value =0.05 level of significant.The interaction between bank credit accessibility and government support on sustainability was also significant (β=0.124,p=0.003), as indicated by a significant value less than .005. The results therefore shows that government support moderate the relationship between bank credit accessibility and sustainability.Based on the result showed from the test of hypotheses, all hypotheses were accepted at 5% level of significance. The study recommended smallholder dairy farmers to emphasize on bank credit accessibility as this credit is more benefit than other loans, financial institutions to establish fair and affordable interest rates suitable to the farmers, and the government was recommended to increase its support in order to allow farmers to invest within the value addition of their products.

DEFINITION OF OPERATIONAL KEY TERMS

Bank Credit Accessibility	Refers to the ease with which individuals, businesses, and other entities can obtain loans and credit from traditional banks and financial institutions.
Government Support	Refers to various forms of assistance, aid, or intervention provided by a government to individuals, businesses, or other entities to achieve specific social, economic, or policy objectives.
Sustainability	Refers to the ability of the farm to produce dairy products while maintaining or improving the long-term health and well-being of the environment, the community, and the economic viability of the farm itself..
Smallholder Dairy Farmers	Referto individuals or households who engage in dairy farming on a relatively small scale, typically with limited resources, land, and herd sizes.

CHAPTER ONE: INTRODUCTION

In this chapter, the research focus on the overview of the research to be undertaken through the study background, the statement of the problem, the general as well as specific objectives, research questions used for the study, the significance of the study, its scope and delimitation, as well as the organization of the study.

1.1 Background to the Study

The sustainability of small farmers is a critical issue that affects food production, rural livelihoods, and the overall well-being of communities and Nations according to the International Finance Corporation (IFC, 2021). The agriculture sector is crucial to not only internal food security, but also employment growth and poverty reduction as it is now considered as an economic sector, specifically in rural areas. However, Small farmers often lack the financial resources to invest in modern farming techniques, equipment, and infrastructure in order to be sustainable (Nsubili, 2021). It was revealed worldwide that access to credit plays a vital role in ensuring the sustainability of small farmers by enabling them to invest in their farms, adopt sustainable practices, and overcome financial challenges which may lead to their sustainability (Nasereldin, Chandio, Osewe, Abdullah & Yueqing, 2023; Girabi&Mwakaje, 2022; Vishwanatha&Mutamuliza, 2021).

Globally, Yadav and Sharma (2020) stated that access to credit and other financial services by small-scale farmers has been considered as one promising way to reducing poverty, improving farm productivity, and easing a smooth transition from subsistence farming to large scale and agribusiness farming in Russia. The authors explained that, in the short-run, credit can help farmers increase their purchasing power to acquire necessary production inputs and finance their operating expenses while in the long run it can improve farmers' sustainability.

In Vietnam, Linh, Long, Chi, Tam and Lebailly (2021) stated that agricultural production in rural area still accounts for a large proportion, contributing to the employment of the majority of workers. However, farmers in rural areas still find it difficult to access credit to enhance their production. The difficulty in raising funds in rural zones will lead to a decline in output, an effect on GDP, and national food security in poor countries. Thus, access to rural credit markets is considered to be an important factor in economic development, especially for low-income households in Vietnam.

In the African context, Ouattara, Xiong, Traoré, Turvey, Sun, Ali and Ballo (2020) argued that the provision of agricultural credit at a subsidized interest rate can be an effective tool for enhancing the production and transformation of rural farm microenterprises in Ivory Coast. The authors asserted that relaxing the credit constraint for microenterprises could lead to greater adoption of modern inputs and improved ability to turn inputs into outputs, both of which boost productivity. Productivity and efficiency underscore the organizational capacity of subsistence microenterprise farms to deal with external shocks, and have far-reaching implications in terms of ensuring their sustainable livelihood.

In the Rwandan context, Muhongayire (2020) stated that smallholder farmers tend to have little or no access to formal credit despite their socioeconomic importance, and this has been a major obstacle for them to apply new farming technologies and it has been very difficult to raise the level of their income through farming activities. To this extent, hunger and poverty has been a persistent problem in their lives. The author explained added that it has been a big challenge to relieve households who are smallholder farmers from their poverty unless adequate and affordable financial services is well streamed into Rwandan rural areas.

The credit accessibility by smallholders' dairy farmers has increasingly been regarded as an important tool for raising the incomes to meet short-term requirements for working capital and for long -term investment in agriculture. The previous studies did not address the

sustainability of dairy farmers, and specifically they are little research carried in the Rwandan context, thus the need of our study.

Additionally, the formal financial sector in Rwanda has stringent lending conditions and therefore will not provide their services to the rural poor farmers (PSF, 2021).The credit accessibility by smallholders' dairy farmers in Rwanda has increasingly been regarded as an important tool for raising the incomes to meet short-term requirements for working capital and for long -term investment(Muhongayire, 2020). Access to credit by smallholders' dairy farmers working in farmers' cooperative is, by and large, seen as one of the constraints limiting their benefits from credit facilities (MINAGRI, 2022).

Thus the need felt by the researcher of assessing the effect of the bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, specifically in Karushunga Cooperative as case study.

1.2 Problem Statement

Although indicators of financial access and inclusion have improved over the past two decades in Rwanda, recent estimates show that the country is yet to catch up other developing countries. For instance, though the percent of Rwandan adults holding an account at a financial institution reached 22% in 2022, it was still lower than the average of Sub Saharian African countries that stood at 29%, or the 45% of adults in South Asia, 51% in Latin American, and 69% in East Asia having an account in 2022.

The percent are even smaller when we consider Rwandan rural areas, where only 19% of the population aged more than 15 years old had an account in 2022(BNR, 2022).

Therefore, this study aims at assessing the effect of the bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, specifically in Karushuga cooperative as case study with government support as a moderater

The big number of smallholders' dairy farmers of the country who do not have access to capital, encompasses the largest portion of the population. This lack of access to financial services is one of the reasons for smallholders' dairy farmers to live in the vicious circle of poverty for long period. The formal financial sector in Rwanda has stringent lending conditions and therefore will not provide their services to the rural poor farmers (BNR, 2022).

The role of smallholders' dairy farmers plays in Rwandan economy and recent proliferation of financial services' providers in the country (such as commercial banks, smallholders' dairy farmers, cooperative societies, and informal lenders), the sector receives less than 10 percent of the banks' lending, the bulk of which is towards the more developed exports sub-sector. The low levels of agriculture credit and financial inclusion in general is largely due to the dominance of the rural economy, with very low distribution of financial services (BNR, 2022).

Despite studies carried on access to finance and performance of farmers, little studies was carried on dairy farmers and the specificity of their activities. Additionally little studies were carried in the Rwandan context, and in the knowledge of the researcher not in Dairy farming. The researcher aimed to fill this gap by carrying a study examining the impact of the bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, moderated by government support, case of Karushuga cooperative.

1.3. Purpose of the Study

The purpose of this study was to examine the impact of the bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, moderated by government support, case of Karushuga cooperative.

1.4 Objectives of the Study

1.4.1 General Objective

The main objective of this study was to assess the effect of bank credit accessibility on the sustainability of smallholders' dairy farmers in Rwanda, specifically inKarushuga cooperative, with government support as a moderator.

The researcher linked credit and government support, as the Rwandan government estimates that the provision of credit to farmers can be a powerful tool for agricultural and rural development when implemented effectively (MINAGRI, 2022).

1.4.2 Specific Objectives

i. To assess the impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative.
ii. To examine the impact of government support on the sustainability of smallholders' dairy farmers in Karushuga cooperative.
iii. To establish the moderate effect of government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative.

1.5. Research Questions of the Study

i. What is the impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative?
ii. What is the effect of government support on sustainability of smallholders' dairy farmers in Karushuga cooperative?
iii. What is the moderating effect of government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers?

1.6 Hypotheses of the study

The present research led to the following hypothesis below:

H1: There is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative

H2: Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative.

H3: There is moderating effect of government support in the relationship of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative.

1.7 Scope of the Study

1.7.1 Context Scope

The context scope of the present study was limited to the effect of bank credit accessibility and government support on the sustainability of smallholder dairy farmers in Rwanda. The respondents in this study were smallholders farmers.

1.7.2 Time Scope

The research was carried out from February 2023 to September 2023.

1.7.3 Geographical Delimitation

The study was conducted in Karushuga cooperative, operating in Karushuga cooperative, Eastern Province, Rwanda.

1.8 Significance of the Study

Under this section, the researcher would like to present how this research (study) is important to different actors including researcher herself; future researchers; community (as smallholders' dairy farmers in Karushuga cooperative) and commercial banks.

Therefore, considering to the bank credit accessibility, the research findings is relevant because they tend to explain how bank credit accessibility affects sustainability of smallholders' dairy farmers in general. The research helps the researcher to get knowledge related to current topic.

In addition, this study enables the researcher to fulfill the necessary requirements for the award of master's degree with honors in finance as a part of academic regulations of Kigali Independent University. The study serves as reference by scholars of ULK and other universities in carrying out their researches. The research clarifies to the community, the effect of bank credit accessibility towards sustainability of smallholders' dairy farmers in Rwanda and is reference for policy makers in order to implement credits policies and implementation.

1.9. Research Methodology

The study was carried out using the ex post facto design. Both primary and secondary data were used. The primary Data were collected through the utilization of a questionnaire on the variables under study. Then the study focused on statistical analysis of data using correlation and multiple regression analysis in order to assess the effects between the variables under study.

1.10 Structure of the Thesis

This study contains five chapters: Chapter one, the general introduction, presents the overview, the background against which this study was conceived, the statement of the problem, the research hypothesis, the objectives of the research on the study, the significance of the study, the scope of the study and finally the organization of the study. Chapter two presents the review of related literature to the study regarding the previous studies and

theories, especially from textbooks, without forgetting the empirical review and conceptual framework.

Chapter three covers the methodology used to collect data: this includes an area of the study, research design, sources of data, sampling design, sample size, data processing, and its analysis. Chapter four focuses on the presentation, analysis and interpretation of findings, while the fifth chapter provides the summary of findings, the conclusion and recommendations.

CHAPTER TWO: LITERATURE REVIEW

This Chapter introduces review of related literature on the bank credit accessibility, government support and sustainability of smallholders' dairy farmers. Specifically, this part is discussed within the conceptual review, the theoretical review, review of related literature, and conceptual framework.

2.1. Conceptual Review

2.1.1. Bank credit accessibility

Bank credit accessibility refers to the ease with which individuals and businesses can obtain credit from banks and other financial institutions (Girabi&Mwakaje, 2022). It is a measure of how readily available and accessible credit facilities are to borrowers. Banks assess the creditworthiness of borrowers based on their financial stability, income, collateral, and credit history. Borrowers with a strong credit profile are more likely to have easier access to credit (Mrindoko, 2022).

2.1.1.3 Outreach

Improving bank credit accessibility requires a combination of efforts from financial institutions, policymakers, and regulators. Measures such as promoting financial inclusion, reducing bureaucratic hurdles, enhancing credit information systems, and fostering a supportive regulatory environment can contribute to increased accessibility to credit for individuals and businesses, particularly for underserved segments of the population(Mwanyika, 2020).

Bank accessibility and its outreach to farmers refers to the extent to which farmers have the means to access banking services and the degree to which financial institutions are able to effectively serve the financial needs of farmers (Nsubili, 2021). Taremwa, Macharia, Bett and Majiwa(2022) argued that the outreach of banks to farmers is not only about providing financial services but also about creating economic opportunities, reducing poverty, and

supporting sustainable agriculture. It plays a crucial role in the development of rural economies and food security. As such, it remains a key focus for governments, financial institutions, and development organizations seeking to improve the lives of farmers and enhance the agriculture sector.

2.1.1.2 Affordability

Nasereldin, *et al*.,(2023) stated that banks require borrowers to provide certain documentation and information to evaluate their creditworthiness. The complexity and burden of these requirements can affect the accessibility of credit, especially for small businesses or individuals with limited resources. Nsubili (2021) stated that banks often require collateral to secure loans. The type and value of collateral can influence the accessibility of credit. Borrowers who lack sufficient collateral may face challenges in obtaining loans.

Chandio, Jiang, Rehman, Twumasi, Pathan and Mohsin (2020) stated that the interest rates and terms offered by banks impact credit accessibility, as higher interest rates or stringent repayment terms may make credit less accessible for borrowers.Taremwa*et al.* (2022)found that government regulations and policies play a crucial role in determining credit accessibility. Regulations that encourage competition, consumer protection, and responsible lending practices can positively influence credit accessibility.

Mwanyika (2020) asserted that the lending policies of financial institutions, including risk appetite, sector preferences, and target market, affect credit accessibility. Institutions with a focus on supporting small businesses or underserved communities may offer more accessible credit options. While Thuku (2021) stipulated that advancements in technology have facilitated the development of digital lending platforms and alternative credit scoring models. These innovations have the potential to improve credit accessibility by reducing paperwork, streamlining processes, and expanding the reach of financial services.

2.1.1.3. Farming systems

Access to credit plays a vital role in ensuring the sustainability of small farmers by enabling them to invest in their farms, adopt sustainable practices, and overcome financial challenges. Access to credit allows them to acquire necessary resources, such as high-quality seeds, fertilizers, irrigation systems, and machinery, which can improve productivity and yield(Chandio*et al*., 2020).Kajigija (2021) found that credit facilities can support small farmers in transitioning to sustainable practices by providing funds for training, certification processes, and the purchase of eco-friendly inputs. Awotide, Abdoulaye and Manyong (2020) found that credit access helps small farmers mitigate risks by providing funds to invest in crop insurance, diversify their production, or build resilience through savings or emergency funds. Credit facilities can support them in establishing processing units, storage facilities, and transportation infrastructure, allowing them to improve the quality of their produce and access higher-value markets, according to Taremwa, *et al.*, 2022).

Mrindoko (2022) also stated that access to credit allows small farmers to invest in their farms, leading to increased productivity, higher incomes, and improved living standards. This, in turn, helps reduce rural poverty and contributes to overall economic development. Also Thuku (2021) provided that sustainable farming practices promoted through credit access can have positive social and environmental impacts as they can help preserve natural resources, minimize environmental degradation, promote biodiversity, and foster sustainable rural development.

It is important to note that providing access to credit alone is not sufficient. Supportive policies, effective financial institutions, and tailored financial products are needed to ensure that credit is accessible, affordable, and well-managed for small farmers(Muhongayire, 2020). Additionally, comprehensive support programs should be in place to address the specific needs of small farmers and promote sustainable agriculture holistically(Girabi&Mwakaje, 2022).Governments, financial institutions, and organizations

need to collaborate to create an enabling environment for small farmers, which includes policies that promote sustainable agriculture, improved access to credit, technical assistance, market linkages, and fair trade practices.

2.1.2. Sustainability of Small Dairy Farmers

Sustainability, in the context of smallholders dairy farmers, refers to the ability to operate in a manner that ensures the economic viability of the farm, protects the environment, and promotes the well-being of farmers and their communities over the long term (Missiameet *al.,* 2021). It involves practices that balance economic, social, and environmental considerations to support the livelihoods of farmers, preserve natural resources, and contribute to the overall sustainability of the dairy industry (Ouattara, *et al.,* 2020). Sustainability is crucial for the economic success of smallholder's dairy farmers. By adopting sustainable farming practices, optimizing resource utilization, and managing costs effectively, farmers can improve their profitability and ensure the long-term viability of their businesses (Ouattara, *et al.,* 2020). Sustainable practices can also enhance market access and competitiveness, leading to improved incomes and economic resilience for smallholders (Mwanyika, 2020).

