

Risk Management Practices in Agricultural Financing in Developing Countries: Experience from Selected Commercial Banks in Tanzania

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Abstract

This study examines risk management tools to mitigate agricultural financing risks. The study analyses risks that lenders face, tools for managing the risks and the correlation between agricultural lending and risk mitigation tools. The used data come from a sample of 55 employees from three selected banks, which is analysed using frequency tables and Chi-square. The findings show that banks face production risks in terms of variability in outputs due to drought and diseases. Tools for managing the risks include collateral, appraisal techniques, diversification of agricultural activities, group liability, guarantee/cash deposits, loan structuring and warehouse receipts. The Chi-square test finds a correlation between risk mitigation tools and agricultural lending; hence, mitigation tools enhance lending to the agricultural sector. Therefore, to manage agricultural risks, banks should deploy these tools optimally. Additionally, exposing farmers to free market practices will enable them to cover costs of their operations, and to repay the loans.

Key words: risk management practices, agricultural financing, mitigation tools

Introduction

Agriculture continues to be a major building block in achieving economic growth, especially for developing countries (WB, 2009; IFC¹, 2010). In this case, the sector remains the major means of livelihood or survival. Of the three-quarters of the world's poor living in the rural areas, more than 80 percent of them depend on agriculture for their livelihoods, either directly or indirectly (IFC, 2010; Bilal & Baig, 2019). In addition, in low-income countries the agricultural sector is vital for economic growth. For example, from the 1980s to 2000, agriculture was one of the major contributing sectors to the economies of developing countries (WB, 2009, IFC, 2010). Apart from providing food, the agricultural sector contributed substantially to the GDP and foreign exchange earnings. In Tanzania, the agricultural GDP contribution amounted to 45%-50% and foreign exchange earnings ranged from 50% - 55% (URT, 2014). Tanzanian agriculture has always been on the development agenda because agriculture is one of the leading sectors of the economy (URT, 2014; ESRF, 2009). It is the main source of income for the rural population, which accounts for about 70 percent of the country's population. Furthermore, the agricultural sector provides employment to more than 70 percent of the country's active labour force and most of the rural households depend on agriculture as their primary economic activity (ESRF, 2009).

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¹ International Finance Corporation of the World Bank

Despite the significant role the sector plays in the economy, agriculture in developing countries, including Tanzania, is characterised by low productivity (IFC 2010; Khan & Zubair, 2019). Yet, increased agricultural productivity can enhance food security, create jobs, boost economic growth and reduce poverty when properly harnessed and developed. Such enhancement of agricultural productivity requires increased investments in the sector (WB, 2009; Khan & Zubair, 2019). Increased investments imply improved flow of financial services to the sector. However, IFC (2010) and Marković and Kokot (2018) noted that despite agriculture being the leading sector of the economy, it remains largely underfinanced. In Tanzania, for example, lending to the agricultural sector is limited, with rural financing mainly being through informal sector channels (Wangwe, 2004).

The under-financing of the agricultural sector is attributable to the inherent risks in the agricultural sector. Generally, agriculture is widely considered to be riskier than other sectors (Christen & Pearce, 2005; Huang & Wang, 2018). The risk is associated with a number of factors, which include weather dependency, price fluctuations and untimely access to agricultural inputs, among other factors. The perception that agriculture is risky has caused the commercially oriented financial institutions to avoid rural and agricultural financing and concentrate on other less risky business opportunities (Wenna, 2010; Colliard, 2019; Marković and Kokot, 2018). Limited financing in the agricultural sector has created a paradox, due to a significant and sound development in functional financial markets, as well as in the uptake of latest lending and other bank-related technologies (Agwe *et al.*, 2009; Christen & Pearce, 2005; Colliard, 2019; Marković and Kokot, 2018).

In addition, the remoteness of rural clients, coupled with lack of branch networks and poor rural infrastructure (which is associated with the underdevelopment of the African countries), imply a high cost of service delivery. As a result, profitability among financial institutions is assumedly low (Wenna, 2010). Some researchers have argued that commercial banks should refrain from venturing into the agricultural sector because of the 'high risks' associated with agricultural lending (Mishra & Lettee, 2005; Ullar, 2007; Agwe *et al.*, 2009). These arguments notwithstanding, financing agriculture worldwide remains inevitable due to anticipated population growth, despite lenders continuing to be hesitant to finance the sector (IFC, 2010; BoU, 2010). In this regard, Christen and Pearce (2006) contend that many financial institutions in Africa lack adequate evaluation instruments for credit risk and management techniques to enable them to set on a radical transformation that could motivate them to establish agricultural lending as a profitable business segment, which would lead to a significant rise in rural households' access to financial services. Hence, risk mitigation instruments need to be known to enable access to financial services to the sector.

Improved lending will enhance agricultural activities in the developing countries, which are the basis of the economic strength of these countries. This argument is supported by the theory of factor endowments, which posits that a country has comparative advantage in the production of the commodities that use more

intensively the relatively abundant factors of production. This model was propounded by Swedish economists, Heckscher and Ohlin between the 1920s and 1930s and highlights the role of resource endowments in the production of a commodity. Tanzania has a comparative advantage in the agricultural sector given the abundant fertile land and labour, with 70 percent of its population living in the rural areas and depending on agriculture for their livelihoods. The World Bank (WB, 2007) indicates that developing countries mostly depend on agriculture for their economic development. However, the existing financing practices of the sector are informal, thereby characterised by limited access to finance (Mohammed, Barrowclough, Kibler & Boerngen, 2020; Martin & Clapp, 2015). The form of informal financing includes lending schemes, moneylenders, loans from other farmers and family members (Mohammed *et al*, 2020).

However, agricultural development should depend on formal financial investments. However, financial institutions are reluctant to provide them due to the risks involved (Bilal & Baig, 2019). Various researchers have dwelt into areas of strength by arguing that to eradicate poverty, the government need to create an enabling environment and aim to help the poor to obtain income generating and gainful employment through promoting production in the agricultural sector (Akarro, 2006). Despite this reality, the agricultural financing practices in many developing economies such as Tanzania have attracted little attention from formal financial institutions such as banks (Huang & Wang, 2018; Khan & Zubair, 2019; Colliard, 2019; Marković and Kokot, 2018).

