DETERMINANTS OF LOW LOAN REPAYMENT ON COTTON INPUTS IN BARIADI DISTRICT, TANZANIA.

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ABSTRACT

Input loan plays a vital role on economic transformations to cotton farming households. However, their acquisition and repayment are characterized by numerous challenges, including high defaults among beneficiaries. This study intended to examine factors contributing to low loan repayment on cotton inputs; and sought to improve its supply to farmers in Bariadi district. Primary and secondary data were collected from farmers and ginners respectively. A purposive and two stage stratified sampling was used to select four wards which received input loans and get a total of 112 respondents, with 70 defaulter and 42 non-defaulter farmers depending on proportions of default for 2011/12 cropping season. Descriptive t- and chi-square statistics were used to describe demographic, farming, socioeconomic, inputs credit requisition, use and repayment characteristics. Results showed significant differences between defaulters and non-defaulters with respect to age, marital status, education, family size, experience in farming, land area under cotton, access to extension, input supplier company, sufficiency of inputs, other sources of loan, perception, training and conditions imposed on loan repayment. Probit model was adopted to determine confounding factors to low input loan repayment among cotton farmers. Results showed that seed cotton harvested (-), type of input (+), input supplier company (+), timeliness delivery of inputs (+), perception on input loan (-), training on loan repayment (-), interval on loan collection (-) and conditions on input loan repayment (-) were statistically significant at $p<0.001$, $p<0.01$ and $p<0.1$. To enhance loan recovery among cotton farmers'; policies efficient on increasing productivity, reviewing beneficiary groups, effective training, close monitoring and development of risk mitigation strategies on repayment conditions should be advocated. However, further disbursement of loan should be targeted to farmers who are

more likely to moderate the desired levels for each significant variable to attain sustainability on input supply.

DECLARATION

I, ATUPELE JAMES MWAKIJOLO, do hereby declare to the Senate of Sokoine University of Agriculture that, this dissertation is my own original work and has neither been submitted to any other institution anywhere for the award of higher degree, diploma, or certificate.

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Dr. F. J. Mishili Date

(Supervisor)

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DEDICATION

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LIST OF ACRONYMS AND ABBREVIATIONS

Ar/Br	Cotton quality grades; Ar stands for white and Br for dull stained
CDF	Cotton Development Fund
CDTF	Cotton Development Trust Fund
CIIP	Cotton Industry Implementation Plan
Co	Company
CSDS	Cotton Sub-sector Development Strategy
DAICO	District Agricultural, Irrigation and Co-operatives Officer
DED	District Executive Director
Dr	Doctor of philosophy
FBGs	Farmers' Business Groups
GOT	Ginning Outturn Test
HIV/AIDS	Human Immunodefficiency Virus/Acquired Immuno Defficiency Syndrome
ITC	International Trade Centre
kg	Kilogram
Ltd	Limited
MIP	Minimum Input Package
M.Sc.	Master of Science
n	number of sample size
OLS	Ordinary Least Square
p	probability
PRIDE	Promotion of Rural Initiatives and Development Enterprises
RLDC	Rural Livelihood Development Company
Std. Dev	Standard Deviation

T	Tanzania
TACOGA	Tanzania Cotton Growers Association
TCA	Tanzania Cotton Association
TCB	Tanzania Cotton Board
TGT	Tanzania Gatsby Trust
TAICO	Township Agricultural, Irrigation and Cooperatives Officer
TOT	Training of Trainers
Tshs	Tanzania shillings
URT	United Republic of Tanzania
var	Variance
VIF	Variance Inflation Factor
vs	versus
WAEO	Ward Agricultural Extension Officer
WCGA	Western Cotton Growing Area

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Cotton is among Tanzania's main export commodities and contributes to the livelihoods of about 40% of the population. As a cash crop, cotton represents a major source of income and employment, offering economic opportunities to between 350 000 and 500 000 smallholder farmers cultivating the crop on plots ranging from 1 to 10 acres (George, 2012).