Taremwa, *et al.* (2021) asserted that Sustainable farming practices help smallholder's dairy farmers minimize their environmental impact. By implementing efficient waste management systems, conserving water resources, reducing greenhouse gas emissions, and adopting sustainable land management techniques, farmers can protect ecosystems, preserve biodiversity, and mitigate the effects of climate change. This not only benefits the environment but also contributes to the long-term sustainability of the dairy industry (Chandioet*al.,* 2020).Sustainability in smallholders dairy farming includes promoting social well-being and enhancing the quality of life for farmers and their communities. By adopting fair labor practices, ensuring good working conditions, and investing in farmer education and

training, smallholders can improve their livelihoods and enhance social equity. Sustainability also involves engaging with local communities, supporting rural development, and fostering social cohesion (Mwanyika, 2020).

Sustainability practices enable smallholder dairy farmers to build resilience against various challenges. By diversifying income sources, implementing risk management strategies, and adopting climate-smart agriculture techniques, farmers can better cope with market fluctuations, climate variability, and other risks. This resilience helps them sustain their businesses, protect their livelihoods, and adapt to changing circumstances (Tambunan, 2020).Many consumers and buyers increasingly prioritize sustainability when making purchasing decisions. By aligning with sustainable practices and obtaining relevant certifications, such as organic or fair trade certifications, smallholder dairy farmers can access premium markets, attract value-added opportunities, and differentiate their products. This can lead to higher market demand, better prices, and improved market stability for their dairy products(Muhongayire, 2020).

Sustainability is essential for smallholder dairy farmers as it supports their economic viability, ensures environmental stewardship, promotes social well-being, builds long-term resilience, and opens opportunities for market access and growth. By embracing sustainability, smallholders can create a sustainable and prosperous future for themselves, their communities, and the dairy industry as a whole(Mrindoko, 2022).

2.1.2.1 Operating self-sufficiency

It is the total financial revenue as a percentage of. the sum of financial expense, operating expense and loan loss provision expense (Davis, 2020).It is the ratio that is usually used in the financial institutions to analyze its ability in generating operating revenues or incomes in order to cover the total cost incurred in running the business (Burkman, 2021).It is defined as the ratio of institutions' operating revenues to it operating expenses including the financial

costs and impairment losses on loans. The outreach of company, the write- off ratio and regional differences are found significant in determining the OSS of MFIs (Heugens, 2022).

Operating self-sufficiency for small dairy farmers refers to their ability to cover their operating costs and sustain their day-to-day operations without relying heavily on external support or subsidies. It implies that farmers generate enough revenue from their dairy activities to meet their ongoing expenses and maintain financial stability without significant dependence on external financial resources(Mwanyika, 2020). According to Mukasa*et al*. (2021) Operating self-sufficiency, in terms of small dairy farmers, also refers to the ability of a dairy farm to produce enough resources, such as feed, forage, and other inputs, to sustain its operations without relying heavily on external sources. It means that the farm can meet its needs for inputs and minimize dependence on external suppliers, thus reducing costs and increasing overall sustainability.

The literature for small dairy farmers, provided that operating self-sufficiency involves several aspects. Yadav and Sharma (2020) provided that small dairy farmers aim to produce a significant portion of their animal feed on their own land. This includes cultivating crops like corn, alfalfa, and grasses, which can be used as fodder. By growing their feed, farmers can reduce reliance on purchasing expensive feed from external sources.

Thuku (2021) stated also that effective forage management ensures a steady supply of high-quality forage throughout the year, reducing the need for additional purchased feed.Kajigija (2021) stated that by focusing on traits such as milk production, fertility, and disease resistance, farmers can develop a herd that is well-suited to their specific environment and management practices.Proper handling and management of cow manure can help small dairy farmers achieve self-sufficiency according to Obuobisa-Darko (2020). Implementing systems such as anaerobic digesters or composting can convert manure into valuable resources like

biogas or nutrient-rich compost, which can be used as fertilizer on the farm. This reduces the need for external fertilizers and waste disposal costs.

Taremwa, *et al*.,(2022) found thatsmall dairy farmers may invest in appropriate equipment and infrastructure to improve efficiency and reduce reliance on external services. This could include investing in milking machines, cooling systems, or small-scale processing facilities, enabling farmers to handle certain tasks on-site instead of outsourcing them.

Operating self-sufficiency is a goal that aligns with sustainable and resilient farming practices as it helps small dairy farmers reduce costs, improve profitability, and enhance their ability to withstand market fluctuations or disruptions in the supply chain. By maximizing the use of on-farm resources, small dairy farmers can achieve greater control over their operations and create a more sustainable business model.

2.1.2.2. Financial self sufficiency

It is achieved by increasing non-profit firm's ability to generate sufficient income to cover all or a substantial portion of their costs or fund several social programs without continued reliance on donor funding (Hillman, 2020). It is self- financial sustaining (or self-sufficient) if it can maintain itself by independent effort. The system self-sustainability is the degree at which the system can sustain itself without external support the fraction of time in which the financial system is self-sustaining (Aksoy, 2021).Itis to be able to maintain oneself or itself without outside aid and or capable of providing for one's own needs a self-sufficient farm means having an extreme confidence in one's own ability or worth (Heugens, 2022).

Finance self-sufficiency for small dairy farmers refers to their ability to meet their financial needs and sustain their dairy operations without relying heavily on external financial assistance(Mwanyika, 2020). It implies that farmers generate sufficient income from their dairy activities to cover their production costs, repay loans, and reinvest in their business without excessive reliance on borrowing or grants. Finance self-sufficiency is achieved when

farmers have a steady and sustainable cash flow(Awotide, *et al.*,2020), can manage their expenses effectively(Obuobisa-Darko, 2020), and maintain financial stability over the long term(Ouattara, *et al.,* 2020).

Key indicators of finance self-sufficiency for small dairy farmers may include Income Generation, effective cost management, Debt Repayment,effective working capital management, investment and Expansion, effective risk management strategies in place, and access to reliable markets and integration into the formal dairy value chain are essential for finance self-sufficiency(Taremwa, *et al.,* 2021). Achieving finance self-sufficiency is a continuous process that requires effective financial management, strong business acumen, and a focus on long-term sustainability. It empowers small dairy farmers to have greater control over their finances, make informed decisions, and build resilient and prosperous dairy enterprises(Mukasa*et al.,* 2021).

2.1.3. Government Support

Government support refers to the various policies, programs, and initiatives implemented by the government to provide assistance, resources, and incentives to smallholder's dairy farmers(Muhongayire, 2020). This support aims to address challenges, promote development, and improve the overall well-being of small-scale dairy farmers. Government support can take different forms, including financial assistance, technical assistance, capacity building, infrastructure development, market access facilitation, and policy interventions(Nsubili, 2021).

Acording to Mrindoko (2022), government support plays a vital role in promoting economic development within the smallholders dairy farming sector. Financial assistance, such as subsidies, grants, or low-interest loans, can help farmers access capital for investments in infrastructure, equipment, or herd improvement. This support improves productivity, enhances competitiveness, and contributes to income generation and poverty reduction in

rural areas. Also Technical assistance and capacity building programs provided by the government enable smallholders dairy farmers to acquire new knowledge, skills, and best practices(Tambunan, 2020).. The government can help farmers connect with buyers, processors, cooperatives, or export markets. It may establish market information systems, promote value addition, facilitate contract farming, and support the establishment of farmer organizations(Chandio*et al.,* 2020). These initiatives enable smallholders to access better markets, negotiate fair prices, and improve their marketing and distribution capabilities.

Government support is essential for improving rural infrastructure, such as roads, transportation networks, electricity supply, and cooling facilities. Adequate infrastructure reduces post-harvest losses, ensures timely collection and transportation of milk, and facilitates access to inputs and services. This infrastructure development enhances the efficiency of smallholders dairy farming operations, reduces costs, and expands market opportunities(Missiame*et al.,* 2021). Government policies and regulations significantly impact the operating environment for smallholders dairy farmers. Supportive policies can create an enabling environment that addresses the specific needs and challenges of smallholders. This includes policies related to land tenure, access to credit, taxation, quality standards, animal health and welfare, and environmental regulations. Well-designed policies and regulations provide a framework that supports the growth and sustainability of smallholder's dairy farming (Chandio*et al*., 2020).

Overall, government support is crucial for the growth, development, and sustainability of smallholder's dairy farmers. It provides essential resources, knowledge, and opportunities that enable farmers to overcome challenges, improve their livelihoods, and contribute to the overall development of the dairy sector and rural communities.

2.1.4. Bank Credit Accessibility andSustainability of Smallholders Dairy Farmers

Effective standards of bank credit accessibility include factors such as the depth of analysis required and how far this is adapted to the needs of the borrower. There is a tradeoff to be made between a wish to understand all aspects of a proposition and cost. How far facilities are to be standardized and how far they are to be tailored to customers individual needs; all are important in creating sustainable credit standards. Moreover, Thuku (2021) says structuring facilities to protect the bank should be done in such a way and as far as possible that benefits eventually accrues to the customer as well. A repayment schedule for a term credit according to Kajigija (2021) should match customer cash flow, not just meet some predetermined arbitrary benchmark.

Setting standards also means recognizing how far customer sensibilities are going to be balanced against the bank's need to protect itself against loss. For example, when a customer's resistance to giving or improving security or providing information is going to be allowed, then there is the need to educate the customer so as to build their capacity to be able to understand the issues at stake. In creating sound credit standards, Nsubili (2021) believe that it is important to include a proper monitoring and control, the point of monitoring according to Missiame*et al.*, (2021) is to identify deterioration as soon as possible and to take constructive remedial action. Its effectiveness depends not only on the ability to spot deterioration, but also the quality of the reaction. It is as important to avoid a panic reaction as a complacent one.

Nasereldin, *et al.* (2023) are of the opinion that credit standards need to be sustained across the economic cycle. They should not be relaxed in good times or over tightened in bad. In general, companies look better at the top of the cycle and weaker at the bottom than they really are. Therefore, logically monitoring needs to be most strictly applied as the cycle

reaches its peak; but this is just the time when companies are tending to seek to drop or weaken covenants as they flex their muscles in the more competitive market place as far as lenders are concerned. The temptation for banks to look at the favorable surface factors and ignore the longer-term risks is greatest, as is the pressure not to lose good business.

Mwanyika (2020) have noted that to succumb to this pressure, as banks historically have, is to sow the seeds of losses in the next recession. The losses in recession reflect the mistakes banks make during booms. Conversely, at the bottom of a recession, Nsubili (2021) believes that survival can be the best proof of management quality and the ultimate robustness of a business that there is. Companies are likely to be at their most chastened by their recent experience and unlikely to be going for over-expensive and risky plans. Even if they do, they have several years of improved economic conditions ahead of them in which they can pay off their borrowings and get away with all but the most damaging mistakes. However, this is the time when banks are at their most defensive, chaste rend by their own losses and more likely to be risk averse as opposed to risk aware. This is when the credit conditions are tightened beyond what is reasonable or the banks simply refuse to lend. Sometimes they almost actually add to losses by refusing to support battered but fundamentally sound companies that could recover if only they had sufficient finance. It is difficult, but necessary, to remain objectives (Chandio, et al.2020).

In the past, lending skills were regarded as essential for all bankers and the most senior members of a bank's management would have them. Times have changed and the credit function within banks is usually one of the less glamorous places to work. Lending is often regarded as 'value destroying' because of the amount of scarce capital it uses and business that generates fees and other non-interest income is seen as more attractive. The problem with this is that customers have a need to borrow. May be the bigger ones access capital markets

direct through bond issues or commercial paper, but there is a lot of research to show that the service that most customers especially business ones most value from their banker is the willingness to grant credit(Girabi&Mwakaje, 2022).

According to Girabi and Mwakaje (2022) banks face a genuine dilemma in that if they ignore the market and apply standards rigidly, they will avoid credit losses but will have to lose the good business and market share. This must be balanced against the need to meet shareholder aspirations. Whiles models of risk-adjusted capital are widely used and returns related to them, shareholders contribute actual real money capital and want returns on that. It is hard for banks to sit with a lot of real capital and keep ignoring the demand to leverage it. A strong credit culture can help achieve the right balance.

If the bank genuinely understand its customers and has the right sort of relationship with them, Mwanyika (2020) thinks it can choose when to bend standards a little and when to adhere to them, if possible, in the context of a strong customer relationship to persuade even the most macho of customers to see the bank's point of view.

Mbonaga (2019) aimed to assess the Influence of Credit Accessibility on Smallholder Rice Farmers' Performance in Tanzania: The Case of Mbarali District. The study employed survey research design and three years data were collected from 300 respondents in Mbarali District. Poison Regression Model was used to estimate the factors affecting access to formal credit facilities while factors influencing production performance of smallholder rice farmers in Mbarali District, were estimated using OLS regression model. The findings revealed that collateral value, farm size, farm tenure, credit size, interest rate, transaction costs and savings are the main factors affecting access to credit facilities by smallholder rice farmers. Access to formal credit facilities, credit size and farm size are the factors influencing production performance of smallholder rice farmers.

H1: There is statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative.

2.1.5. Government Support and Sustainability of Smallholders' Dairy Farmers

Government support can have a significant impact on the sustainability of smallholder dairy farmers (Mwanyika, 2020). Smallholder dairy farmers often face challenges accessing credit and affordable financing. Thuku (2021) stated that Government support in the form of low-interest loans, grants, or subsidies can help farmers invest in improved infrastructure, acquire high-quality dairy cattle breeds, and purchase modern equipment and technology. This financial assistance enables smallholders to enhance their productivity, increase their income, and improve their overall sustainability.Mukasa*et al*.,(2021) argued that governments can provide training programs and extension services to smallholder dairy farmers. These programs offer technical expertise, knowledge, and guidance on best practices in dairy farming, such as animal nutrition, breeding, disease control, and pasture management. By equipping farmers with the necessary skills, governments contribute to the long-term sustainability of smallholder dairy farming by improving productivity and ensuring the welfare of livestock.

Governments can invest in the development of infrastructure related to dairy farming, such as milk collection centers, chilling plants, processing facilities, and transportation networks. These infrastructure developments help smallholder farmers in efficient milk collection, storage, and processing. It reduces post-harvest losses and ensures that farmers can access markets and receive fair prices for their milk. Accessible infrastructure enhances the sustainability of smallholder dairy farming by improving the overall value chain(Chandio*et al.*, 2020).Governments can also play a crucial role in creating favorable market conditions for smallholder dairy farmers. They can establish policies that support fair trade, prevent

price fluctuations, and ensure market access for small-scale producers. This stability and access to markets provide farmers with income security and incentivize them to continue dairy farming. Additionally, governments can promote local consumption of dairy products through campaigns and institutional procurement, which can contribute to increased demand and better prices for smallholders.

Kajigija (2021) stated that governments can invest in research and development activities specifically focused on smallholder dairy farming. This includes studying and developing improved dairy cattle breeds suitable for local conditions, promoting sustainable feeding practices, and finding innovative solutions to address challenges faced by smallholders. Research and development efforts enable farmers to adopt sustainable and efficient practices, enhancing their productivity and long-term viability. However, Thuku (2021) noted that the impact of government support may vary depending on the specific policies, implementation strategies, and local contexts. However, when governments provide targeted support to smallholder dairy farmers, it can significantly contribute to their sustainability, improving their livelihoods and overall well-being.

In the context of Rwanda, the Government support in dairy farming in Rwanda has had a significant impact on smallholder farmers. The government of Rwanda recognizes the potential of dairy farming to contribute to rural development, poverty reduction, and food security. As a result, it has implemented various support programs and policies to assist smallholders in the dairy sector (USAID, 2021).

The government of Rwanda has prioritized improving dairy breeds through artificial insemination and breeding programs. This support has resulted in the availability of high-yielding dairy cattle breeds, such as the Friesian and Jersey, which produce more milk

compared to local breeds. Improved genetics have led to increased milk production and productivity for smallholder farmers(MINAGRI, 2022).