From this discussion, both theoretical and empirical studies acknowledge that high risks involved in agricultural finance limit access to credit by farmers (Bilal & Baig, 2019; Huang & Wang, 2018; Khan & Zubair, 2019; Colliard, 2019; Marković and Kokot, 2018). The importance of the agricultural sector to the development of these countries together with change in the livelihoods of rural people has been a primary issue of many researchers (Colliard, 2019; Huang & Wang, 2018; Khan & Zubair, 2019). However, the studies have covered little with regard to the tools available to mitigate those risks to enable a smooth flow of credit to the agricultural sector, especially to the rural areas. This study has attempted to fill this gap. It has examined the tools available to manage the agricultural sector-related risks, with a view to create a viable environment that could lead to enhancing smooth lending to the sector. Specifically, the study sought to:

- (i) Establish different types of risks that lenders face in agricultural financing.
- (ii) Identify different types of tools used in agricultural financing risk management
- (iii) Determine the association between agricultural lending and risk mitigation.

Overview of Agricultural Financing in Tanzania

Prior to economic liberalization, Tanzania's financial sector was mainly owned by the government, which allowed the government to interfere frequently in the financial system (Wangwe, 2004). With this interference, credit was based on government priorities, without paying regard to creditworthiness; as such, banks were convenient

agents of the fiscal policy (Chijoriga, 1999). Two institutions, the National Bank of Commerce (NBC) and the then Co-operative and Rural Development Bank (CRDB) were dominant in providing rural financial services. The NBC provided working capital and other short-term finance to agriculture and other rural activities, whereas the CRDB provided development finance for rural development activities. Each institution was governed by its own stature, and the supervisory role of the central bank, the Bank of Tanzania (BoT) was limited (URT, 2007). Credit was allocated administratively by the BoT, which established legal ceiling in bank lending and deposits, in addition to regulating interest rates. This situation contributed to the decline in financial services offered to the rural areas. Moreover, these loan policies contributed to a huge NBC loan portfolio (70%) being in arrears in 1988 and 95% of this colossal debt had been caused by parastatals and co-operatives. With a non-performing loan portfolio, coupled with an inability to attract deposits, the formal financial sector ran bankrupt, and depended on financing from the central government (URT, 2007).

Economic reforms that took place in Tanzania from the mid-1980s led to a move from a centralised to an open market economy, which is mostly controlled by the private sector (Chijoriga, 2009; URT, 2007). The financial sector reforms were part of the broader economic reforms, whereby the main aspects of the reforms were enacted in the Banking and Financial Institutions Act (1991). The Act provided the legal framework that permitted major changes in the financial sector, particularly the entry of private banks into the financial market, decontrolling of interest rates and vesting the BoT with its supervisory and regulatory role. The government took the initiative to restructure major banks and financial institutions, which included the restructuring and downsizing of the National Bank of Commerce (NBC) and the recapitalisation of the Co-operative and Rural Development Bank (CRDB) through selling of shares to the public (URT, 2007). With the introduction of new banks, competition was enhanced, which led to improvement in the quality and quantity of the financial services and products offered, at least in the urban centres (Wangwe, 2004).

Nevertheless, the financial services to the rural population and, specifically, to the agricultural sector remained low, despite commercialisation of the rural economy requiring credit facilities as an integral part of the process (Wangwe, 2004; Chijoriga, 2009). Many of the rural population did not benefit much from the country's financial reforms, as they seemed to have bypassed them (URT, 2007). This observation suggest that financial institutions are yet to embark on providing services to rural agriculture in earnest. Implicitly, financial institutions in Tanzania are generally reluctant to finance rural agriculture because of the inherent high risks. Based on the country's history in rural financing, particularly in the post 1967 socialist phase leading up to the liberal era, a general perception has been that agricultural financing in the country is a risky business. Thus, this study was motivated by a need to establish the tools for containing the risks involved in financing the rural sector, thereby removing the fear among financial institutions and, consequently, their reluctance to lend to the agricultural sector. Adoption of mitigating tools by the country's financial sector could enable the agricultural sector to grow and benefit more the rural population in particular and the economy in general.

Conceptualisation of Risk Management in Financing Agriculture

There are varied definitions of risk. For example, Bilal and Baig (2019) define risk as an imperfect knowledge whereby the possible outcomes of an event can be known and estimated. It is a possibility that the occurrence of an event could have adverse impacts or repercussions on the goals and objectives of an enterprise (Mike, 2010). For agricultural activities, risks include a large array of uncontrollable elements that affect output and prices, thereby causing highly variable economic returns to farm households (Wenna, 2010). These risks include climatic events, geological events, pollution, predation, theft, disease, health factors, accidents, infrastructure and environmental problems, management issues, consequential losses, for example, an inability to conduct a business profitably, rising costs of capital, and exchange rate movements (Mike, 2010). Agwe *et al.* (2009) categorise risks inherent in financing agriculture into three broad classifications. The first category relates to agricultural production and includes natural factors such as weather, pests, diseases, and market factors (e.g. prices of seeds, fertilizers and pesticides). The second category relates to the farmer and his or her well-being, assets, skills and the ability to bargain effectively with suppliers and buyers of farm produce. The third relates to financial institutions, their capacities, and the regulatory environment in which they operate. Alternatively, agricultural risk can be grouped into production risks, market risks, liquidity risks, operational risks, credit risks and political risks (Maurer, 2010). Given the different categorisations of agriculture-related risks, many researchers contend that the complexities of managing agricultural risk carries important implications for the risk related to financing the sector (Mike, 2010; Wenna, 2010; Agwe, *et al.*, 2009; Maurer, 2010).