With the ginning sector in Tanzania being competitive, the ginning out turn (GOT) ratio is depressed. The GOT is more or less stable at 34% with a seed content of 62% and an ordinary waste of 4%. This implies that farmers receive a higher share of the lint price; however the share perceived by farmers is reduced significantly when profits from cotton seeds are considered (Mwinuka and Maro, 2013). Most of the ginned cotton lint, about 70 to 80% is exported to the Far East while the remaining lint is traded in the East African region and domestic textile and spinning mills.

Tanzania's cotton production is 100% rain-fed; with the cultivated area varying depending on weather conditions and cotton market price trends. Droughts and downward shifts in cotton prices on the world market compel some of the farmers to switch to alternative crops (TCB, 2010). Peasant agricultural production is generally undertaken in extreme weather conditions with erratic rainfall distribution and poor agronomic practices which contributes to low productivity. The variation in the degrees of soil fertility is little, leading to land productivity differential between farms even and not far apart. The agro-

ecological system is diverse associated with policy distortion against agriculture (Issah, 2011).

The cotton sub-sector has undergone one of the most dramatic liberalization processes which have shifted the role of institutions from the village level to the private sector, resulting into new obstacles and challenges in cotton production (Valerian, 2012). Farming is more of traditional subsistence activity with low level use of modern technology. Agricultural inputs continue to be of limited availability in the respective markets and there is a diminishing capacity of public sector agencies to support smallholder farmers. The market infrastructure is relatively underdeveloped in the areas of transport, storage and market services (Dawes, *et. al*., 2009**)**.

The indicative floor price announced by the regulator during the onset of every buying season causes much disruption to farmers when selling their cotton. At times of soaring world market price, especially in regions where competition among buyers is high, the actual price paid to farmers is usually higher than indicative price as the season advances. Contrary, in regions where competition is restrained by remoteness and poor infrastructure, buyers enjoy virtual monopolies. They purchase cotton at floor price even though in neighbouring regions the going market price is higher, causing much discontent among farmers, and eventually abandon cotton cultivation. Conversely, when the world market price falls significantly in the course of the buying season, marketing is also disrupted, as farmers are very reluctant to sell at a price below the indicative price (RLDC, 2008).

The measure of cotton quality is based on the characteristics of cotton fibres and degree of contamination of cotton with foreign substances, especially polypropylene (Peltzer and

Rottger, 2013). Wiggins and Keats (2014) noticed that insufficient supervision and monitoring of government in the market has led to the inconsistence of quality standards, in which many smallholder farmers are in frustrated on adhering to; leading to their imperfect participation in the mainstream agricultural markets.

However, competition among ginners has led to the abandonment of the practice of sorting cotton according to Ar and Br grades. The expansion of ginneries by new buyers often tends to be less quality sensitive, as the benefits of better utilization of their ginning capacity often outweigh the cost of accepting lower quality cotton. Cheating on weights and scales during cotton purchase by company agents has encouraged deliberate contamination of cotton by farmers who seek to artificially increase the weight of their produce to offset their losses (George, 2012).

Although there is increase in world cotton production, the population growth and consumption of cotton fibre continues at a rate which predicts an imminent shortage in the near future. Dawes (2008) and ITC (2011) reported that small holder farmers being asset poor do not have sufficient resources to purchase the quantity of inputs required to produce commercially viable yields. Few farmers have adopted the intensive use of agricultural inputs to capture some of its potential benefits; due to high economic costs of delivery and low profitability on investment in terms of productivity. According to Issah (2011), the problem is worst in areas with low rainfall and is aggravated by the lack of attractive saving mechanisms, increasing demands for cash to use on school fees and health care; and the price increase for inputs themselves.

The ginning companies provide farmers with material input support, which are designed solely to subsidize the farmers own resources. Value chain finance in terms of credit

becomes an essential part of the solution to improve productivity, which at current records is estimated to be between 560 to 750 kg of seed cotton per hectare (TCB, 2010).

It was obviously, the reason for the government of Tanzania and cotton stakeholders to establish contract farming. The system provides the easiest form of input loan to contracted cotton farmers through ginners. The direct involvement of ginners in provision of input loans and extension support is to make them participate fully in the production process; and increase the production potential amongst smallholder farmers which is normally very weak.