The government has facilitated the provision of technical assistance and training programs to small dairy farmers. These programs focus on various aspects, including animal husbandry, feed management, disease control, and pasture management. By equipping farmers with knowledge and skills, they are better able to manage their farms efficiently and maximize milk production(Taremwa, *et al.*, 2022).

The government has also invested in the development of dairy infrastructure, including milk collection centers, cooling facilities, and processing plants. This infrastructure has improved the milk value chain by ensuring proper handling, storage, and transportation of milk. Smallholder farmers can sell their milk to collection centers, where it is aggregated and transported to processing facilities, ensuring a reliable market and fair prices (USAID, 2021).

The government has established financial support mechanisms, such as subsidized loans and grants, to assist small dairy farmers (MINAGRI, 2022). These financial resources enable farmers to invest in infrastructure, purchase improved dairy cattle breeds, and acquire necessary equipment. Access to credit facilities empowers farmers to expand their operations, increase productivity, and enhance their overall profitability (USAID, 2022).

The government has played a crucial role in facilitating market linkages for small dairy farmers. By establishing partnerships with private sector stakeholders, cooperatives, and processors, the government helps smallholder access formal markets and secure stable prices for their milk. This reduces the risks associated with market uncertainties and ensures a steady income for farmers(Taremwa, *et al.*, 2022).

The government has implemented policies and regulations to support the dairy sector. This includes quality standards for milk, animal health regulations, and incentives for investment in the sector. These measures ensure that smallholder farmers adhere to quality and safety standards, thus enhancing the competitiveness of Rwandan dairy products in domestic and international markets(Taremwa, *et al.,* 2021). Government support in dairy farming in Rwanda has positively impacted smallholder farmers by improving their productivity, income, and livelihoods. It has created an enabling environment for sustainable growth in the sector and has contributed to poverty reduction and rural development.

Mokgomo, Chagwiza, Tshilowa (2022) used GHS data spanning the period 2013 to 2016 to assess how government agricultural development support influences the livelihoods of small-scale farmers in South Africa. Using both descriptive analyses with Propensity Score Matching (PSM) and Logistics estimations, the result of the study indicates that the proportion of households who have access to the agricultural development support have decreased marginally by two percent from 16% in 2013 to 14% in 2016. The study also reveals that agriculture development assistance given by the South African government is effective in reducing food insecurity, improving agricultural production and income of the beneficiary small-scale farmers.

H2: Government Support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative.

2.1.6. Moderate effect of Government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers

In the relationship between bank credit accessibility and the sustainability of smallholders' dairy farmers, government support can potentially act as a moderating factor. Government support can help improve the accessibility of bank credit for smallholders' dairy farmers as it can establish programs or initiatives that provide guarantees, collateral support, or interest

rate subsidies to incentivize banks to lend to smallholders(Missiame*et al.*, 2021). By reducing the risks associated with lending to this sector, government support can enhance the availability of credit, making it easier for smallholders to obtain financing for their dairy farming activities(Obuobisa-Darko, 2020).

Ouattara, *et al.* (2020) argue that as government support includes financial literacy programs and capacity-building initiatives targeted at smallholders' dairy farmers, therefore by improving farmers' understanding of financial management, loan utilization, and repayment strategies, government support can enhance their creditworthiness and increase their chances of accessing bank credit. This, in turn, promotes the sustainability of smallholders by ensuring they effectively manage borrowed funds and use them to enhance their productivity and profitability.Mwanyika (2020) also provided that as smallholders' dairy farmers often face challenges that may increase their credit risks in the eyes of banks, the Government support can help mitigate these risks by providing guarantees or credit insurance schemes to banks. By sharing or absorbing a portion of the risk associated with lending to smallholders, government support can encourage banks to extend credit to this sector, which reduces the perceived risk for lenders and improves the accessibility of bank credit for smallholders, supporting their sustainability.

Government support can encourage banks to develop financial products and services that specifically cater to the needs of smallholders' dairy farmers. This may include flexible repayment terms, seasonal loans, or loans structured to align with the cash flow patterns of dairy farming(Nasereldin, *et al.,* 2023). Government support can incentivize banks to design customized credit offerings that consider the unique circumstances and challenges faced by smallholders. Such tailored financial solutions enhance the suitability and accessibility of credit for smallholders, contributing to their sustainability. By collecting and analyzing data on credit disbursement, repayment rates, and the overall financial performance of

smallholders, the government can assess the sustainability of credit interventions, and this evaluation helps identify areas for improvement and ensures that government support is effectively moderating the relationship between bank credit accessibility and the sustainability of smallholders' dairy farmers(Tambunan, 2020).

It's important to note that the specific moderating effect of government support may vary depending on the design and implementation of support programs, the regulatory environment, and the overall financial ecosystem(Tambunan, 2020).. Government support should be tailored to the specific needs and circumstances of smallholders' dairy farmers to ensure its effectiveness in promoting their access to bank credit and contributing to their long-term sustainability.

Nasereldin,*et al*. (2022)assessed The Credit Accessibility and Adoption of New Agricultural Inputs Nexus: Assessing the Role of Financial Institutions in Sudan. The study used primary data from 401 rural households to show what kinds of farmers can get credit from banks in Sudan. The probit model is used to examine the factors that determine both farmers' access to credit and the adoption of new inputs, and to show the nexus of credit accessibility and the adoption of new input through other factors. The main findings show that farming experience, the number of close friends, hire labor, cultivated land, irrigation, and extension services from the government, are the factors that significantly determine farmers' credit accessibility from banks.

H3:There is moderating effect of government support in the relationship of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative.

2.2. Theoretical Review

2.2.1 Financial Intermediation Theory

Financial intermediation theory is a framework that seeks to explain the role and functions of financial intermediaries in the economy. It focuses on the intermediation process by which

financial institutions facilitate the flow of funds between savers and borrowers. The theory provides insights into how financial intermediaries address the information and transactional frictions that exist in financial markets (Taylor, 2021). The theory builds upon the foundational works of economists such as John Hicks, Franco Modigliani, and Merton Miller, who made significant contributions to understanding the role of intermediaries in financial markets. However, it has evolved and expanded through the contributions of numerous researchers and practitioners(Tambunan& Kenton, 2020).

The financial intermediation theory emphasizes the role of intermediaries in mitigating information asymmetry, transforming and managing risks, providing liquidity, and achieving economies of scale. By performing these functions, financial intermediaries contribute to the efficient allocation of capital, mobilization of savings, and the overall stability of the financial system (Taylor, 2021).

As for the supporters of financial intermediation theory, Tambunan and Kenton (2020) find it valuable in explaining the functioning and importance of financial intermediaries. They acknowledge the role of intermediaries in reducing information asymmetry, providing liquidity, and managing risks. Taylor (2021) argues that financial intermediation contributes to the efficient allocation of capital and fosters economic growth by channeling funds from savers to borrowers.

On the other hand, critics have raised several points of contention regarding financial intermediation theory. Rehman (2021) argues that the theory assumes an idealized view of intermediaries and overlooks their potential flaws and inefficiencies. Phelan (2021) also highlight that the theory may not fully account for the impact of technological advancements, such as online platforms and peer-to-peer lending, which can disrupt traditional intermediation processes. Additionally, there are debates about the effectiveness of regulatory

measures in ensuring the stability of financial intermediaries and the financial system as a whole.

2.2.2. Theory of Information Asymmetry

The proponent of the theory was George A. Akerlof in 1970 and was later advanced by Michael Spence in 1973 together with Joseph Stiglitz in 1975, all against the different applications involved in the theory. Michael Spencer proceeded with the thoughts of Arkelof in his paper following the Signaling and Signaling balance in the Job Market (1973). He utilizes work advertise for instance, where he displays contracting representatives as speculation choices made under uncertainty.

The theory explains the relationship between the lender and borrower of the financial resources. During assessment of the borrower, lenders face challenges on evaluating due to limited information provided by the credit applicant (Lopez &Saidenberg, 2000a). Information asymmetry in credit market exists when the credit applicants have sufficient information about returns and potential risks related to projects invested on which the financial resources is allocated (Werner, 2016). While on the other hand the credit provider lacks sufficient data regarding the credit applicant.

Information asymmetry is associated with two challenges which includes moral hazards and adverse selection (Yehuala, 2008). Financial institutions face challenges to solve those problems especially when issuing credits to poor households who usually borrow small amounts, hence it is not economically to dedicate financial resources during monitoring and evaluation creditworthiness of the credit applicants (Werner, 2016).

The business isn't sure of the gainful abilities of a person before contracting her. Indeed, even in the wake of procuring, the profitable capacities are not promptly clear assome specific preparing and learning needs to occur. Spence reasons that in light of the fact that the capacities of an individual set aside opportunity to get the hang of, employing is an

investment decision and on the grounds that the abilities are not known before hand with assurance, it is a venture choice under uncertainty. He contrasts such a speculation choice and a lottery where the business sees a specific shot of captivation in the lottery and a specific possibility of losing (Auroren, 2003).

The Theory of Information Asymmetry, particularly in the context of finance and economics, refers to the idea that in transactions or relationships involving two parties (such as buyers and sellers or lenders and borrowers), one party may have access to more or better information than the other. This theory has generated both supporters and critics.

George Akerlof, Michael Spence, and Joseph Stiglitz made significant contributions to the theory of information asymmetry and were awarded the Nobel Prize in Economic Sciences for their work. Their research shed light on how information gaps can lead to market inefficiencies, adverse selection, and moral hazard(Tambunan, 2020).

Savvy investors and financial analysts often rely on their ability to gather and interpret information that is not readily available to the general public. They support the theory because it provides a framework for understanding the importance of information in investment decisions (Mrindoko, 2022).

Government regulatory bodies and policymakers use the theory of information asymmetry to design regulations and disclosure requirements aimed at reducing information gaps and ensuring transparency in financial markets. These regulations help protect investors and maintain market integrity(Yadav & Sharma, 2020).

Scholars in economics, finance, and related fields continue to explore and expand upon the theory of information asymmetry. Their research contributes to a deeper understanding of how information imbalances affect various aspects of economic and financial systems(Tambunan, 2020).

Critics of the Theory of Information Asymmetry argue that markets are generally efficient and tend to eliminate information asymmetry over time. They contend that in competitive markets, prices adjust quickly to new information, reducing the impact of information asymmetry. Behavioral economists point out that human behavior is not always rational and that individuals may make decisions based on factors other than perfect information. In some cases, even when information is available, people may not act on it as expected(Mrindoko, 2022).

Critics suggest that the theory may overemphasize the negative consequences of information asymmetry, such as adverse selection (the problem of hidden information) and moral hazard (the problem of hidden actions), while not fully exploring the potential benefits of information asymmetry, such as specialization and expertise. The theory of information asymmetry often relies on simplifying assumptions to model complex real-world situations. Critics argue that these assumptions may not always hold in practice, leading to a disconnect between theory and reality(Heugens, 2022).

Critics also contend that, while information asymmetry is a valid concern, it is possible to mitigate its effects through mechanisms such as reputation building, third-party certification, and contractual arrangements. They argue that these mechanisms can reduce the negative consequences of information imbalances. They highlight that the impact of information asymmetry can vary significantly depending on the context and specific circumstances of a situation. What may be a problem in one context may not be as significant in another(Nsubili, 2021).

This theory is relevant in our study since it emphasizes on the importance of record keeping in farming ventures which then act as an important source of information for lenders to use during credit analysis.In summary, the theory of information asymmetry is a valuable concept for understanding how information imbalances can affect economic and financial

interactions. While it has garnered significant support and contributed to our understanding of markets and decision-making, it also faces criticisms related to its assumptions, applicability, and the role of market forces in mitigating information imbalances.

2.2.3. Financial Sustainability Model

The Sustainable Agriculture Framework is a set of principles and practices that guide agricultural systems to be environmentally friendly, economically viable, and socially responsible over the long term. It promotes sustainable land and resource management while ensuring food security, economic stability for farmers, and minimal harm to the environment. There is no single inventor or specific year associated with the framework's development, as it has evolved over time through contributions from various agricultural experts, researchers, and organizations. However, sustainable agriculture principles have been discussed and applied for several decades(Yadav & Sharma, 2020).

Sustainable agriculture prioritizes the conservation of natural resources, including soil, water, and biodiversity. It seeks to minimize environmental degradation and the use of synthetic chemicals and pesticides(Yadav & Sharma, 2020). Farming practices should be economically viable for farmers. Sustainable agriculture aims to provide fair and stable incomes to farmers, ensuring their livelihoods and the long-term economic sustainability of agricultural operations (Nasereldinet al., 2023).

The framework emphasizes the well-being of farmers and rural communities. It promotes social equity, fair labor practices, and rural development. Farmers' quality of life and access to essential services are essential considerations (Girabi&Mwakaje, 2022). Sustainable agriculture often involves crop diversification, crop rotation, and integrated pest management to reduce the reliance on a single crop or production method. This helps enhance soil health and resilience to pests and diseases (Thuku, 2021).

Conservation agriculture techniques, such as minimal tillage and cover cropping, are commonly used to reduce soil erosion, improve soil structure, and enhance water retention.

IPM principles are employed to minimize the use of synthetic pesticides and focus on pest control through natural predators, biological controls, and crop rotation. Integrating trees and shrubs into agricultural systems, known as agroforestry, can improve soil fertility, provide shade, and contribute to biodiversity(Tambunan, 2020). Many sustainable agriculture practices align with organic farming principles, which emphasize the avoidance of synthetic chemicals and the use of natural and organic inputs (Heugens, 2022).

The framework emphasizes the importance of environmentally friendly farming practices, leading to reduced soil erosion, improved soil health, and protection of water resources. It helps mitigate the negative impacts of agriculture on ecosystems. Sustainable agriculture promotes food security by ensuring stable food production while maintaining the capacity of ecosystems to support future generations. It focuses on enhancing yields without depleting natural resources(Heugens, 2022).

By promoting economically viable farming practices, the framework aims to provide farmers with stable incomes and reduce financial risks associated with agriculture. The framework addresses social equity concerns by emphasizing fair labor practices, community development, and equitable access to resources, including land and water.Sustainable agriculture practices are often more resilient to climate change impacts, such as extreme weather events and shifting growing seasons. Crop diversification and soil conservation contribute to resilience(Yadav & Sharma, 2020).

Through the protection of natural habitats and the use of diverse farming practices, sustainable agriculture helps preserve biodiversity by providing habitats for wildlife and pollinators. The framework has contributed to increased consumer awareness of the environmental and social implications of their food choices, leading to greater demand for

sustainably produced food. Sustainable agriculture principles have influenced agricultural policies and research agendas worldwide, driving investments in sustainable farming practices and technology (Thuku, 2021).

The Sustainable Agriculture Framework has both supporters and critics, reflecting the diverse perspectives and challenges associated with implementing sustainable agricultural practices. Environmentalists and conservationists generally support sustainable agriculture for its emphasis on reducing the negative environmental impacts of farming. They appreciate practices that protect soil health, minimize chemical use, and promote biodiversity. Many small-scale and family farmers find the framework appealing because it offers practical solutions that can enhance the long-term productivity of their land while maintaining environmental integrity (Mrindoko, 2022).

Consumers concerned about the quality and safety of their food, as well as its environmental and social implications, often support sustainable agriculture. They seek out sustainably produced food products in the market. Sustainable agriculture aligns with the principles of local food movements. These movements advocate for shorter supply chains, reduced transportation emissions, and the support of local farmers and economies(Nasereldin*et al.*, 2023).

Agricultural researchers and scientists appreciate the framework for providing a structured approach to improving agricultural practices, conducting experiments, and developing innovative solutions to agricultural challenges. Also, Governments and policymakers recognize the potential of sustainable agriculture to address issues such as food security, environmental degradation, and rural development. They often implement policies and programs that encourage sustainable farming practices (Thuku, 2021).