Given this complexity, the concept of risk management takes different definitions. Harwood *et al.* (1999), for example, define it as a process of choosing among alternatives to reduce the effects of risks. Seen this way, risk management is an efficient set of tools for managing risk strategies and credit decision-making for identification of events in broader classes of operational, credit, liquidity, market and other risks (Bilal & Baig, 2019). Risk management strategies can reduce risk within the operation, transfer risk outside the operation, or build the operation's capacity to bear the risk (Bilal & Baig, 2019). Mike (2010) describes risk management process to include risk identification, assessment, treatment, monitoring and control. Harwood *et al.*'s (1999) definition implies that risk management strategies are techniques that enable reduction of risk exposure, risk coping by way of transferring it to third parties, or risk retention through adequate loan reserve provisioning. Mishra and Lettee (2005) contend that for individual farmers and agribusinesses, risk management involves choosing among alternatives for reducing the effects of risk on the firm, thereby affecting the firm's welfare position. With specific focus on how formal financial institutions can manage risks, Wenner, Navajas, Trivelli, and Tarazona (2007), identify a number of instruments that are used in the agricultural sector. In this regard, the common instruments used are (i) an appropriate credit evaluation technology given the operating environment and constraints; (ii) reliance on portfolio diversification; (iii) limits on agricultural lending; and (iv) adequate provisioning. Additionally, risk

transfer instruments (insurance, third party guarantee funds, securitization, trust funds, and derivatives) are not widely available or prominent in the agricultural sector. Despite that risk transfer is observed to be uncommon, other studies recommend these strategies (Bilal and Baig, 2019; Mike, 2010; Mishra & Lettee, 2005) and therefore were used as key variables in this study. The limits to agricultural lending, proposed by Wenner *et al.* (2007), indicate that agricultural financing is still constrained by the willingness and availability of funds from formal financial institutions.

This study has adopted the definitions of risk management as provided by Harwood *et al.* (1999), Mike (2010) and Mishra and Lettee (2005). The adoption of these definitions is based on the provided process, with multiple tools recommended for risk management. Therefore, the study's definition of risk management is summarised as the process of applying techniques to reduce the effect of potential risks. The techniques proposed in the literature include crop insurance, weather index, collateral, appraisal techniques, forward/future contracts, diversification, credit guarantee covers, loan structuring and warehouse receipt (Mike, 2010; Mishra & Lettee, 2005).

Apart from the conceptualization of agricultural risk, agricultural finance is a concept that describes the flow of financial services for agricultural production, processing, and marketing, which includes short-, medium-, and long-term loans, leasing, savings, payment services, crop and livestock insurance (IFC, 2010). In some cases, agricultural value chain finance helps to emphasise the vertical dimension of agricultural finance between different segments of the agricultural value chains. Tchale and Keyser (2010) define agricultural finance as provision of financial services to smallholder farmers and poor rural households for agricultural production, marketing and processing. Although there are several definitions of agricultural finance, this study adopts the meaning of agricultural finance as defined by Tchale and Keyser (2010). This definition augurs well with the purpose of this study as it reflects the direction of the flow of funds to the farming population.

The risks in agricultural financing are also explained using the moral hazards concept. In this case, the concept postulates that a party tend to take risk because the costs of taking the risk will not be borne by the party taking the risk (Bengt, 1979). Accordingly, a moral hazard may occur when the actions of one-party change to the detriment of another after a transaction has taken place. Thakor *et al.* (1994) recognise moral hazard as a key problem to loan contracting and explain that it applies to cases where lenders are not sure of the borrowers' behaviour; hence, they tend to avoid extending credit to them and insist on providing secured loans. Other researchers have explained the moral hazard concept relating to lending behaviour in the context that the party insulated from risk behaves differently from how it would be if it were fully exposed to the risk (Arrow, 1968). Accordingly, a party decides on how much risk to take, while another party bears the costs if things go wrong. For example, a farmer may have little tension in case the agricultural produce is not enough to cover the amount borrowed and there is no collateral pledged to cover the loan. The banks, therefore, need to identify the types of risks, the mitigating tools and associated effect on agricultural financing.

Therefore, the concept of moral hazards asserts that the lenders' decision behaviour when they are covered from risks depends on whether the predicted risks can be managed to a satisfactory level. Implicitly, if risk types, sources and mitigation tools are known, lenders may be willing to extend credit to the agricultural sector because they are sure that, in the event risks occur, the effect will not be felt, as there are alternative risk mitigation instruments to reduce the effect of a loss. Thus, lenders will only take risk if they can ascertain that they will not endure the cost of the risk. This concept emphasises the view that the knowledge of risk management will enable lenders to take risks inherent in agriculture since they will be sure that the loss will be minimised by mitigation tools. To sum up, the concept of moral hazard relates to lending behaviour in that lenders will always avoid extending credit in situations perceived to be risky, but when the tools to reduce risk are in operation, they could extend such loans.

Furthermore, various scholars have empirically examined lending practices in the agricultural sector, and the findings are not consistent. Bilal and Baig (2019), for example, examined the balanced role of internal and external compliance in the risk evaluation process of specialised agriculture financing. Specifically, they focused on adaptive behaviour of risk managers to determine the role of proposed transformation for risk monitoring (RM) and control process in risk mitigation and avoidance of agricultural credit failure. Using a self-administered survey, the study was conducted among risk-related officers and managers in Zarai Taraqiati Bank Limited (ZTBL) in Pakistan. The results showed that the risk evaluation process in ZTBL was reasonably efficient in mitigating risks. Given the sensitive nature of farm credit, the study also identified a need for fundamental reforms in risk policy manuals in line with the central bank's agricultural prudential regulations and other standards. The methodology used in this study captured information from various officials of the bank to get the perception from different staff. This approach is important because the staff responsible for making loan assessments may influence the process of identifying risky customers. Thus, the views and assessment procedures of individual staff is crucial in the processes of agricultural financing. The understanding of tools and procedures for risk assessment and management are also based on what individual assessors know. In addition to the findings by Bilal and Baig (2019), risk management in agricultural financing needs to consider three crucial areas: types of risks, types of tools used in managing the risks of agricultural financing and the association between agricultural lending and risk mitigation. Bilal and Baig (2019) did not cover these areas. This study is centred on these areas.

Another issue is how agricultural finance can be used to facilitate attaining the joint objectives of development, mitigation of and adaptation to climate change in agriculture in the developing countries (Huang and Wang, 2018). The results from the study indicate that agriculture does not get a proportionate share of investment and foreign aid has not increased proportionately as to assist developing countries to maintain sustainable agriculture under climate change. Furthermore, their results show that there is a wide range of areas in mitigation of and adaptation to climate change that require substantial investment. The study calls for the mainstreaming

of agricultural mitigation and adaptation in agricultural development programmes, enhancing local capacity, and considering different stakeholders' needs. These ingredients will contribute to finance sustainable agriculture successfully under climate change. Huang and Wang (2018) note that the sector is exposed to several risks, which range from climatic change and variation to financing practices. Apart from local financing, foreign aid financing in the sector is also limited. Hence, to attain successful financing of sustainable agriculture further research should dwell on agricultural financing and risk management, which motivated this study.

Frederick (2012) conducted a study on strategies to manage credit risks by Ghana Commercial Bank. The study assessed the extent to which the implementation of various strategies to manage credit risks by the bank helped to mitigate those risks, thereby reducing the amount of non-performing assets. The study findings showed that the Ghana Commercial Bank employs a range of strategies to manage credit risks. These include portfolio diversification, loan size limit, collateralisation, credit insurance, portfolio securitisation, credit scoring, internal rating, guarantees and financial ratios. However, the study addressed credit risk management for the entire bank's portfolio rather than risk management strategies focusing specifically on the agricultural portfolio. Credit risk is one of the types of risks that affect agricultural financing. Other risks in agriculture include, for example production risks, which Frederick's (2012) study did not cover. Thus, risk can result from different factors depending on the product assessed (see Figure 1). This study has attempted to broaden the knowledge on strategies for managing agricultural risks in Tanzania.

Regarding agricultural risk management, Ullar (2007) examined different types of risks facing financial institutions, co-operatives and NGOs in lending to the agricultural sector as well as the risk management strategies they use. The study found these risks to include, for example, market risks, weather risks, operational risks and liquidity risks. The study concluded that financial institutions could employ a combination of risk mitigation strategies to limit the costs of the agricultural risks. The strategies used in risk mitigation included crop insurance, collaterals, futures and options, re-insurance, diversification of the agricultural activities, structuring of repayment schedules and use of collateral substitutes such as group lending/joint liability. As explained in Figure 1, these types and strategies of mitigating risks have been adopted in this study.

Summary of Agricultural Risk Management Process

Figure 1 summarises the process of identifying sources of agricultural risks, risk mitigation tools and results of risk management. The figure is based on the assumption that risk management techniques lead to effective risk management process, which in turn increases access to lending to the agricultural sector. As discussed, agricultural risks emanate from different sources, including production, especially climate change effects, marketability of agricultural output, the financing process, and externalities, including the influence of politics. Additionally, the risk management process, which involves choosing among alternative strategies for reducing the effects of risk, entails the following: (1) Transferring the risks to a third party; (2) Retention or reducing the risk within

the operation; (3) Coping or building the operation's capacity to bear the risk (Mishra & Lettee, 2005). Therefore, the study assumes that, given an effective risk mitigation process, lenders would be motivated to extend credit to the agricultural sector. The motive behind this conceptualization was how to mobilize investment to the agricultural sector through financing by banks and financial institutions to achieve economic growth and food security.

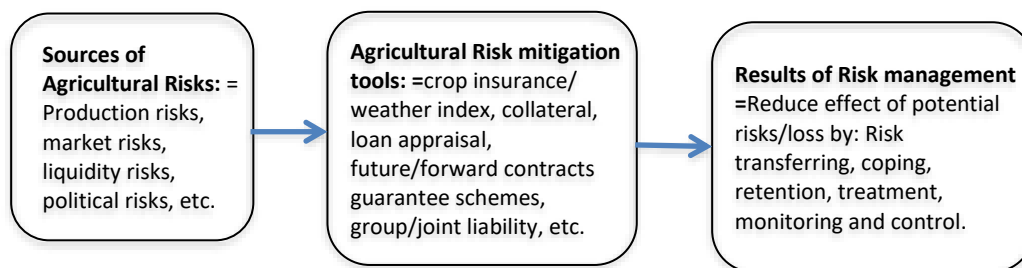


Figure 1: Process of Managing Agricultural Risk

Source: Synthesised from the reviewed literature

Methodology

The study was conducted at three selected banks based in Dar es Salaam. Due to ethical considerations, the names of the banks are not mentioned. However, these banks were selected purposively because they are largely involved in financing agriculture and have large agricultural portfolios in their books. According to the annual reports of these banks for 2018, their respective share of the agricultural portfolio in the banks' total credit portfolios were 20 percent for the first Bank, 25 percent for the second bank and 40 percent for the third bank. In addition, the selected financial institutions had diversified loan portfolios across sectors, across geographical space, and within the agricultural portfolio. As such, they had all the favourable characteristics, including study population for achieving the objectives of the study. The study aimed to collect data from 60 respondents (i.e. 20 from each participating bank) who were working in the agricultural financing/agribusiness departments/units in the selected banks. The proposed sample size is based on the recommendation that chi-square should not be used if the sample size is less than 50 (Bearden, Sharma & Teel, 1982; Spitzer, Pelizzola & Futschik, 2020). As well, the number of respondents (60) was considered appropriate as it was intended to be of equal proportion among the selected banks.

The selection of individual staff as unit of analysis was motivated by Bilal and Baig's (2019) argument that the staff responsible for loan assessments may influence the process of identifying risky customers. The views and assessment procedure of individual staff were deemed essential in the processes of agricultural financing. In addition, the understanding of tools and procedure for risk assessment and management are also based on what was known by individual assessors. Therefore, this was the rationale behind the selection of 20 respondents from each bank, instead of having a single response from each bank.