Critics argue that sustainable agriculture practices can be costlier and less efficient in terms of yield compared to conventional farming methods. They contend that this can pose economic

challenges for farmers. Some critics question the scalability and feasibility of sustainable agriculture practices t o meet the global demand for food, particularly given the projected population growth(Yadav & Sharma, 2020).

Transitioning from conventional to sustainable agriculture can be challenging for farmers, requiring time, investment, and relearning of farming practices. Critics argue that the transition period may be financially burdensome. Concerns exist about the ability of sustainable agriculture to consistently achieve high levels of productivity, which is important for ensuring food security, especially in regions with high population densities(Girabi&Mwakaje, 2022).

Critics suggest that sustainable agriculture practices may lead to higher prices for agricultural products, potentially limiting access to nutritious food for low-income consumers. Some argue that sustainable agriculture practices may be less resilient to certain environmental challenges, such as extreme weather events, leading to production risks. Other contend that global trade in agricultural products may be hindered by sustainability standards, potentially affecting the livelihoods of farmers in developing countries who rely on exporting crops(Tambunan, 2020).

It's important to note that the implementation and success of sustainable agriculture practices can vary depending on factors such as location, scale of farming, crop type, and local conditions. As a result, the framework's applicability and effectiveness may differ across contexts.

Additionally, ongoing research and innovation in sustainable agriculture aim to address some of the concerns raised by critics while continuing to promote more environmentally friendly and socially responsible farming practices (Yadav & Sharma, 2020).

This theory is our support as it is a holistic approach to agriculture that seeks to balance the needs of the environment, society, and the economy. It encourages responsible and resilient farming practices that can address current challenges while safeguarding the capacity of future generations to meet their needs.

2.3. Review Related Literature

Using a field experiment involving agricultural microenterprises in Bangladesh, Nusrat, Plamen, Mohammad and Subal (2019) assessed the Effects of Access to Credit on Productivity: Separating Technological Changes from Changes in Technical Efficiency. The authors estimated the impact of access to credit on the overall productivity of rice farmers and disentangled the total effect into technological change (frontier shift) and technical efficiency changes. They found that relative to the baseline rice output per decimal, access to credit resulted in, on average, approximately a 14 percent increase in yield, holding all other inputs constant. After decomposing the total effect into the frontier shift and efficiency improvement, they found that, on average, around 11 percent of the increase in output came from changes in technology, or frontier shift, while the remaining 3 percent was attributed to improvements in technical efficiency. The efficiency gain was higher for modern hybrid rice varieties, and almost zero for traditional rice varieties. Within the treatment group, the effect was greater among pure tenant and mixed-tenant microenterprise households compared with microenterprises that only cultivated their own land.

Mokgomo*et al.*(2022) aimed to use GHS data spanning the period 2013 to 2016 to assess how government agricultural development support influences the livelihoods of small-scale farmers in South Africa. Using both descriptive analyses with Propensity Score Matching (PSM) and Logistics estimations, the result of the study indicates that the proportion of households who have access to the agricultural development support have decreased marginally by two percent from 16% in 2013 to 14% in 2016. The study also reveals that

agriculture development assistance given by the South African government is effective in reducing food insecurity, improving agricultural production and income of the beneficiary small-scale farmers. Following the observed marked gender, racial and geographical differences in households' access to the agricultural development support, the Ministry of Agriculture and its allied ministries and departments responsible for the implementation of the agricultural development support programs must streamline policies to account for the lack of support to farmers in general. Addressing such differences is necessary to ensure that the programme achieves its intended overall objectives.

Awotide, *et al.* (2020) examined the impact of access to credit on agricultural productivity in Nigeria using the Endogenous Switching Regression Model (ESRM). The first stage of the ESRM reveals that total livestock unit and farm size are positive and statistically significant in determining the farmers' access to credit. The second stage reveals that total livestock unit and farm size are negative and statistically significant in explaining the variations in cassava productivity among the farmers that have access to credit, while household size, farm size, and access to information assets are negative and statistically significant in explaining the variation in cassava productivity among the farmers without access to credit. Access to credit has a significant positive impact on cassava productivity.

Missiame*et al*. (2020) assessed the impact of access to credit from rural and community banks (RCBs) on the technical efficiency of smallholder cassava farmers in Ghana. The study employed the stochastic frontier, and endogenous switching regression models to estimate the technical efficiency, and the impact of RCB credit access, respectively, on a randomly selected sample of 300 smallholder cassava farmers in the Fanteakwa District of Ghana. Results suggest that cassava farmers in the District are 70.5 percent technically efficient implying that cassava yield levels could be increased further by 29.5 percent without changing the current levels of inputs. The results further reveal that the gender of the

household head, access to extension services, membership in farmer organizations, and proximity to the bank are the major factors that positively influence farmers to access credit from RCBs. On average, farmers who accessed credit from RCBs have significantly higher technical efficiencies than farmers who did not access, suggesting that access to credit from RCBs positively impacts the technical efficiency of small holder cassava farmers.

Nasereldin,*et al.* (2023) investigated the Credit Accessibility and Adoption of New Agricultural: Assessing the Role of Financial Institutions in Sudan. They used primary data from 401 rural households to show what kinds of farmers can get credit from banks in Sudan. The probit model is used to examine the factors that determine both farmers' access to credit and the adoption of new inputs, and to show the nexus of credit accessibility and the adoption of new input through other factors. The main findings show that farming experience, the number of close friends, hire labor, cultivated land, irrigation, and extension services, are the factors that significantly determine farmers' credit accessibility from banks. Some of these determinants, such as cultivated land and irrigation, also influence the adoption of new inputs. There exists a strong correlation between credit accessibility from banks and the possibility of using new input. In addition, an IV probit model shows that farmers' use of chemical fertilizers and improved varieties directly influences the loan decision from banks. This means farmers' credit demand induced by the chance of using new input actually has been satisfied by the banks in Sudan.

Mwanyika (2020) focused on evaluating the effect of credit accessibility on performance of small scale farms in TaitaTaveta County, Kenya. The study was anchored on the trade- off theory of capital structure, the theory of Information Asymmetry, Adverse Selection Theory, the Pecking Order Theory, and the demand and Supply Theory. The study utilized descriptive review method. The research targeted 1101 small scale farms living in 4 sub counties across the county. Therefore, a 111 sample size made of small scale farms was used to represent the

target population by the use of simple arbitrary sampling to provide for every member of the target population. The data was gathered by using a self-administered questionnaire, analyzed by use of descriptive statistics utilizing graphs and tables. SPSS was used to analyze data through a regression model.

Mrindoko (2022) investigate the impact of Village Community Bank (VICOBA) loans on smallholder farmers' household income in Kiteto District, Tanzania. The study involved 100 smallholder farmers who had accessed VICOBA loans. The study applied a cross-sectional survey design. In the case of the study approach, it was a mixed method. The data were solicited from smallholder farmers through questionnaire, in-depth interviews and FGDs. The collected data were analysed using regression analysis. The results of this study indicate that loan amount, interest rate, loan accessibility and transaction costs had a significant impact on smallholder farmers' income. On the contrary, the grace period, repayment period and mode of repayment were not significant. The study findings imply that the VICOBA loans had an impact on the income of smallholder farmers, and have improved their living conditions as well as assisted them to climb out of excessive poverty.

Mbonaga (2020) aimed to address the issue of poor access to credit facing smallholder rice farmers in Mbarali District. Moreover no study has attempted to assess the influence of access to credit facilities on performance of smallholder rice farmers. The study used quantitative analysis approach to establish cause and effect relationship between variables. The study employed survey research design and three years data were collected from 300 respondents in Mbarali District. Poison Regression Model was used to estimate the factors affecting access to formal credit facilities while factors influencing production performance of smallholder rice farmers in Mbarali District, were estimated using OLS regression model. The findings revealed that collateral value, credit size, interest rate, transaction costs and savings are the main factors affecting access to credit facilities by smallholder rice farmers.

Access to formal credit facilities, credit size and farm size are the factors influencing production performance of smallholder rice farmers.

Girabi and Mwakaje (2022) investigated the impact of microfinance on agricultural productivity by smallholder farmers in Tanzania with the case study of Iramba District. A total of 98 respondents were selected randomly from credit beneficiaries (CB) and non-credit beneficiaries (NCB). The collected data were analyzed through descriptive statistics and multiple regression analysis. Findings revealed that, CB realized high agricultural productivity compared to the NCB respondents. This is partly because the CB were relatively better in accessing markets for agricultural commodities, use of inputs and adoption of improved farming technologies. The major factors hindering smallholder farmers' access to credit were reported to be lack of information, inadequate credit supply, high interest rates and defaulting.

In Rwanda, Kajigija (2021) focused to determine factors that affect smallholder farmers accessing credit facilities, identify discrepancies between rural and urban areas in accessing formal credit and also determine whether there is a gender gap in accessing credit facilities as well as gaps between different wealth groups. The data used in this study was drawn from the FinScope Rwanda 2022 survey conducted in 2020/2022 by Centre for Economic and Social Studies (CESS) and approved by the National Institute of statistics of Rwanda (NISR). Standard binary logit technique was deployed to assess the factors determining smallholder farmers' access to formal credit. Among the findings is that households which are headed by male and female headed household are not statistically significant. However, the study revealed that there is discrepancies in smallholder farmers living in urban and rural areas in accessing formal credit and also the difference in wealth groups in accessing credit from the formal sources was statistically significant. The study recommends improving transportation

infrastructures such as roads, telecommunication, and other infrastructures in different areas to make financial services providers more accessible across the provinces.

Taremwa, *et al*. (2022) sought to identify and assess the determinants of access to agricultural credit among rice and maize smallholder farmers in Rwanda. The study was conducted in the eastern and western provinces of Rwanda using a cross-sectional survey design. Sample districts, sectors, and cells were obtained using stratified random sampling techniques. Convenient and purposive samplings were used to sample households and farmers, respectively. Data were collected using structured interviews and questionnaires, and were analyzed using a binary logistic regression model. Model results indicated that both individual and institutional factors determine access to agricultural credit among smallholder maize and rice farmers in eastern and western provinces of Rwanda. The individual factors included: saving of money in commercial banks (Adjusted Odds Ratio (AOR) = 2.389), owning a size of land that is 0-0.1 ha (AOR = 0.127), and knowledge of the repayment terms of agricultural loans (AOR = 0.203), while the institutional factors included: having privately-owned finance institutions in the area (AOR = 0.287), offer of both long and short-term loans (AOR = 0.290), interest rate between 11-15% (AOR = 0.178), the process for obtaining agricultural credit not being too long (AOR = 2.026). Institutional factors were more important than the individual farmer characteristics in determining access to credit. Policy interventions aimed at bolstering agricultural credit access among the smallholder farmers should address institutional challenges such as information asymmetry and the lack of credit guarantees that hinder agricultural credit access.

Muhongayire (2020) assessed the factors influencing smallholder farmers' access to credit in Rwamagana District, Rwanda. The study sought to establish the relationship between formal and informal credit use and to assess the factors that influence smallholder farmers' access to formal credit. It was hypothesized that informal credit participation is negatively associated

with formal credit use and that access to credit is not determined mostly by household socio-economic andinstitutional factors such as land, agricultural extension service, gender. Both primary and secondary data were used in the analysis. Multi stage sampling technique was used. A sample of 185 smallholder farmers stratified by access to formal credit was drawn. Descriptive statistics show that farmers' credit users and non users were significantly different by gender of household head, keeping farm records head, off-farm incomes at 5 percent level of significance. Moreover, education of household, agricultural extension service, participating in informal credit was significantly different at 1 percent level of significance.

However, other variable such as age of household head and land size of household head were not significant different between users and non-users. Results from the logistic model showed that, participating in informal credit increased the likelihood of participating in formal credit by 29.2 percent. It also found that off-farm income, agricultural extension service, participating in informal credit and education level of household head were statistically significant at 1 percent level of probability. The farmers earning more of farm income increased the likelihood of participating in formal credit by 4.6 percent. In addition, farmers with higher levels of education and those who receive technical advice from agricultural extension services are more likely to use formal credit (14.9 percent versus 14.5 percent respectively).

2.4. Conceptual Framework

A conceptual framework may be considered as an analytical instrument with several variations, and utilized to establish conceptual distinctions and idea organization (Creswell & Creswell, 2018). Figure 1 presents the variables of concern in the present study along with their corresponding dimensions, where the independent variable aims of the assessment of

bank credit accessibility, while dependent variable is about the analysis of the sustainability of the of smallholders' dairy farmers.

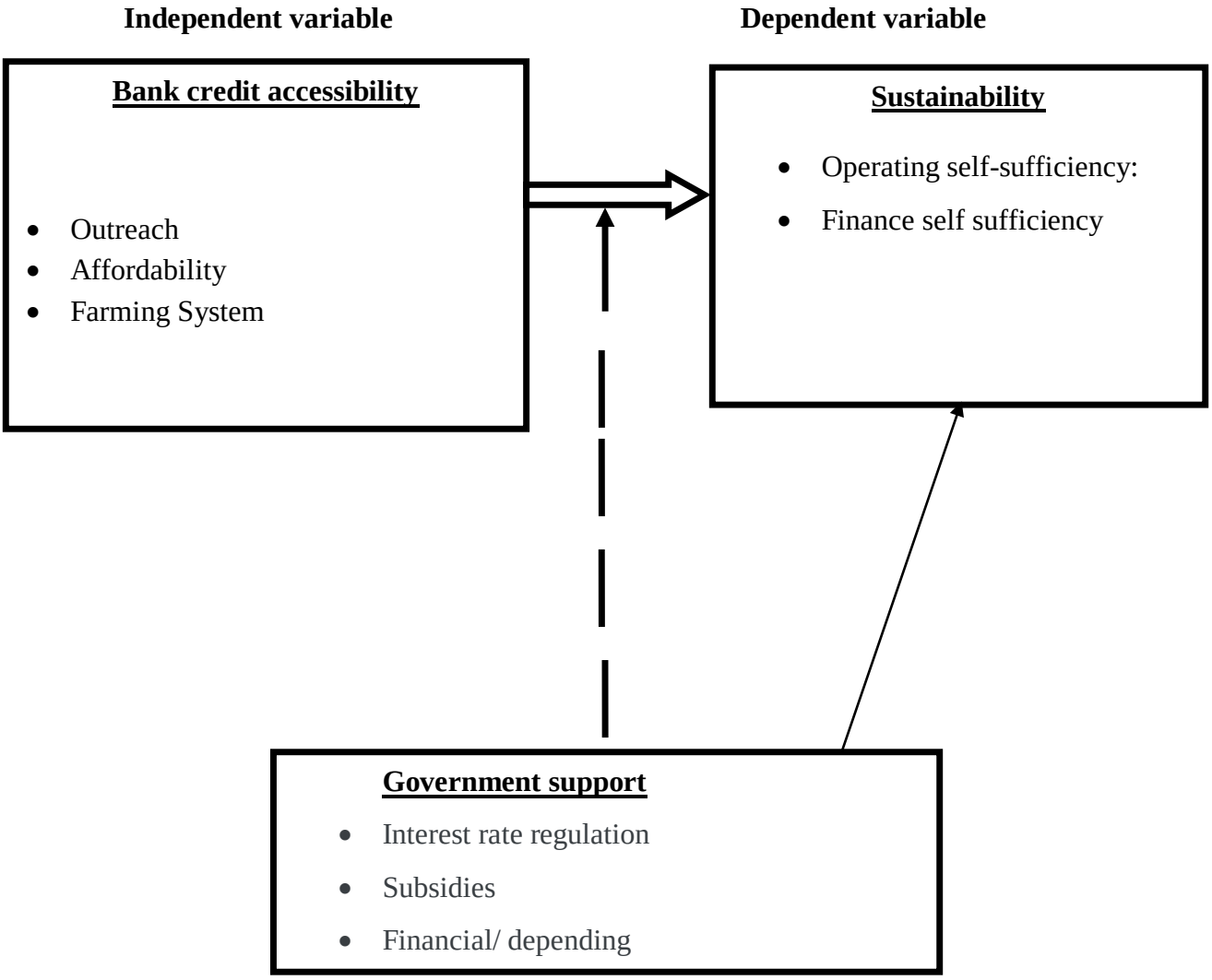

Figure 2. 1Conceptual Framework

Source: Researcher (2023)

2.5. Summary

According to the different reports and other books (papers & journals) written by other scholars (and or authors), those read by current researcher; they found that there are only few studies done on bank credit accessibility and its components including for example financial data management; banking bank credit accessibility and banking risks management, etc; and

yet they present mixed results, where their research findings show that the bank credit accessibility contents towards sustainability of smallholders dairy farmers are often described with so many details. In other words, there are few studies made by different authors who did researches on bank credit accessibility and sustainability of smallholders dairy farmers, especially for the case of Rwandan economy; therefore, in order to provide effective contribution in academic researches; it is from that biased gap where current researcher was motivated to do research on: bank credit accessibility towards sustainability of smallholders dairy farmers in Karushuga cooperative; during the period from 2021 up to 2022.

CHAPTER 3: RESEARCH METHODOLOGY

This chapter is about the overall approach to the research process, from the rational foundation of the study to the collection and analysis of the data collected about impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Rwanda, case of Karushuga cooperative. The chapter explains how the researcher collected the data, the nature of data collected, where data were collected and how they were analyzed. It presents the methods and methodological techniques and approaches that were applied in data collection, sampling techniques as well as problems that were encountered in the study.

3.2. Research Design

Yin (2014) defined research design as a logical problem, not a logistical problem, before a builder or architect can develop a work plan or order materials, they must first establish the type of building required, its uses, and the needs of the occupants. The present study was descriptive research design with the primary goal of gathering the perceptions of respondents on the variables under study. The perceptions of respondents were analyzed using frequencies, mean, standard deviation by using quantitative data. While the correlation analysis was utilized to evaluate the relationship between the study's variables, and multiple regression used to test hypotheses of the study.

3.3. Study Population and Sample Size

3.3.1. Study Population

Bailey (2022) says that the population is universal objects over which research is to be carried out. The ideal practice in research was to gather information from the entire

population; this ensures maximum coverage of the population concerned in the research. But due to limited time and funds the entire population of the research cannot be covered and the sample defined as a sub set of population is used. Duttolph (2022) argued that if the sample is selected properly, the information collected about the sample may be used to make statements about the whole population.

The entire population of the study who are supposed to provide the information data related to the objectives of the research study are 198 dairy farmers members of the Cooperative Karushugain Karushuga cooperative, Karangazi Sector.

3.3.2. Sample Size of the Study

Before identifying the respondents to this research, it is necessary to indicate how the sample size is determined. In order to determine the sample size, the following mathematical formula designed by Taro Yamane (1967) is used; where, n is the sample size; N is size of the population and e is marginal error or level of confidence. Based on data from the cooperative Karushuga, there are 198 farmers in the cooperative.

General scientific formula: $\frac{\mathbf{N}}{\mathbf{1+N(e)^2}}$; and then the sample size is $n = \frac{198}{1+198(0.05)^2}$;

$n = \frac{198}{1.495}$= 132; then the sample size is 132 respondents.

3.3.3 Sampling Technique

Sampling Technique is a sampling technique where every item in the population has an even chance and likelihood of being selected in the sample. Here the selection of items completely depends on chance or by probability and therefore this sampling technique is also sometimes known as a method of chances (Bailey, 2010). The researcher used simple random sampling technique which involves selecting a subset of individuals or items from a larger population in a manner where each member of the population has an equal and independent chance of

being included in the sample (Saunder, 2012). The goal of random sampling was to obtain a representative sample that accurately reflects the characteristics of the entire population, allowing the researcher to make valid inferences about the population as a whole.

3.4 Data CollectionTechniques and Tools

The study employed questionnaires and undertake desk research on available documentation for data collection Desk research were based on reports that are available in public libraries, websites that may be used for this research purpose.

3.4.1 Questionnaire

The researcher distributed self-structured questionnaires to respondents selected for the study. It was administered to sampled respondents over a period of three weeks. The self-structured questionnaire was based on Liker scale which is a rating scale that requires the subject selected for the study to indicate his/her level of agreement or disagreement with a given statement (Kothari & Garg, 2014). The equivalent weight for the answers provided by respondents was measured as follows:

1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, and 5.Strongly Agree.

Table 3. 1.Interpretation of Scale

Scale	Interpretations
1	Strongly Disagree (SD)
2	Disagree (D)
3	Neutral (N)
4	Agree (A)
5	Strongly Agree (SA)

Source: (Saunder, 2016)

There are several sections based on the research objectives: Demographic questions in Section A include those pertaining to gender, age, education, and work experience. Research

objective one are in Section B, research objective 2 is in section C, and research objective 3 are in section D. There were ten statements for each of the research specific objective, and these all come from various earlier papers where they were applied and empirically supported. Each of the participants who was sampled for the study got a questionnaire. The researcher distributed the questionnaire to 132 respondents over the period of one month due to the size of the population, and the location of the case study.

Secondary data sources were the foundation for which the theoretical and conceptual framework of the research was built. Relevant literature from related case existing studies, books, government related institutions reports, websites, and private institutions were contacted for reports; different libraries from different high learning institutions such as Kigali Independent University were used to provide the review of the literature and giving the needed information concerning the topic under study in order to make this study meaningful.

3.4.2. Documentation

Saunders *et al.,* (2012) define documents as items that provide details about a topic that academics are interested in studying. The researcher took care to compare the information from the questionnaire with information from other sources, such as reports which were made public. The researcher obtained additional information on sustainability of smallholders farmers by consulting available documentation on the subject. As a form of knowledge management and knowledge organization, documentation can be provided on paper, online, or on digital or analog media, such as audio tape or CDs (Lohrey, 2014), and the researcher intended to use paper documentation and online documentation only**.**

3.5. Pilot Study

In order to gauge how well each of the statements in the questionnaire is understood, a pilot research was carried out. This made it easier to assess if the statements' intended meanings as

expressed in each construct are correctly communicated. The purpose of a pilot study was to lessen the possibility of making research mistakes when formulating the construct of the questionnaire. The pilot research was carried in Rugende rice cooperative which cultivate rice in Rugende marshland. The researcher gave out copies of the questionnaire to 25 respondents in Rugende Rice Cooperative, in order to allow her to determine whether the questionnaire was adequate. Additionally, it made it easier to evaluate if a full-scale study would be possible in the future. The researcher edited and changed the questionnaire's statements that were not clear, while some of them were reworded, especially those that were not correctly responded by the respondents as expected, based on the pilot study and the instrument appraisal.

3.6. Validity and Reliability of the Research Instrument

Several professionals in the field of credit and finance validated the research tool. The study's supervisor, and the manager of the Bank of Kigali Mr UGIRASHEBUJA Denis, makes up the panel of experts. The researcher also used confirmatory factor analysis (CFA) to build validity and calculated the correlation between the primary construct and the components. Were used if Average Variance Extracted (AVE) was above 0.5 (Kakooza, 2021).

Table 3. 2:Validity Test

S/N	Variables	Number of items	Average Variance Extracted
1	Bank credit accessibility	10	0.641
2	Government Support	10	0.588
3	Sustainability	10	0.687

Source: Researcher's Pilot Study (2023)

The reliability of the instrument was evaluated in this study using the Cronbach's Alpha coefficient, which illustrates the correlation between each item. Cronbach's Alpha groups the instrument's questions into potential groups before calculating correlation coefficients for each group. A computer algorithm handled this part, and the result was a single Cronbach's Alphas value that must be more than 0.7(Kakooza, 2021). This number is more than 0.7 when the research instrument is very reliable and the scale's items have a higher level of internal consistency.

Table 3. 3: Reliability Test

S/N	Variables	Number of items	Cronbach's Alpha(α)
	Bank credit		
1	accessibility	10	0.741
2	Government Support	10	0.799
3	Sustainability	10	0.706

Source: Researcher's Pilot Study (2023)

3.7. Methods of Data Analysis

In the area of statistical methods, one can find original, excellent papers that emphasize many facets of contemporary statistical theory as well as noteworthy applications. This thesis aimed to promote collaboration between statisticians and scientists from other fields who are interested in statistical methods generally. The data was evaluated using descriptive and inferential statistics, such as correlation and multiple regression analysis, as part of the research analysis process. The data in this study were computed and analyzed using the data analysis software statistics product and service solution (SPSS).

3.7.1. Descriptive statistics

Descriptive statistics like mean, frequency, and coefficient of variations were used to characterize bank credit accessibility, government support, as well as sustainability.

3.7.2. Mean (M)

Mean the best known and frequently used measure of the center of distribution of a quantitative variable is well known as a mean. The mean refers to "averaging", adding up the data points and dividing by how many there are, Mean: is the average value calculated by adding up the values of each case for a variable and dividing by the total number of cases (Lohrey, 2014) and the formula is:

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} xi$$

Table 3. 4: Interpretation of Mean

Interval	Level	Interpretation
1.00-1.89	No extent	The fact does not appear
1.90-2.79	Low extent	The fact appear less
2.80-3.59	moderate extent	The fact appears moderately
3.60-4.39	High extent	High evidence of the existence of the fact
4.40-5.00	Very great extent	Very strong evidence of the existence of the fact

Source: Saunder (2012)

3.7.3. Standard Deviation (σ)

The standard deviation is a number that represents the degree of data variability. It represents how near the data is to the mean. It informs the researcher about the distribution of the data (Saunder, 2012). S is typical distance from the mean, larger values of S represent greater spread, if S = 0 means that all observations take the same value. The formula of standard deviation is:

$$(S) = \sqrt{S^2}$$

Where, $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(xi - \overline{X})^2$

Homogeneity refers to objects or people that have comparable features or are all of the same kind, whereas heterogeneity refers to things or people who have few or no similar traits.

Table 3. 5:Interpretation of Standard Deviation

Standard Deviation	Level spreading
σ<0.50	Homogeneity
σ>0.50	Heterogeneity

Source: Saunder (2012)

3.7.4. Pearson Correlation

The statistical relationship between trade credit and investment performance for export-oriented companies was measured extremely well using the Pearson correlation coefficient. The goal of the correlation study was to determine the strength and proximity of the variables. The rules for interpreting the correlation coefficient are as follows.

Table 3. 6:Evaluation of Correlation

Correlation coefficient	**interpretation**
r=1	Perfect linear correlation
0.9<r<1	Positive high strong correlation
0.7<r< 0.9	Positive strong correlation
0.5<r<0.7	Positive moderate correlation
0<r<0.5	Weak correlation
r=0	No, relationship

Source: Saunder (2012)

3.7.5. Multiple Linear Regressions

The effects of numerous predictor variables (rather than just one) on the dependent measure are assessed using multiple regression analysis. Use linear regression to calculate the mean change in a dependent variable given a one-unit change in each independent variable. When the independent variable is another variable that could be categorical, continuous, or ordinal, and the dependent variable is continuous (ratio or interval data), OLS is used. After testing the study hypotheses, including linear relationship, multivariate normality, no or little multicollinearity, multiple linear regression analysis can be done because the dependent variable in this study is ratio data rather than ordinal data (Likert scale of five responses).

Multiple regression models were used to analyze the significance of the influence of the independent factors on the dependent variables, and the moderating variable. Based on previous models that have been used to assess the impact of each predictor, the current study will use the model that is described below.

Model specification

Formula for Multiple Linear Regression:

$Y=\beta_0+\beta_1X_1+\beta_2 X_2+\beta_3 X_1*X_2+Ɛ$:

Where

β0= Constant,

β1-β4=regression coefficients,

ε= errorterm.

X1 = Independent Variable (Bank credit accessibility)

X2= Moderator Variable (Government Support)

Y = Dependent variables (Sustainability)

β_0 = Constant coefficient

Model Evaluation

To assess the applicability of each model, pre-estimation tests will be conducted. This was required since, before any estimating is done, it reveal whether there have been changes made to the variables that make up the models. In order to assess the best estimating method for every model, a post-estimation test is performed.

Multicollinearity: is an undesirable situation caused by high correlations between the independent variables (Corbin et al., 2014). The study made use of variance inflation factors and tolerance values to check for multicollinearity consistency (VIF). The tabulated data was compared to t-statistics, z-statistics, and F-statistics with probability values at 1 percent, 5 percent, and 10 percent levels. If two or more variables have a Variance Inflation Factor (VIF) of five or greater, then one of them needs to be eliminated from the regression analysis.

A Priori Expectation: All independent sub variables are predicted to have a significant impact on each dependent variable as the expected outcomes or a priori expectation for the built-in econometric models. Each econometric model experience a favorable effect of this kind. The independent variables typically have a considerable and favorable impact on the dependent variable.

3.8. Ethical Consideration

The researcher used the utmost caution when distributing the data collection tools to the respondents in order to safeguard their rights and privacy. This research project considered three ethical principles: informed consent, voluntary participation, and privacy/anonymity. The study of these concerns satisfied the following.

The researcher gave informed consent after being made aware of any ethical issues. This was achieved by the researcher requesting permission from both the selected cooperative and ULK in order to conduct the research.

When creating the questionnaire before the study begins, care was taken to avoid requesting the respondents' sensitive or offensive personal information. The researcher made appointments in advance to avoid offending the respondents. The researcher explained in deep to the respondents comprehends the benefits and challenges of participation by describing the nature and objective of the study and the fact that they would not get any financial incentives for doing so.

The researcher ensured that respondents' information was handled professionally and in confidence. The respondents' anonymity was preserved for the study's aims by coding them rather than reflecting the names that were utilized.

Confidentiality laws were followed in order to protect study participants' privacy. The researcher respected the respondent's privacy by going to where they like. The researcher correctly attributed the authors who were used in this study and the person who created the standardized exam using citations and references in order to avoid plagiarism.

The researcher obtained informed consent from the respondents before distributing the questionnaire and provided them with the option to withdraw from the study at any point while it was still in progress. No specific research findings were disclosed to or made available to study participants. All study participants had access to the final research report, should they want to do so.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

The chapter contains data analysis, presentation and results interpretation as well as discussion of the findings according to the study objective and aims. The main purpose of this study was to assess the Bank credit accessibility and sustainability of smallholders dairy farmers in Rwanda, with evidence from Karushuga cooperative, as the case study. The chapter entails questionnaire response rate, demographic characteristics of respondents, an analysis of study findings, discussion and interpretation. Analysis of data was done using the Statistical Product and Service Solutions (SPSS) version 27.0. This information was grouped based on the research objectives and results then presented through tables and cross tabulations. The size of the sample of this study was composed by 132 dairy farmers in Karushuga cooperative. The study used both descriptive and inferential statistics such as correlation analysis and multiple linear regression analysis have been used.

4.1. Response Rate

Among 132 questionnaires distributed, 104 were returned back and they were effectively filled giving a response rate of 78.7%. With regard to the statements of Kothari (2011), a response rate of more than 60% is adequate for statistical analysis as well as making inferences about target population.

Table 4, 1:Response Rate

	N	**Percent**
Filled Questionnaire	104	78.7
No Response	28	21.3

Researcher (2023)

4.2 Demographic Characteristics of Respondents

The profile of respondents was deemed necessary because the ability of the respondents to give satisfactory information on the study variables greatly depends on their background.