In drawing the sample, the study used both purposive and simple random sampling techniques. According to Kumar (2019), purposive sampling is applicable when the researcher targets specific information. In this study, specific information on agricultural lending was sought, hence the justification for employing purposive sampling to select the three banks and the agricultural financing departments. Simple random sampling method was used with regard to selecting individual employees from the departments, which gave every individual working in the department an equal chance of being selected from the population (Gray, 2019). Using a list of employees from these departments/units, the study selected 60 respondents. Out of this sample size, 55 questionnaires were duly filled and returned, which is a response rate of 92 percent.

To ensure the quality of data collected, both reliability and validity were considered during data collection and analysis. Reliability of a research instrument is the extent to which the instrument yields the same results on repeated trials (Key, 1997). Accordingly, reliability is chiefly concerned with making sure that the data gathering method produces consistent results. There are several methods for assuring reliability of the data. In this study, data reliability was tested with Cronbach's alpha using SPSS, which is a highly recommended and used method (Taber, 2018). Scholars such as Gray (2019) describe a viable Cronbach alpha as one falling between 0 and 1, where a measure of greater than 0.7 represents data reliability. The results of the study show that the average Cronbach's alpha coefficient for all the itemised questions in the study's instrument was 0.822, which is above the threshold level of 0.7, hence indicating that the data collected were reliable.

Table 1: Cronbach's Alpha Coefficients for the Variables Studied

Item	Dimensions	Cronbach's Alpha Coefficients
QN-1:	Demographic characteristics	0.857
QN-2:	Types of risks	0.946
QN-3:	Other types of risks	0.909
QN-4:	Types of tools used in agric.	0.751
QN-5:	Risk mitigation tools	0.780
Overall Reliability		0.822

Furthermore, Key (1997) defines data validity as the degree to which a test measures what it is supposed to measure. In this regard, the data gathering instrument should measure what it claims to measure and in a consistent manner. Thus, to attest for data validity, the data collection instrument was prepared and piloted before application in the field. Responses, comments and observations were used to modify the questionnaire accordingly before the main survey. Through SPSS, the findings were presented using tables, for easy interpretation. Specifically, descriptive statistics were used to analyse different types of risks and tools used in agricultural risk management. Furthermore, the Pearson's Chi-square analysis was employed to measure the association between

agricultural lending and risk mitigation at a statistically significant level of 5%. Pearson's Chi-square is used to measure the degree of independence among the variables for the study. In this case, it was used to test the study's questions to ensure that there was a statistical association between risk management and agricultural lending. A non-parametric test Chi-square was chosen to examine association between agricultural lending and risk mitigation, which is the main objective of the study.

Findings and Discussion

Profile of the Respondents

Apart from considering the objectives of the study, the respondents' profile is important to highlight their demographic characteristics. In this study, the respondents' characteristics were based on organisation, gender, age, level of education and number of years they had worked in the institutions under review. The findings indicate that 34.5 percent, 31 percent and 34.5 percent of the respondents were from the first, second and third banks, respectively. In addition, 30.9 percent were females, whereas most of the respondents (69.1%) were males. With regard to their level of education, the findings indicate that majority of the respondents (69.1%) were holders of postgraduate qualifications at master's level, whereas those with undergraduate degrees accounted for 25.5 percent and holders of diplomas were very few (5.5%). These findings imply that many of the employees working under agricultural departments were highly educated, hence signifying their capacity to make sound project analyses of the farm enterprises. Notably, the relevance of skills and knowledge is one of the criteria for placing these employees in appropriate departments.

The findings on the age of respondents indicate that the majority (67.3%) were aged between 30 and 40 years, followed by those aged between 41 and 50 years (21.8%) and those aged below 30 years constituted 5.5 percent. The remaining (5.4%) were aged 51 and above. These findings suggest that most of the staff working under the departments of agriculture in the banks were young and belong to the energetic age group, which may reflect on the motivation and physical ability to execute the activities. The findings tie up with most of the agricultural activities being located in the rural areas, which explains the need to have young energetic individuals who can manage fieldwork and frequently travel to and from those areas to make follow-ups with farmers in their fields, in addition to monitoring their activities. The findings further indicate that the highest percentage of respondents (60%) had worked for 1–3 years, whereas 29.1 percent of the respondents had worked for their organisations for 4 - 5 years and 10.9 percent for seven years and longer. These findings imply that the majority of the respondents (60%) had worked with the departments for relatively short periods, thereby suggesting that they are still acquiring experience in issues of financing agriculture. However, 40 percent had worked for more than four years, indicating that they had relative enough experience on issues of agricultural financing; thus, they were better placed to provide valuable information pertaining to the research problem.

Different Types of Agricultural Risks

The first objective of this study was to identify different types of risks, which the banks normally face in lending to the agricultural sector. The respondents were asked to indicate which among the given types of risks mostly affected their banks in lending to farmers. Their responses are summarised in Table 2. The responses were ranked as 'mostly faced', 'modest', 'average', 'lowest/marginally' and 'not faced at all'. Findings on production risks show that 50.9 percent of the respondents indicated that production risks had mostly affected the banks' lending operations, whereas 29.1 percent reported that production risks had moderately affected their lending activities and 16.4 percent said the risks affected the operations marginally. Production risks was categorically interpreted as weather conditions, pests and diseases, which affect yields, thereby occasioning low income that made farmers', as borrowers, fail to honour their loan obligations. These findings indicate that production risks highly affect lending activities by lowering the farmers' yield, such that farmers ultimately fail to repay their bank loans, as was reported by almost 50 percent of the respondents. Banks faced market risks as well, which for the respondents constituted volatility of prices and demand for agricultural commodities. With these risks, 41.8 percent of the respondents indicated that the risks had mostly affected the lending activities of the banks to the agricultural sector. Furthermore, 47.3 percent indicated that market risks had affected the banks' operations moderately, 7.3 percent reported that market risks had affected the lending activities of the banks marginally and 1.8 percent said that market risks had not affected their lending activities at all. These findings generally imply that, to a large proportion, market risks have had significant effect on agricultural lending.