Table 4, 2. Demographic characteristics of respondents

Factors	Categories	Frequency	Percentage (%)
Respondents' Gender	Male	76	73
	Female	28	27
	Total	**104**	**100**
Age Group	18-24	4	4
	25-30	9	9
	31-35	11	11
	36-40	26	25
	41-45	15	14
	46-50	17	16
	50 +	22	21
	TOTAL	**104**	**100**
Marital Status	Single	12	12
	Married	81	78
	Divorced	2	2
	Widow	9	9
	Total	**104**	**100**
Education level	No school	11	11
	Primary	28	27
	Secondary Diploma	44	42
	Bachelor's degree	17	16
	Master's degree	4	4
	PHD	0	-
	Others (please specify)	0	-
	Total	**104**	**100**
Location of the farm	Urban	0	-
	Peri-urban	41	39
	Rural	63	61
	Total	**104**	**100**
Years in Farming activity	1-5 years	4	4
	6-10 years	25	24
	11-15 years	39	38
	Above 15 years	36	35
	Total	**104**	**100**
Other occupation a part from farming	No other occupation	31	30
	Business	59	57
	Handcraft	9	9
	Mason	5	5
	Taxi Driver	0	-
	Other (Specify)	0	-
	Total	**104**	**100**

As Table 4.2 shows, during this research, the respondents were both gender, male and female, whereas 73% were male while 27% were female. This shows that majority of dairy farmers are male in the Karushuga cooperative, and implies that dairy farming is still the business for men, but one should say that the women are the most on the farm while men are the one who are seen in administration of the farm.

Table 4.2 shows that majority of respondents are between the ages of 36-40 years and were 26%, followed by those aged above 50 years met 21%, then those between 46-50 years counting 16% of the sample size. Then came those aged between 41-45 (14%), then 31-35 years meeting 11%, between 25-30 years counting 9% and finally those aged between 18-24 years were only 4% of respondents. This implies that dairy farming is still done by mature people, while youth are not involved in the dairy farming, or are not given places of responsibilities as the management of farms.

Table 4.2 revealed that majority of respondents 78% of respondents were married people, followed by those who aresingles counting 12%. Then come those who are widow/widower with 9% and those divorced counted 2%. This suggest that dairy farming is done within households, as operating a farm requires to be supported by many persons, and thus farmers got married in order to ensure the subsistence of their farm.

From the findings was established that the majority 42% of respondents had secondary school diploma. Followed by people who had only done primary school meeting 27%, then that holding bachelor degree per 16%, while 11% have no school, then those with Master degree counting 4% only. The study found no respondent with PHD degree. This is an indication that dairy farming is still done by people with average education, and those with high degrees are not involved enough in the activity.

From the findings the study established that most farms are located in rural areas 61%, and 39% are located in peri-urban areas. No farm is located within urban areas, which is normal as the policy for farming forbid the implementation of farms within urban areas.

From the findings the study established that most respondents 38% had been involved in dairy farming for a period between 11-15 years, followed by those with experience over 15 years meeting 35%, then 24% reported to being in dairy farming for a period between 6-10 years, then 4% being within the activity for a period between 1-5 years. The findings imply that the respondents had been in dairy farmers long enough and hence had knowledge about the issues that the researcher was looking for.

From the findings was established that the majority 57% of respondents had other business beside their dairy farming activities. Followed by people who had no other occupation 30%, then those who do some handcraft activities per 9%, while 5% do masonry activities after their dairy farming activities. This is an indication that dairy farmers have other activities in order to increase their incomes.

4.3.Descriptive Results

The following part presents the findings of the study based on the specific research objectives. The findings and their discussions of the case study cooperative (Kabushunga cooperative). The used descriptive statistics such as frequency, percentage, mean and standard deviation. The assumption was made on the basis of lower the score, the more important are the variables as evaluative criteria. Interpretation of mean and standard deviation were interpreted as follow: Mean between 4.00-5.00 implies a very great extent (i.e., strong evidence of the existence of the fact), Mean between 3.00-3.99 implies to a great extent (i.e., the fact appears more); Mean between 2.00-2.99 implies to small extent (i.e., the fact appears less), and mean between 1.00-1.99 implies to no extent (i.e., the fact does not appear). Standard deviation less or equal $0.5(\sigma) \leq 0.5$) implies that homogeneity, otherwise heterogeneity.

4.3.1 Views on Bank Credit Accessibility (BCA)

The study sought to examine the effect of bank credit accessibility in Karushuga cooperative. The respondents were questioned if they agreed or disagreed with the statements and findings are presented in the table 4.3.

Table 4, 3. Bank Credit Accessibility (BCA) in Karushuga cooperative

Statement	**SD**		**D**		**UN**		**A**		**SA**		**M**	**SD**
N=104	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**		
The Banks are nearby my farm	14	13	15	14	8	8	46	44	21	20	3.43	0.61
The credit offered by financial institutions is always readily available	18	17	15	14	19	18	38	37	14	13	3.14	0.77
The banks' lending terms and conditions are lenient	18	17	28	27	8	8	34	33	16	15	3.02	0.84
The banks require few documents during loan application	20	19	17	16	14	13	36	35	17	16	3.13	0.82
The banks have short loan processing time	22	21	35	34	12	12	24	23	11	11	2.68	0.84
The loan processing fees charged by the banks is affordable	8	8	12	12	8	8	48	46	28	27	3.73	0.58
The financial institutions are always easy to access	14	13	16	15	5	5	41	39	28	27	3.51	0.59
The banks offer loans without discrimination	14	13	16	15	11	11	39	38	24	23	3.41	0.67
The cost of making a trip to the banks is low	22	21	31	30	9	9	25	24	17	16	2.85	0.84
The interest rates charged by the banks is affordable	28	27	20	19	9	9	24	23	23	22	2.94	0.83
Overall Mean											**3.18**	

Source: Primary Data (2023)

The results from table 4.3 indicated a mean of 3.43 and standard deviation (SD) of 0.61 with most respondents 44% agreed that the Banks are nearby their farms. The mean of 3.14 and SD of 0.77 with most respondents 37% agreed that the credit offered by financial institutions is always readily available. The mean of 3.02 and SD of 0.84 with 33% of the respondents agreed that the banks' lending terms and conditions are lenient.

Findings in Table 4.3 indicated the mean of 3.13 and SD of 0.82 with most respondents 35% agreed that the banks require few documents during loan application. However, the mean of 2.68 and SD of 0.84 indicate that most respondents 34% disagreed that the banks have short loan processing time.The mean of 3.73 and SD of 0.58 with 46% of respondents agreed that the loan processing fees charged by the banks is affordable. The mean of 3.51 and SD of 0.59 with 39% of respondents agreed that the financial institutions are always easy to access.

Findings in Table 4.3 indicated the mean of 3.41 and SD of 0.67 with most respondents 38% agreed that the banks offer loans without discrimination. However, the mean of 2.85 and SD of 0.84 indicate that most respondents 30% disagreed that the cost of making a trip to the banks is low. Also, the mean of 2.94 and SD of 0.83 with 27% of respondents strongly disagreed that the interest rates charged by the banks is affordable.

The overall mean of 3.18 tends to 4 which mean a great extent and implies that banks credits are accessible moderately for dairy smallholders in Karushuga cooperative.

4.3.2 Views on Sustainability of Dairy Farmers in Karushuga cooperative

The study sought to assess perceptions of respondents on the Sustainability of Dairy Farmers in Karushuga cooperative. The respondents were questioned if they agreed or disagreed with the statements with regard to sustainability. The findings were presented in the table 4.4.

Table 4, 4.Sustainability of Dairy Farmers in Karushuga cooperative

Statement on Sustainability	**SD**		**D**		**UN**		**A**		**SA**		**M**	**SD**
N=104	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**	**Fr**	**%**		
My farm generates enough returns to cover expenses without credit from banks	14	13	21	20	4	4	38	37	27	26	3.41	0.67
I have enough liquidity to cover daily expenses	17	16	18	17	4	4	42	40	23	22	3.35	0.72
My farm has been having stable cash flow	16	15	20	19	9	9	40	38	19	18	3.25	0.78
I was able to cover my production cost at my farm in the past years	17	16	17	16	9	9	36	35	25	24	3.34	0.74
I have acquired appropriate production tools for my farm	16	15	21	20	12	12	37	36	18	17	3.19	0.81
Revenue from my farm helps me to repay my loans on time	12	12	18	17	16	15	34	33	24	23	3.38	0.64
My farm generates enough revenue for value addition	24	23	31	30	13	13	24	23	12	12	2.70	0.78
My farm asset base has grown in the past years	14	13	15	14	10	10	37	36	28	27	3.48	0.67
My farm has expanded in the past years	22	21	18	17	9	9	34	33	21	20	3.13	0.88
My productivity has been constantly increasing in the past years	12	11	20	19	17	16	34	32	22	21	3.36	0.81
Overall Mean											**3.26**	

Source: Primary Data (2023)

The results from table 4.4 indicated a mean of 3.41 and standard deviation (SD) of 0.67 with most respondents 37% agreed that their farm generates enough returns to cover expenses without credit from banks. The mean of 3.35 and SD of 0.72 with most respondents 40% agreed that they have enough liquidity to cover daily expenses. The mean of 3.25 and SD of 0.78 with 38% of the respondents agreed that their farms have been having stable cash flow.

Findings in Table 4.4 indicated the mean of 3.34 and SD of 0.74 with most respondents 35% agreed that they were able to cover their production cost at their farms in the past years. The mean of 3.19 and SD of 0.81 indicate that most respondents 36% agreed that they have acquired appropriate production tools for their farms. The mean of 3.38 and SD of 0.64 with 33% of respondents agreed that revenue from their farms help them to repay their loans on time. However, the mean of 2.70 and SD of 0.78 indicate that most respondents 30% disagreed that their farms generate enough revenues for value addition.

Findings in Table 4.4 indicated the mean of 3.48 and SD of 0.67 with most respondents 36% agreed that their farm assets base have grown in the past years. The mean of 3.13 and SD of 0.88 indicate that most respondents 33% agreed that their farms have expanded in the past years. Finally, Table 4.4. revealed the mean of 3.36 and SD of 0.81 with 32% of respondents agreed that their productivity has been constantly increasing in the past years.

The overall mean of 3.26 tends to 4 which mean a great extent and implies that smallholder dairy farmers in Karushuga cooperative are moderately sustainable.

4.3.3. Views on Government Support in Karushuga cooperative

The study sought to assess perception of respondents on the government support in Karushuga cooperative. The respondents were questioned if agreed or disagreed with the statements with regard the variable, and the findings were presented in the following table 4.5

Table 4, 5. Views on Government Support in Karushuga cooperative

Statement on GS	SD		D		UN		A		SA		M	SD
N=104	Fr	%	Fr	%	Fr	%	Fr	%	Fr	%		
I received farming materials from government at a subsidized rate	5	5	4	4	1	1	35	34	59	57	4.34	0.44
Government has provided me with special grants for my dairy farm	7	7	4	4	1	1	38	37	54	52	4.23	0.47
Government created favorable business climate for dairy farmers	2	2	4	4	10	10	47	45	41	39	4.16	0.47
Government provided me with training programs	5	5	4	4	1	1	20	19	74	71	4.48	0.42
Government is providing us with access to market for our product	1	1	1	1	12	12	24	23	66	63	4.47	0.42
Government has settled up information and resource center for dairy farmers	5	5	4	4	8	8	48	46	39	38	4.08	0.5
Government always ensures fair competition for dairy products	14	13	16	15	5	5	41	39	28	27	3.51	0.64
I receive veterinary services from government at a subsidized rate	12	12	11	11	15	14	40	38	26	25	3.55	0.67
Government has built good transport means for dairy farmers	12	12	31	30	15	14	27	26	19	18	3.10	0.74
I have received tax incentives from the government	2	2	5	5	2	2	38	37	57	55	4.38	0.45
Overall Mean											**4.03**	

Source: Primary Data (2023)

The results from table 4.5 indicated a mean of 4.34 and standard deviation (SD) of 0.44 with most respondents 57% strongly agreed that they received farming materials from government

at a subsidized rate. The mean of 4.23 and SD of 0.47 with most respondents 52% strongly agreed that the government has provided them with special grants for their dairies.

The mean of 4.16 and SD of 0.47 with 45% of the respondents agreed that Government created favorable business climate for dairy.

Findings in Table 4.5 indicated the mean of 4.48 and SD of 0.42 with most respondents 71% strongly agreed that Government provided them with training programs. The mean of 4.47 and SD of 0.42 indicate that most respondents 63% agreed that Government is providing them with access to market for their products. The mean of 4.08 and SD of 0.50 with 46% of respondents agreed that Government has settled up information and resource center for dairy farmers. The mean of 3.51 and SD of 0.64 indicate that most respondents 39% agreed that Government always ensures fair competition for dairy products.

Findings in Table 4.5 indicated the mean of 3.55 and SD of 0.67 with most respondents 38% agreed that they receive veterinary services from government at a subsidized rate. The mean of 3.10 and SD of 0.74 indicate that most respondents 30% disagreed that Government has built good transport means for dairy farmers. Finally, Table 4.5. revealed the mean of 4.38 and SD of 0.45 with 55% of respondents strongly agreed that they have received tax incentives from the government.

The overall mean of 4.03 tends to 5 which mean a very great extent and implies that the government support for dairy farming is available at a very great extent in Karushuga cooperative.

4.4. Inferential statistics

The study used inferential statistics such as correlation analysis and multiple regression to determine the effect of Bank credit accessibility on sustainability of smallholders dairy farmers in Karushuga cooperative, specifically by assessing the impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative, examine the impact of government support on the sustainability of smallholders' dairy farmers in Karushuga cooperative, and to establish the moderate effect of government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative. Based on the results from regression analysis, the study

can show the effect of each predictor such as banking credit accessibility and government support, on the sustainability.

4.4.1. Correlations analysis

The correlation is one of the most common and most useful statistics. Linear correlation coefficient, measures the strength and the direction of association between the study variables was assessed using Pearson coefficient of correlation. The Pearson's coefficient of correlation ranges between +1 to -1. A zero (0) coefficient indicates that there is no association between the two variables. A coefficient value of greater than 0 indicates a positive relationship between the variables and hence an increase in the value of one variable leads to an increase in the other values of the other variable and the converse is true. A value less than 0 indicate a negative association between the variables that is as the values of one variable increases the values of the other variable decreases (Lohrey, 2014).

The study sought to determine the correlation between the independent variable (bank credit accessibility) and the dependent variable (sustainability measured by operating self-sufficiency and Finance self-sufficiency). To calculate the correlation (strength) between the study variables and their findings the Survey Data used the Pearson's coefficient of correlation (r). The findings are presented in table below.

Table 4, 6. Correlation analysis

		Bank Credit Accessibility	Government Support	Sustainability
Bank Credit Accessibility	Pearson correlation	1		
	Sig. (2-tailed)	.000		
Government Support	Pearson correlation	.245**	1	
	Sig. (2-tailed)	.000		
Sustainability	Pearson correlation	.717**	.872**	1
	Sig. (2-tailed)	.000	.000	
	N	104	104	

****. Correlation is significant at the 0.01 level (2-tailed).**

The results of the study in Table 4.6 show that there is a weak but significant relationship between Bank credit accessibility and government support, because the calculated Pearson correlation and significance level between Bank credit accessibility and government is positive and significant (r=0.245 ; P≤0.001) level of significance. Thus, this implies that Bank credit accessibility has a weak and significant effect on government support.

The results of the study in Table 4.6 show that there is a positive and significant relationship between Bank credit accessibility and sustainability, because the calculated Pearson correlation and significance level between Bank credit accessibility and sustainability is positive and significant (r=0.717 ;P≤0.001) level of significance. Thus, this implies that Bank credit accessibility plays a positive and significant effect on sustainability of smallholder's dairy farmers in Karushuga cooperative.

The results of the study in Table 4.6 show also that there is a positive and significant relationship between government support and sustainability, because the calculated Pearson correlation between government support and sustainability is positive and significant (r=0.872 ; P≤0.001) level of significance.

The results of this current research are supported by the results of the study of Mbonaga (2019) aimed to assess the Influence of Credit Accessibility on Smallholder Rice Farmers' Performance in Tanzania, and found that Access to formal credit facilities, credit size and farm size are the factors influencing production performance of smallholder rice farmers.

4.4.2. Diagnostics test of the regression model

After running the regression model, post-estimation tests were conducted to ensure that the model was a good fit and the estimates received from the model were efficient and reliable. This study satisfactorily performed conditional diagnostics statistical tests. The study tested for normality, and multicollinearity.

4.4.2. 1.Multicollinearity test

Multicollinearity is the undesirable situation where the correlations among the independent variables are strong. Variance Inflation Factor (VIF) was used to assess multicollinearity in the multiple regression models. Zikmund, Babin, Carr and Griffin (2013) mentioned when there are two or more variables have a Variance Inflation Factor (VIF) of 5 and above, amongst them one should be removed from the regression analysis as this shows multicollinearity. Thus, in a study, if two or more variables have a Variance Inflation Factor of 5 or more than that one of them must be removed out if the same.

Table 4, 7.Test for Multicollinearity

Model		Collinearity Statistics	
		Tolerance	**VIF**
	Bank credit accessibility	0.803	1.245
	Sustainability	0.596	1.678
	Government support	0.461	1.931

Source: Primary Data (2023)

Table 4.8, indicated that all the variables were not highly correlated with each other as indicated by the Variance Inflation Factors (VIF) of below five. Since all 3 variables has VIF which is less than 5 indicating that there is no multicollinearity. Therefore, all variable of predictors will be included in the model.

4.4.3. Multiple linear Regression on effect of bank credit accessibility on sustainability

The study sought to identify the effect of Bank credit accessibility on sustainability of dairy farmers in Karushuga cooperative by using multiple linear regression model to determine the effect of independent sub-variables (Outreach, affordability, and Farming practices) on the

dependent variable which is sustainability. The regression models were run to test whether the model is significant or not. The statistical significance was verified by the Coefficient (β), t-statistic and Prob. In additional, statistically significant relationship between the dependent variable and independent variable from the model were accepted at 5% significance level. The analysis applied the Statistical Product & Service Solutions (SPSS) version .27 to compute the measurements of the multiple regressions for the study. Model relationship with Bank credit accessibility these variables can be arranged in a function or equation as follows:

Sustainability = $Y=\beta 0+\beta 1\ X1+\beta 2\ X2+\ \beta 3\ X3\ +\ \varepsilon$, Model 1

X1 = Outreach (OR), =X2= Affordability (AF), X3= Farming practices (SU), ε = error term

Table 4, 8: Model summary on effect of Bank credit accessibility on sustainability

Model	R	R Square	Adjusted R Square	Std Error of the estimate
1	.791a	.626	.616	1.17001

a. Predictors: (Constant): Outreach, Affordability, and Farming practices

.The results from the above Table 4.8, the value of coefficient of determination (R-Square) was .626 and the adjusted R-Square was .616 an indication that 61.6% of variation in sustainability in Karushuga cooperative was due to changes in Bank credit accessibility. This means that other factors not included in this model influence the sustainability of dairy farmers in Karushuga cooperative at only 38.4% level, and Bank credit accessibility influence it at 61.6%.

Table 4, 9: ANOVA between Bank credit accessibility and sustainability

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	7.221	3	1.805	62.454	.004b
	Residual	4.307	100	0.023		
	Total	11.527	103			

a. Predictors: (Constant):Outreach, Affordability, and Farming practices

b. Dependent variable: Sustainability

The findings in the Table 4.9, indicate that the overall model was significant shown by F statistic of 62.454 and p-value calculated =.000 is less than Critical p-value =0.05 level of significant. Therefore, this implies that jointly the variables of Bank credit accessibility (Outreach, affordability, and Farming practices) had significant effect to the variation of sustainability in Karushuga cooperative. Therefore, it can be concluded that Bank credit accessibility has significant effect on sustainability in Karushuga cooperative. Therefore, H01 which states that there is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at all levels of significance.

Table 4, 10: Regression coefficients between Bank credit accessibility and sustainability

Model		Unstandardized Coef.		Standardized coef.	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.607	0.499		1.217	0.024
	Outreach	0.764	0.144	0.697	5.315	0.000
	Affordability	0.109	0.111	0.112	0.981	0.032
	Farming practices	0.111	0.135	0.106	0.825	0.042

a. Dependent Variable: Sustainability

Source: Generated into SPSS 27

From coefficient table, outreach has significant impact on sustainability of dairy farmers in Karushuga cooperative (β1= 0.697, t= 5.315, sig. =0.000). This indicates that 1-unit change in outreach will lead to 0.697-unit change in sustainability. From coefficient table, affordability has positive and significant effect on sustainability of dairy farmers in Karushuga cooperative (β2= 0.112, t= 0.981, sig. =0.032). This indicates that 1-unit change in affordability will lead to 0.112-unit change in sustainability. Farming practices has significant effect on sustainability of dairy farmers in Karushuga cooperative (β3= 0.106, t= 0.825, sig. =0.042). This indicates that 1-unit change in farming practices will lead to 0.042-unit change in sustainability

H1 Testing:

Hypothesis one states that there is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative. As indicated in ANOVA table 4.8, the F-test value was 62.454 with significance value of 0.004 at 5% level of significance. Since theF-calculated was62.454 and the p-value obtained was less than 0.05, this implies that Bank credit accessibility has significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative. Therefore, theH1 stating that there is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted.

The results of this current research are supported by the results of the study of Mbonaga (2019) aimed to assess the Influence of Credit Accessibility on Smallholder Rice Farmers' Performance in Tanzania, and found that Access to formal credit facilities, credit size and farm size are the factors influencing production performance of smallholder rice farmers(β= 0.415, t= 2.121, sig. =0.044).

4.4.4. Multiple linear Regression on impact of government support on the sustainability of smallholders' dairy farmers in Karushuga cooperative

The study sought to identify the effect of Government support on sustainability of dairy farmers in Karushuga cooperative by using multiple linear regression model to determine the impact of moderator variable government support on the dependent variable which is sustainability. The regression models were run to test whether the model is significant or not. The statistical significance was verified by the Coefficient (β), t-statistic and Prob. In additional, statistically significant relationship between the dependent variable and independent variable from the model were accepted at 5% significance level. The analysis applied the Statistical Product & Service Solutions (SPSS) version .27 to compute the measurements of the multiple regressions for the study. Model relationship with government support these variables can be arranged in a function or equation as follows:

Sustainability = Y=β0+β1 X1 +β1 X2 +β1 X3+ ε, Model 1

X1 = Interest rate regulation, X2=Subsidies, X3=Financial/ depending

Table 4, 11. ANOVA between Government support and sustainability

Model		Sum of squares	df	Mean square	F	Sig.
2	Regression	7.221	3	1.805	62.454	.001b
	Residual	4.307	100	0.023		
	Total	11.527	103			

a. Predictors: (Constant):Government support

b. Dependent variable: Sustainability

The findings in the Table 4.0, indicate that the overall model was significant shown by F statistic of 62.454 and p-value calculated =.001 is less than Critical p-value =0.05 level of significant. Therefore, this implies that the variables Interest rate regulation, Subsidies, and Financial/ depending had significant impact to the variation of sustainability in Karushuga cooperative. Therefore, it can be concluded that Government support (Interest rate regulation, Subsidies, and Financial/ depending)has significant impact on sustainability of dairy farmers in Karushuga cooperative. Therefore, H2 which states that Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at all levels of significance.

Table 4, 12. Regression coefficients between Government support and sustainability

Model	R	R Square	Adjusted R 2	Std Error of the estimate		
2	.872a	0.773	0.732	1.96168		
Model		**Unstandardized Coef.**		**Standardized coef.**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
2	(Constant)	0.607	0.499		1.217	0.024
	Interest rate regulation	0.314	0.096	0.385	4.317	0.000
	Subsidies	0.219	0.044	0.307	0.750	0.035
	Financial/ depending	0.682	0.077	0.261	1.732	0.014

a. Independent Variable: Interest rate regulation, Subsidies, and Financial/ depending

b. Dependent Variable: Sustainability

Source: Generated into SPSS 27

The results from the above table 4.11, the value of coefficient of determination (R-Square) were 773, an indication that 77.3% of variation in sustainability of dairy farmers in Karushuga cooperative was due to changes in government support. This means that other factors not included in this model influence the sustainability of dairy farmers in Karushuga cooperative at only 22.7% level, and government support influence it at 77.3%.

From coefficient table, Table 4.11 provides the summary of results of regression analysis for the effect of Interest rate regulation, Subsidies, and Financial/ depending on sustainability in Karushuga Cooperative. The results indicate that interest rate regulations (β1= 0.385; t= 4.317, p-value=0.035<0.05), subsidies (β2= .307; t= .750, p-value=0.035<0.05), and Financial/ depending (β3= .261; t= 1.732, p-value=0.014 <0.05) have positive and significant effect on sustainability in Karushuga Cooperative.. This shows that 1 unit increase in Interest rate regulation, Subsidies, and Financial/ depending will lead to 0.385 units, 307 units and .261 unitsincreases in sustainability in Karushuga Cooperative..

H2 Testing:

Hypothesis two states that Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative. As indicated in ANOVA table 4.9, the F-test value was 62.454 with significance value of 0.001 at 5% level of significance. Since theF-calculated was 62.454and the p-value obtained was less than 0.05, this implies that government support has significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative. Therefore, theH2 stating that Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted.

The findings are in agreement with Mokgomo, Chagwiza, Tshilowa (2022) who used GHS data spanning the period 2013 to 2016 to assess how government agricultural development support influences the livelihoods of small-scale farmers in South Africa. The study revealed that agriculture development assistance given by the South African government is effective in reducing food insecurity, improving agricultural production and income of the beneficiary small-scale farmers.cooperative (β= 0.385, t= 4.317, sig. =0.000).

4.4.5. Test of the Moderation Effect

Objective three sought to establish how government support moderates the relationship between bank credit accessibility and sustainability in Smallholder dairy farmers in Rwanda. Its hypothesis was that there is moderating effect of government support in the relationship of bank credit accessibility and sustainability of smallholders' dairy farmers in Nyagatare District. This hypothesis was tested using Moderated Regression Analysis (MRA) facilitated by hierarchical regression approach of interest was the interaction between Bank credit accessibility and government support.

Under this hierarchical regression approach, the means of the constructs were computed using the items measuring the respective constructs. The mean composite values of the two constructs were subsequently standardized (z score). Next, the interaction between the standardized bank credit accessibility construct and the standardized government support construct (ZTC*ZTR) was also computed. Zikmundet al. (2013) state that the composite scores represent small sets of data points that are highly related to one another conceptually or statistically, and when the items are combined and presented as a single score, they help in reducing the potential for information overload.

Three steps of the hierarchical regression were employed in line with the three categories of variables. In the first step, sustainability was entered as the dependent variable. The standardized scores of bank credit accessibility and government support were entered as

independent variables in step 2. In step 3, the standardized interaction score was entered as the independent variable.

Table 4, 13. Estimated Regression Coefficients for moderating effect model

		R 2 -Change	**F**	**df 1**	**df 2**	**P**
	ZBCA*ZGS	0.147	8.251	3	100	.000

Model		**Unstandardized Coef.**		**Standardized coef.**	**T**	**Sig.**
		B	**Std. Error**	**Beta**		
	(Constant)	0.099	0.275		0.36	0.022
	Z-score					
3	BCA	0.798	0.077	0.535	1.414	0.000
	Z-score GS	0.184	0.050	0.224	3.677	0.000
	BCA*GS	0.264	0.197	0.124	1.339	0.003

a. Dependent Variable: Sustainability
b. ZBCA: Z score for bank credit accessibility
c. ZGS: Z score for Government support
Source: Generated into SPSS 27

R2 change was triggered to show Test(s) of highest order unconditional interaction(s): results of the test of highest order unconditional interaction presented in Table 4.12, yielded a significant R2 change, $\Delta R2 = .147$, $F(1, 100) = 8.251$, $p=.0000$. R 2 change denotes existence of moderation. This therefore is an indication that government support moderated the relationship between bank credit accessibility and sustainability among dairy farmers in Rwanda.

An examination of the results of step 3 of the hierarchical regression (Table 4.12), revealed the following information on moderating influence of government support: Bank credit accessibility ($\beta=0.535$, $p=0.002$) was a significant predictor of sustainability because

significant value was less than .05; this means that bank credit accessibility has a significant effect on sustainability of dairy farmers.

Government support (β=0.224, p=0.000) was significant predictors of sustainability because the significant value was less than .005; which implies that government support at its own had significant effect on sustainability.

The interaction between bank credit accessibility and government support was also significant as indicated by a significant value less than .005. The results therefore shows that government support moderate the relationship between bank credit accessibility and sustainability.

The moderation equation for government support moderating the relationship between bank credit accessibility and sustainability in the presence of control variables is therefore given as:

SUS= -0.099+0.535BCA+0.224GS+0.124BCA*GS

H3 testing (Regression)

Based on the results of the regression analysis as illustrated in Table 4.11, showed that all the model parameters were significantly different from zero at 5% level of confidence ($p<0.005$). Based on the results, the interaction between bank credit accessibility and the government support were significant. The model results showed that a unit increase in bank credit accessibility independently increased sustainability levels by 0.535 units. Equally a unit increase in government support led to 0.224 unit increase in sustainability. The joint interaction between government support and bank credit accessibility increases sustainability levels by 0.124 units. The study therefore confirm the H3 which states that Government support significantly moderate the relationship between bank credit accessibility and sustainability of smallholder dairy farmers in Rwanda should be accepted because there is

sufficient evidence that government support had a moderating effect on the relationship between bank credit accessibility and sustainability of Smallholder dairy farmers.

The results imply that Bank credit accessibility do require that, government support which also have the potential to impact positively on the bank credit accessibility and sustainability link, be managed if the predictive power of bank credit accessibility is to be enhanced. Moreover, the results imply that, when Smallholder dairy farmers make effort to benefit for government support, the effect that bank credit accessibility measures can have on sustainability of Smallholder dairy farmers are likely to be increased resulting in higher sustainability in smallholder dairy farmers($\beta=0.124, p=0.003$).

This result further implies that Bank credit accessibility practices does not operate independently as a determinant of sustainability in Smallholder dairy farmers but rather its predictive power can be enhanced by managing government support as this impact positively on bank credit accessibility-Sustainability relationship. Furthermore, the results imply that when Smallholder dairy farmers put effort to enhance government support, the effect of that bank credit accessibility can have on sustainability in Smallholder dairy farmers can be intensified thus resulting to the higher sustainability in sampled Smallholder dairy farmers.

Similarly, the interaction effect; in this case 12% may be seen as low but confirm moderation (Zikmundet al., 2013). The significant interaction indicates that the presumed moderator (government support) moderates the effect of the predictor variable (bank credit accessibility) on the outcome variable (sustainability) of the Smallholder dairy farmers in Rwanda.

The finding that government support moderate the bond between bank credit accessibility and sustainability confirms that bank credit accessibility is a process that needs taking cognizance of individuals involved. Previous studies have pointed out the need to factor government support when examining antecedents of sustainability.

These results imply that the study accept H3 stating thatthere is moderating effect of government support in the relationship of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative.

The results agreed with other research findings obtained from the study conducted in Sudan by Nasereldin, Chandio, Osewe and Abdullah (2022), which found a moderating effect between government support and bank credit accessibility, and that government support positively contribute to the bank credit accessibility and sustainability of farmers.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter gives the summary of the research findings that were obtained from the study that was anchored on specific objectives, conclusions that were made, the recommendations that were drawn, and finally, the suggested areas for further researches.