Table 2: Different Types of Risks Affecting Agricultural Financing

Different types of risks faced by lenders in agricultural financing	Rating category (%)					Total
	<i>Mostly faced</i>	<i>Modest</i>	<i>Average</i>	<i>Lowest</i>	<i>Not faced at all</i>	
Production risks	50.9	29.1	16.4	1.8	1.8	100.0
Market risk	41.8	47.3	7.3	1.8	1.8	100.0
Liquidity risk	30.9	45.5	9.1	10.9	3.6	100.0
Credit risk	40.0	41.8	14.5	1.8	1.8	100.0
Natural calamities	1.8	9.1	23.6	45.5	20.0	100.0
Operational risks	7.3	27.3	41.8	16.4	3.6	100.0
Political risks	3.5	9.1	12.7	41.8	27.3	100.0

The findings further indicate that 30.9 percent of the respondents reported that liquidity risks had mostly affected the banks' lending activities to the agricultural sector as 45.5 percent of the respondents indicated that liquidity risk affected moderately their banks' lending activities. Additionally, 9.1 percent of the respondents said liquidity risks had affected their activities on average and 10.9 percent said these risks had affected the activities marginally, whereas 3.6% said the risk had not affected their banks at all. Liquidity risks means the inability of farmers to have income/funds to meet their farm operating expenses, including inability to have funds to pay for loan obligations when they fall due. Generally, the study

findings deduce that liquidity risks had significant effects on banks' lending activities as many of the respondents indicated the risks to affect highly and moderately their lending operations, that is, 30 percent and 45 percent, respectively.

Respondents were also asked to indicate how credit risks affected their banks in lending to the agricultural sector. In this regard, credit risk refers to the possibility of a loss to the bank emanating from the failure of the borrower to repay a loan. The findings indicate that 40 percent of the respondents said credit risk had highly affected their banks whereas 41.8 percent reported that credit risk had affected their banks moderately. In addition, 14.5 percent of the respondents said that the risk had affected the banks' activities on average and a very small number (1.8%) said the risk had marginally affected the banks' activities. Furthermore, 1.8% of the respondents said credit risk had not affected at all the bank's lending activities to the agricultural sector. These findings tend to suggest that credit risk affected lending activities of the banks to the agricultural sector.

Additionally, the respondents were asked to indicate how natural calamities such as floods, drought, earthquakes and fire had affected the banks' lending activities to the agricultural sector. The findings indicate that small a proportion (1.8%) of the respondents said natural calamities affected highly the lending operations to the agricultural sector, followed by 9.1 percent who reported that the risk affected them moderately, whereas 23.6 percent and 45.5 percent reported that the risk had affected their operations on average and marginally, respectively. The findings also show that 20 percent of the respondents said that this risk had not affected them at all. These findings indicate that natural calamities had insignificantly affected the banks' lending activities to the agricultural sector. This might be attributable to the fact that in Tanzania the occurrence of these adverse events such as earthquakes are not common, although floods, drought and fire tend to appear occasionally.

Furthermore, the respondents were asked to show how operational risks had affected the banks' lending activities to the agricultural sector. Operational risks in this regard referred to accessibility of the rural area through road networks and banks' branch network. The findings show that a small proportion of respondents (7.3%) said operational risks affected the activities highly; 27.3 percent said operational risks affected the activities moderately whereas 41.8 percent of the respondents reported that the risk had affected the banks' activities on average. About 16.4 percent said the risk had affected marginally the banks' activities and an even smaller number (3.6%) stated that the risk had not affected the activities at all. It can be deduced from these findings that operational risks, to a large extent, had moderate effects on the banks' lending activities.

Another category of risks was political risk or negative government interference in the lending activities of the banks. The findings indicate that 27.3 percent of the respondents reported that political risks somehow did not affect at all the lending activities, whereas 41.8 percent reported that political risks had marginally

affected their agricultural lending. Few respondents (3.5%) reported political interference as a big problem. Political risks refer to government acts such as intervention in agricultural markets, for example, export embargo for some food crops, fixing of prices for agricultural products as is the case for the cotton and cashew nuts sub-sectors. The government often applies such practices as a political tool to assure a certain level of income for smallholder farmers, which, directly affects the lenders. To a large extent, the findings imply that political risk did not affect much the banks' lending activities to the agricultural sector, which suggest that banks make credit decisions without political influence.

Other types of agricultural risks were also sought from the respondents through face-to-face discussion. The findings show that limited knowledge of farmers constitutes a risk in lending to the agricultural sector. In this regard, the respondents reported that farmers usually lack knowledge and have low level of education to enable them to keep proper records of production costs and revenue. The respondents added that limited agricultural extension service system in the country trigger a poor knowledge on appropriate farm management and practices, including using modern farming technologies. Other risks were reported to be the untimely availability of agricultural inputs to support production and poor management of the received funds. In this case, the results indicated that agricultural inputs, such as fertilizer and pesticides are not availed in time or in some cases they are not availed at all, which highly affect the agro-produce. Moreover, the respondents pointed out that lack of legal ownership of land under cultivation and climate change effects, such as drought, were also sources of concern, like other type of risks facing lenders.

Tools Used in Agricultural Risk Management

The second objective of the study was to identify different types of tools used in managing the financing of agricultural risks. Table 3 shows the percentage distribution of the respondents' answers regarding the types of tools used in managing agricultural risks. Specifically, the respondents were asked to rate how the various tools the banks used to mitigate the risks in terms of 'mostly used', 'moderately used', 'averagely used', 'lowest/marginally used' and 'not used at all'. The findings of the study show that a majority of the respondents (66.7%) reported that banks did not use at all crop insurance scheme as a risk management tool, whereas 9.3 percent of the respondents said that crop insurance scheme was used marginally and 14.8 percent said crop insurance was used moderately by banks to mitigate the risks. Results further show that a small proportion of the respondents (7.4%) said crop insurance was used by their banks. These findings imply that crop insurance scheme was not widely employed as a tool for mitigating risks in lending activities. The findings suggest that agricultural insurance is not well developed in Tanzania. The slow development of agricultural insurance could be attributed to limited geographical coverage of the insurance companies of which their operations are concentrated in urban centres. In addition, agricultural insurance companies face challenges related to availability of data on production conditions, yield distributions and market availability.