5.1. Summary of findings

This section presented the findings summary based on the research objectives such as to assess the impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative, to examine the impact of government support on the sustainability of smallholders' dairy farmers in Karushuga cooperative, and to establish the moderate effect of government support in the relation of bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative.

5.1.1. Impact of Bank Credit Accessibility on Sustainability of Smallholders' Dairy Farmers in Karushuga cooperative.

The findings in the Table 4.8, indicate that the overall model was significant shown by F statistic of 62.454 and p-value calculated =.004 is less than Critical p-value =0.05 level of significant. Therefore, this implies that jointly the variable Bank credit accessibility had significant effect to the variation of sustainability in Karushuga cooperative. The results from the above Table 4.9, the value of coefficient of determination (R-Square) was .626 and the adjusted R-Square was .616 an indication that 62.6% of variation in sustainability in Karushuga cooperative was due to changes in Bank credit accessibility.

From coefficient table, outreach has significant impact on sustainability of dairy farmers in Karushuga cooperative ($\beta 1= 0.697$, $t= 5.315$, sig. $=0.000$). This indicates that 1-unit change in outreach will lead to 0.697-unit change in sustainability. From coefficient table, affordability has positive and significant effect on sustainability of dairy farmers in

Karushuga cooperative (β2= 0.112, t= 0.981, sig. =0.032). This indicates that 1-unit change in affordability will lead to 0.112-unit change in sustainability. Suitability has significant effect on sustainability of dairy farmers in Karushuga cooperative (β3= 0.106, t= 0.825, sig. =0.042). This indicates that 1-unit change in suitability will lead to 0.042-unit change in sustainability.

Therefore, H1 which states that there is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at 5% level of significance.

5.1.2. Impact of Government Support on Sustainability of Smallholders' Dairy Farmers in Karushuga cooperative

The results from the above table 4.11, the value of coefficient of determination (R-Square) were 773, an indication that 77.3% of variation in sustainability of dairy farmers in Karushuga cooperative was due to changes in government support. The findings in the Table 4.0, indicate that the overall model was significant shown by F statistic of 62.454 and p-value calculated =.001 is less than Critical p-value =0.05 level of significant. From coefficient table, government support has significant impact on sustainability of dairy farmers in Karushuga cooperative (β= 0.385, t= 4.317, sig. =0.000). This indicates that 1-unit change in government support will lead to 0.385-unit change in sustainability. Therefore, H02 which states that Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at all levels of significance.

.5.1.3. The moderate effect of government support in the relation bank credit accessibility and sustainability of smallholders' dairy farmers in Karushuga cooperative

The results revealed that Bank credit accessibility (β=0.535, p=0.002) was a significant predictor of sustainability because significant value was less than .05; this means that bank credit accessibility has a significant effect on sustainability of dairy farmers.

Government support (β=0.224, p=0.000) was significant predictors of sustainability because the significant value was less than .005; which implies that government support at its own had significant effect on sustainability.

The interaction between bank credit accessibility and government support was also significant (β=0.124,p=0.003), as indicated by a significant value less than .005. The results therefore shows that government support moderate the relationship between bank credit accessibility and sustainability.The study therefore confirm the H3 which states that Government support significantly moderate the relationship between bank credit accessibility and sustainability of smallholder dairy farmers in Rwanda.

5.2 Conclusion

The findings indicates that the bank credit accessibility has significant impact on sustainability of dairy farmers in Karushuga cooperative (β= 0.415, t= 2.121, sig. =0.044). This indicates that 1-unit change in bank credit accessibility will lead to 0.415-unit change in sustainability.Therefore, H1 which states that there is a statistical significant impact of bank credit accessibility on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at 5% level of significance.

The results indicate that interest rate regulations (β1= 0.385; t= 4.317, p-value=0.035<0.05), subsidies (β2= .307; t= .750, p-value=0.035<0.05), and Financial/ depending (β3= .261; t= 1.732, p-value=0.014 <0.05) have positive and significant effect on sustainability in Karushuga Cooperative.. This shows that 1 unit increase in Interest rate regulation, Subsidies, and Financial/ depending will lead to 0.385 units, 0.307 units and 0.261 units' increases in sustainability in Karushuga Cooperative. Therefore, H2 which states that Government support has statistical significant effect on sustainability of smallholders' dairy farmers in Karushuga cooperative is accepted at all levels of significance.

The interaction between bank credit accessibility and government support was also significant (β=0.124,p=0.003), as indicated by a significant value less than .005. The results therefore shows that government support moderate the relationship between bank credit accessibility and sustainability. The study therefore confirm the H3 which states that Government support significantly moderate the relationship between bank credit accessibility and sustainability of smallholder dairy farmers in Rwanda.

5.3 Recommendations

In line with some weaknesses found within the research, the following recommendations are proposed to improve sustainability of Smallholders dairy farmers in Rwanda:

Bank credit accessibility: The study recommends that Banks should emphasize on reducing their loan processing period as it was proven to be break on bank credit accessibility, and thus harming the sustainability of farmers. The banks should determine the maximum period for the loan processing; thus, borrowers would know exactly how to act accordingly within their activities. And we recommend that financial institutions and policy makers to establish fair and affordable interest rates suitable to the farmers.

Government support: Thus, the study recommends that government may increase awareness and campaign through trainings and extension program to enhance the technical skills and knowledge of smallholder dairy farmers, including diseases prevention and milk quality control. Training can be provide trough workshops farmers field school and use of information and communication technology. And also infrastructure development in rural areas to improve the productivity and efficiency of smallholder dairy farmers this include development and maintain rural roads to facilitate transportation of inputs, insuring reliable electricity supply for milk cooling and processing facilities , and establish milk collection centers I close proximity to farming communities

Sustainability of dairy farmers :is essential for smallholder dairy farmers as it supports their economic viability, ensures environmental stewardship, promotes social well-being, builds long-term resilience, and opens opportunities for market access and growth.Explore the current livestock management practices employed by smollhoders dairy farmers in karushuga cooperative . This could include aspects such as breed selection, feeding practices ,health management , housing condition and milk technique so, we recommended other dairy farmers in other district of our country to visit karushuga cooperative

5.5. Suggestions for Further Studies

Based on findings of the study, future studies may concentrate on:

The study was carried out on Dairy farmers in Karushuga cooperative, thus the same study should be carried out in another District in Rwanda or another farming sector such agriculture, to find out if the same results will be obtained

In our research used qualitative and quantitative research ,so I suggest future studies that will be based on other research methodology to find out same result Cross section data to analyze the determination of access to formal credit by smallholders dairy farmers in Rwanda was used . the study only focused on what is determining a smallholder farmers ability to have formal credit when needs it .however there are same areas which are study didn't cover like risk attitude of the smallholder farmers towards taking credit .same farmers are risk averse and they may decide not to brow from formal Financial institution due tofear of default . this is consider as limitation of the prevent study which needs to be addressed in the future studies

This research has not yet expressed all variables related to Bank credit accessibility that may have affected the sustainability of farmers in Karushuga cooperative, as it was proved that bank credit accessibility contributes 61.6% only. Then other researchers who are interested in

similar problems are suggested to conduct continuation research by adding variables. Further research should be also undertaken on the other variables of sustainability.

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APPENDIX

APPENDIX A: INTRODUCTION LETTER

APPENDIX B:SURVEY QUESTIONNAIRE DESIGNED FORDAIRY FARMERS IN KARUSHUGA COOPERATIVE

Dear respondent,

This questionnaire is part of a project at Kigali Independent University to meet the requirements for a Master's degree in business administration. The focus of this study is on "Bank Credit Accessibility and Sustainability of smallholders' Dairy Farmers in Rwanda, specifically in Karushuga cooperative.".

We respectfully request your assistance in the study by responding to the following questions. Your participation will undoubtedly be greatly valued. The information gathered for this purpose will be kept totally private and used solely for academic purposes. In this regard, your participation is greatly appreciated.

Subject: Bank credit accessibility and sustainability of smallholders dairy farmers in Rwanda

Case study: Karushuga cooperative

Section 1: Demographic characteristics

1. Phone number: ……...

2. Gender or Sex

i.Male ☐

i.Female☐

3. Age

i.18-24 ☐

i.25-30 ☐

i.31-35 ☐

ɾ.36-40 ☐

ɾ.41-45 ☐

i.46-50 ☐

i.50 + ☐

6. Location

ɾ.Urban

i.Peri-urban

i.Rural

7. Years in Farming activity

i.1-5 ☐

i.6-10 ☐

i.11-15 ☐

ɾ.15+ ☐

8. Other occupation a part from farming

i.No other occupation ☐

4. Marital status

i.Single ☐

i.Married ☐

i.Widow ☐

ɾ.Divorced ☐

5. Education level

i.No school ☐

i.Primary ☐

i.Secondary ☐

ɾ.Diploma ☐

ɾ.Bachelor's degree ☐

i.Master's degree ☐

i.PHD ☐

i.Others (please specify)

……

i.Business ☐

i.Handcraft ☐

ɾ.Mason ☐

ɾ.Taxi Driver ☐

i.Other (Specify)

……

Section 2A: Bank Credit Accessibility (BCA)

Please score the most appropriate option against each of the questions below:
(5) Strongly agree; (4) Agree; (3) Uncertain (2) Disagree; (1) Strongly disagree
Scale : 1-SD 2-D 3-UN 4-A 5-SA
Key : **1-SD**: Strongly Disagree
2-D: Disagree
3-UN: Uncertain
4-A: Agree
5-SA: Strongly Agree

S/N	Statements	SA	A	UN	D	SD
BCA1	The Banks are nearby my farm	5	4	3	2	1
BCA2	The credit offered by financial institutions is always readily available	5	4	3	2	1
BCA3	The banks' lending terms and conditions are lenient	5	4	3	2	1
BCA4	The banks require few documents during loan application	5	4	3	2	1
BCA5	The banks have short loan processing time	5	4	3	2	1
BCA6	The loan processing fees charged by the banks is affordable	5	4	3	2	1
BCA7	The financial institutions are always easy to access	5	4	3	2	1
BCA8	The banks offer loans without discrimination	5	4	3	2	1
BCA9	The cost of making a trip to the banks is low	5	4	3	2	1
BCA10	The interest rates charged by the banks is	5	4	3	2	1

	affordable					

Section 2B: Government Support (GS)

Please score the most appropriate option against each of the questions below:

(5) Strongly agree; (4) Agree; (3) Uncertain (2) Disagree; (1) Strongly disagree

Scale : 1-SD 2-D 3-UN 4-A 5-SA

Key : **1-SD**: Strongly Disagree

2-D: Disagree

3-UN: Uncertain

4-A: Agree

5-SA: Strongly Agree

S/N	**Statements**	**SA**	**A**	**UN**	**D**	**SD**
GS1	I received farming materials from government at a subsidized rate	5	4	3	2	1
GS2	Government has provided me with special grants for my dairy farm	5	4	3	2	1
GS3	Government created favorable business climate for dairy farmers	5	4	3	2	1
GS4	Government provided me with training programs	5	4	3	2	1
GS5	Government is providing us with access to market for our product	5	4	3	2	1
GS6	Government has settled up information and resource center for dairy farmers	5	4	3	2	1
GS7	Government always ensures fair competition for dairy products	5	4	3	2	1
GS8	I receive veterinary services from government at a subsidized rate	5	4	3	2	1
GS9	Government has built good transport means for dairy farmers	5	4	3	2	1
GS10	I have received tax incentives from the government	5	4	3	2	1

Section 2C: Sustainability ()

Please score the most appropriate option against each of the questions below:

(5) Strongly agree; (4) Agree; (3) Uncertain (2) Disagree; (1) Strongly disagree

Scale : 1-SD 2-D 3-UN 4-A 5-SA

Key : **1-SD**: Strongly Disagree

2-D: Disagree

3-UN: Uncertain

4-A: Agree

5-SA: Strongly Agree

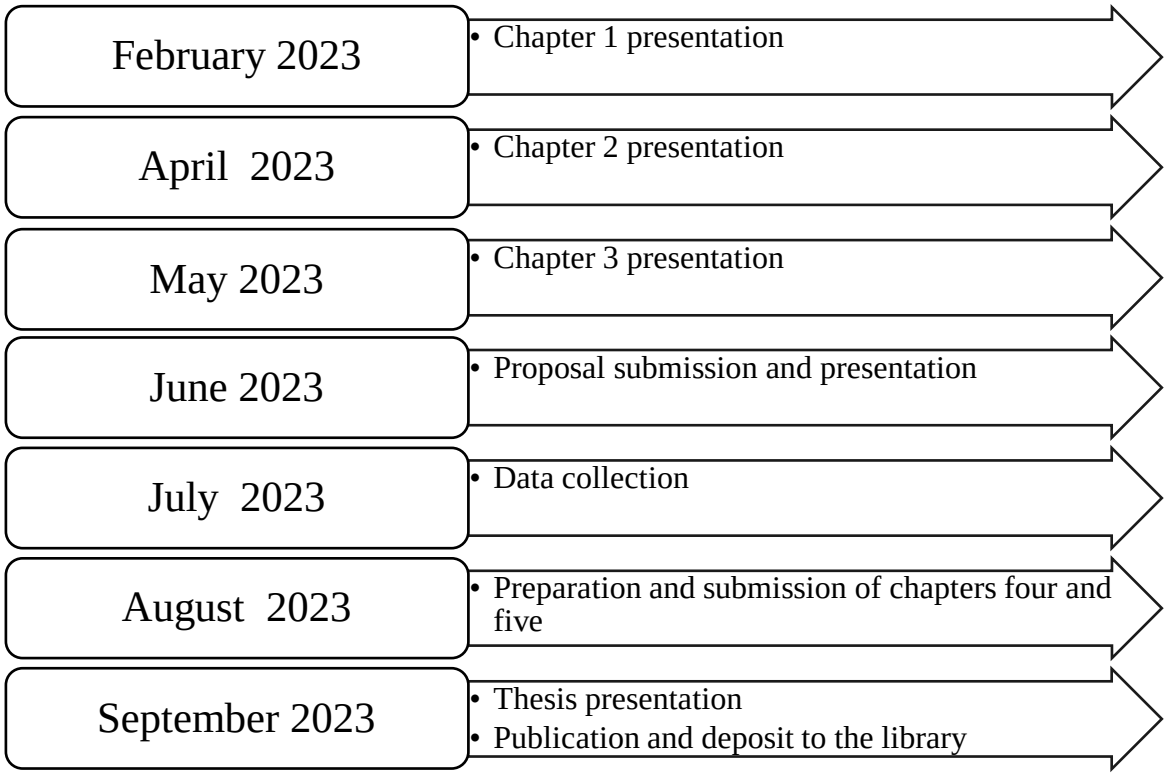
S/N	Statements	SA	A	UN	D	SD
SB1	My farm generates enough returns to cover expenseswithout credit from banks	5	4	3	2	1
SB2	I have enough liquidity to cover daily expenses	5	4	3	2	1
SB3	My farm has been having stable cash flow	5	4	3	2	1
SB4	I was able to cover my production cost at my farm in the past years	5	4	3	2	1
SB5	I have acquired appropriate production tools for my farm	5	4	3	2	1
SB6	Revenue from my farm helps me to repay my loans on time	5	4	3	2	1
SB7	My farm generates enough revenue for value addition	5	4	3	2	1

SB8	My farm asset base has grown in the past years	5	4	3	2	1
SB9	My farm has expanded in the past years	5	4	3	2	1
SB10	My productivity has been constantly increasing in the past years	5	4	3	2	1

Thank you for your time.

MUHAWENIMANA Olive

APPENDIX C: TIMELINE



APPENDIX D: BUDGET

S/N	Description	Cost (Rwf)
1	Internet connection	50,000
2	Field data collection	100,000
3	Hiring assistant in data collection	100,000
	Consultancy fees for experts	200,000
4	Transport fee	50,000
5	Printing and Biding	70,000
6	Publication	150,000
	Total	**720,000**