The results further show that large a proportion (70.9%) of the respondents reported that asset-based lending was traditionally used by banks as fall-back position against any loss or loan default by farmers, whereas 27.3 percent and 1.8 percent said the technique was moderately and on average used by banks, respectively. Respondents reported collateral use as the most accepted and strong tool by the banks to avoid losses of funds in the event of default. The study findings also suggest that, to a large extent, banks and financial institutions demand real estate mortgage (immovable collateral) for provision of loans. Regarding appraisal techniques, about 63.6 percent of the respondents reported that banks mostly used appraisal techniques to manage risks, whereas 30.9 percent said the technique was moderately used and 5.5 percent said the technique was used on average. The findings imply that appraisal technique was highly employed by banks as tool to mitigate agricultural risks. Banks conduct loan appraisal of the loan applicant to determine his or her creditworthiness. To undertake proper appraisal, banks collect detailed information on the potential borrower to conduct sound appraisal and do close monitoring. Hence, the information obtained is vital in assessing the bankability of the borrower as way to manage risks. Since the appraisal techniques rely mostly on availability of information on the loan applicants. Record keeping is crucial to this exercise and the knowledge of the farmer about agricultural activities significantly counts in successful and sound appraisal. Nevertheless, failure of the loan applicant to provide adequate information might lead to inaccessibility of credit. With these findings, farmers should be educated on the importance of keeping proper records of their farm activities.

Table 3: Different Types of Tools Used in Agricultural Risk Management

Types of tools used in agricultural financing risk management	Rating category (%)					Total
	<i>Mostly used</i>	<i>Modest used</i>	<i>Average used</i>	<i>Lowest used</i>	<i>Not used at all</i>	
Crop insurance/weather index	7.4	14.8	1.9	9.3	66.7	100.0
Collateral (asset-based lending)	70.9	27.3	1.8	N/A	N/A	100.0
Appraisal techniques	63.6	30.9	5.5	N/A	N/A	100.0
Forward/future contracts,	7.3	14.5	21.8	12.7	43.6	100.0
Diversification	5.6	35.2	42.6	7.4	9.3	100.0
Collateral substitutes	31.5	25.9	18.5	14.8	9.3	100.0
Credit guarantee covers	49.1	34.5	7.3	7.3	1.8	100.0
Cash deposits	29.1	18.2	32.7	14.5	5.5	100.0
Loan structuring	60.0	27.3	9.1	3.6	N/A	100.0
Warehouse receipt,	31.5	42.6	14.8	7.4	3.7	100.0

Respondents were also asked to indicate whether forward/future contracts and options were techniques widely used by their banks, whereby 43.6 percent of the respondents reported that future contract/options were not widely used tools in managing agricultural risks; hence, they were not taken as vital tools used in their banks. A small proportion (7.3%) of the respondents indicated that future contracts are used in shifting risk from a firm that desires less risk to someone who is willing to accept the risk in exchange for a profit. The study findings deduced that forward contracts and the use of value chain financing, which involve price pre-fixing, are techniques rarely

used in the studied banks. The mostly used forward/future contracts in farming activities is contractual farming, which normally involves big farms, such as sugarcane plantations, wheat and barley farms. Forward contracts help to protect against price risk, as futures and cash prices converge against the end of the delivery period.

For diversification of farm activities, 42.6 percent of the respondents reported that banks somehow used diversification as tools in managing risks followed by 35.2 percent of the respondents who reported that diversification technique is moderately used by the organisations to hedge against risks. Diversification is done by either channelling credit to different geographical zones or by financing different types of agricultural activities in the value chain, for example, crops, livestock, processing, storage, marketing activities, among others; to avoid major losses when events happen to one geographical location or certain type of agricultural activities. The findings showed that diversification is an important instrument for mitigating risk and that confining credit to a single agricultural activity would subject the bank to a difficult financial position in the event of calamities occurring.

The respondents were further asked to indicate whether collateral substitutes, such as the use of group lending and joint liability, among others, were used to manage agricultural risks. The findings indicate that 31.5 percent of the respondents reported that collateral substitute was mostly used while 25.9% said the tool was used moderately. In addition, 18.5 percent reported that the tool was used averagely and 14.8 percent said it was marginally employed. The findings imply that the technique was useful in managing risks. Regarding the use of guarantee schemes/cover, a large proportion of the respondents (49.1%) said that the instruments were widely used; and 34.5% of the respondents said the tool was moderately used (34.5%). Furthermore, respondents reported that cash covers/deposits were mostly used (29.1%); averagely used (32.7%); whereas those who said that cash covers were used moderately were 18.2 percent. These findings denote that the availability of credit guarantee schemes help banks to mitigate against lending risks. In this case, the government provide special covers to loans that are directed to agricultural activities under special arrangement.

Other risks management tools as indicated in Table 3 are loan structuring technique and warehouse receipt financing and collateral management. We conclude from the findings that banks apply several risk management tools in financing the agricultural sector. Using several tools is a strategy for reducing the risks. The respondents further added that the ability to detect the financing risks depends on the knowledge and experiences of the bank officers. Hence, bank officers should be trained well as to understand and apply different techniques of identifying and managing the agricultural financing risks.

Association Between Agricultural Lending and Risk Mitigation

The third objective of the study was to determine the association between risk mitigation and agricultural lending. The findings indicate that most of the respondents just agreed (38.2%) or strongly agreed (38.2%) that the process of

managing effectively the risks increases loans to the agricultural sector. Only a small proportion disagreed (12%) or strongly disagreed (9%). Furthermore, the study examined whether the results were statistically significant by using cross tabulation analysis. To test the significance of the results, the Pearson Chi-square test was used at $p < 0.05$. The results of the test showed that there was a significant association between risk mitigation tools and agricultural lending at 0.05 level (P-Value=0.001). Hence, the study concluded that there was statistically significant relationship between agricultural lending and risk mitigation (Table 4). This finding means that proper risk mitigation tools could increase agricultural lending.

Table 4: Relationship between Agricultural Lending and Risk Mitigation Tools

Mitigation tools	Agricultural Lending (%)					Total
	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neither agree or disagree</i>	<i>Agree</i>	<i>Strongly agree</i>	
Strongly disagree	40.0	N/A	N/A	N/A	14.3	9.10
Disagree	40.0	100.0	57.10	9.5	N/A	16.4
Neither agree or disagree	20.0	N/A	N/A	9.5	N/A	5.5
Agree	N/A	N/A	28.6	76.2	19.0	40.0
Strongly agree	N/A	N/A	14.3	4.8	66.7	29.1
Total	9.1	1.8	12.7	38.2	38.2	100.0
Chi-Square Tests	Value			df		P-Value
Pearson Chi-Square	58.35			16		0.001

In this study, the various types of the agricultural risks discovered by the study corroborate with the theoretical and empirical studies reviewed. Generally, the findings imply that the banks should establish proper risk mitigation strategies so that they finance the agricultural sector (Bilal & Baig, 2019; Huang & Wang, 2018; Frederick, 2012). Most of the respondents indicated the major types of agricultural risks to include production risks, which imply the risks involved based on variability in farm output caused by farming conditions, pests and diseases. Other risks, which were also observed in this study and other studies reviewed, were market risks, liquidity risks, credit risk and political risks (Mishra & Lettee, 2005; Maurer, 2010). The findings further indicate that government interference in issuing credit to the rural sector has significantly been reduced, in contrast to the past when banks were directed by the government to issue credit based on its preferences, which led to non-repayment of credit by many borrowers and caused some banks to shut down (Chijoriga, 1999). In this case, the financial reforms that led to liberalizing the financial sector contributed to reduce government involvement in decisions related to issuing credit.

The findings also indicate that there are different tools used in combination by the banks to mitigate risks. These tools, which have also been identified by previous studies include collateral or asset backed lending, appraisal techniques, diversification of agricultural activities, collateral substitutes (group/joint liability), guarantee covers and cash deposits, loan structuring and warehouse receipts (Bilal & Baig, 2019; Huang & Wang, 2018).

The result that was not consistent with those of previous studies is with regard to crop insurance/weather index, whereby most of the respondents (over 70%) reported that the tool was not used at all or was only marginally used. Notwithstanding this result, crop insurance is universally applied as a common tool for mitigating production risks (Afroz, Akhtar & Farhana, 2017). The instrument ranks among the best tools in managing agricultural weather risks and is used to transfer the risk to other parties; hence, it has the potential to help protect people and livelihoods against climate shocks and climate risks. The findings of this study imply that crop insurance schemes in the country are either unavailable or not well developed, perhaps because of the difficulties involved in administering the schemes profitably. Mishra and Lettee (2005) observed that in developing countries the client base is dispersed; farm production systems are heterogeneous; the insurable value is small; the data are unreliable and obtained with difficulty; and administrative costs as a percentage of the premiums are high. These factors translate to high premium levels, which are seldom affordable by the farmers.

The result of the Chi-square test showed the relationship between risk mitigation and lending to be statistically significant. The test results also imply that effective risk management would result in increased agricultural credit by lenders, thereby improving agricultural productivity (WB, 2009). This result is consistent with the practicality of the moral hazard concept. That is to say, if risk types, sources and mitigation tools are known, lenders will be willing to extend credit to the agricultural sector because they will be protected against moral the hazard if such risks were to occur. The will not suffer the loss due to alternative risk mitigation instruments to contain the effect of loss (Bengt, 1979; Thakor *et al*, 1994; Arrow, 1968). Therefore, the knowledge of risk management could enable lenders to take risks inherent in agriculture since the mitigation tools would cushion off the loss.

Conclusions

The study findings identified several risks facing banks in lending to agricultural activities. The various types of the agricultural risks identified by the study correspond to the findings of the empirical studies by various researchers (Ullar, 2007; Mishra & Lettee, 2005). In this case, majority of the respondents indicated the major types of agricultural risks to include production risks, which are the risks occasioned by variability in farm output due to farming conditions, pests and diseases. Uncertainties about the availability of inputs, the cost of inputs, the price of farm products, the availability of markets for farm outputs, and variability in production (quantity) and yield have negative effects on output. Low farm incomes account significantly for loan defaults, thus heightening the risk to the banks. Thus, banks need to come up with appropriate strategies for managing these risks. The risk mitigation process should employ a combination of various tools and strategies to minimise losses by lenders, since no single tool was found to be adequate in providing a solution to all agricultural risks. Furthermore, the study surmises that effective risk mitigation process could lead to increased agricultural credit, which ultimately would lead to improved agricultural productivity. In view of this conclusion, the following are recommendations follow from the findings of the study:

- *Banks should use a combination of risk management tools in the lending process*
Given a significant association between risk tools and the lending process, financial institutions should use a combination of various types of tools to manage agricultural risks, which would facilitate increased lending to the agricultural sector.
- *Employees of agricultural departments should be trained in agricultural enterprise financing and farm management*
Skilled personnel are vital in undertaking sound appraisals of the borrowers and proper evaluation of the farming activities with regard to their capability to generate sufficient incomes, together with performing loan structuring to match the seasonality and income cycles with loan repayment schedules.
- *Farmers ought to maintain and keep proper records on their production history*
Such records include farm budgets, costs, revenues and data on sale of products. In this regard, the study found that banks use appraisal techniques to evaluate a borrower's bankability of which exercise requires information partly from the borrower. Thus, proper records of the farm enterprise would assist the borrower in this regard.
- *The government should strengthen the agricultural extension service system*
Extension services play a crucial role in advising farmers on appropriate farm management and practices, including employing modern farming technologies, such as use of improved seeds and modern farm management methods. However, these extension services need to be availed to the farmers at affordable environment.
- *The government and policymakers should facilitate land survey exercises*
This exercise would enable the formalisation of land ownership, which is a crucial instrument for collateralisation. The use of collateral as a mitigation tool was found to be highly preferred by the banks.
- *The market free practices should be implemented among the farmers*
These practices would enable them to sell their produces at market prices to be able to cover their operations costs and to repay the loans. This recommendation follows from the response that when government control prices for agricultural produce, it limits the farmers to get high prices for their products, which ultimately affect loan repayment.

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