In contract farming, ginning companies mobilize farmers' business groups (FBGs) for contract execution and provide them with a range of services such as inputs, implements, extension and storage facilities on loan basis and bear all the associated economic risks. On the other side, farmers who are mainly peasants supply land and labour and beyond this bear no other risk on responsibility in the production of seed cotton, which is the main raw material for the production of lint.

Contract farming has demonstrated to be an effective means of tackling the main bottlenecks of the sub-sector. Even though on such a scale loan repayment rates for seeds, pesticides and spray pumps were modest, input use and average yields in WCGA rose significantly to 411 kg/acre from a baseline of 310kg/acre, convincing the Tanzania Cotton Board to scale it up nationwide (George, 2012).

1.2 Problem Statement and Justification

The Tanzania Cotton Board in collaboration with cotton stakeholders are extending loan facility on input to cotton farming households in western cotton growing areas (WCGA).

The aim is to narrow the gap between required capital and that which farmers possess. The ginning company's credit is based on minimum input package (MIP), which consists of the supply of three rounds of insecticides, 8 and 10 kg of delinted and fuzzy cotton seeds for one acre of cotton field. Upon further bargaining, ginners can extend more loan assistant to farmers to furnish the cost of land preparation, weeding and seed cotton harvesting.

However, there is a serious loan repayment problem in the area, which discourages cotton industry stakeholders from promoting and extending input loan to farmers. Ginners distributed input loan to farmers in Bariadi district in the 2011/12 cropping season worth Tshs 916 186 050. The value of input loans recovered was Tshs 350 286 630, with the amount of Tshs 565 899 420 due owed to farmers. The proportion of un-retrieved value of loan is very high, provoking the liquidity position of ginning companies, which is adversely affected. The cotton companies predict on intolerable expansion to provide input loan to farmers, as those who are indebted abandon cotton production and thus avoid paying the amount owing.

In the contract pre-requisite, producers only repay their debts if they produce enough cotton to offset input loan received. This has contributed tremendously to the ever increasing value of un-retrieved loans. Operating costs incurred by ginning companies are currently high, regardless of value of inputs distributed and the area of coverage.

Despite of incredible loan portifolios among cotton farmers, there are few studies which have been carried out to determine the cause for low repayment rates on input loan since contract farming system is still new to Bariadi district. Input supply during the previous 2010/11 cropping season, was under pilot to few wards and farmers.

This study is significant to the cotton industry as it will provide useful information in the formulation of appropriate policy guidelines on loan components to improve input loan provision to cotton farmers to meet the existing challenges in Bariadi district. Also, it will assist to regulate the terms of participation by ginners and farmers in order to increase the current level of input loan recovery, and make cotton production a sustainable enterprise for poverty reduction.

1.3 Objectives of the Study

13.1 General objective

The general objective of the study is contribution to improve input loan supply and sustainability to cotton farmers in Bariadi district.

1.3.2 Specific objectives

The study sought to achieve the following specific objectives:

i. Identify the production characteristics of contracted cotton farmers who obtained input loan from ginners.
ii. Examine the attitude of cotton farmers on input loan requisition, use and repayment in their contracted business groups.
iii. Examine factors which influence input loan repayment from contracted cotton farmers.

1.4 Research Questions

To answer the objectives, the following research questions are to be asked.

i. What are production characteristics of farmers who obtained input loan?
ii. What factors affect input loan utilization among contracted cotton farmers?
iii. What are the major challenges of input loan facilitation through ginners?

iv. What factors are responsible for cotton farmers to default input loan?

1.5 Limitation of the Study

The study is based on the assumption that the sample of interviewed cotton farmers in villages is a fair representation of farmers' business groups because of their homogeneous characteristics in cultural and socio-economic status. Some respondents are not willing to give information on the amount of credit they owe to ginners while others are difficult to be located.

Most of the farmers are afraid of being detained and brought to the magistrate court for defaulting loan repayment. Farmers' business groups are not well advanced in record keeping. The accuracy of most of the data collected depends on the data available and the ability of farmers to recall. However, the strength and weakness of the data were balanced by conducting lead farmers group discussions.

When collecting data from ginneries, persons in charge tend to hesitate on providing actual information related to cotton purchases, deliveries and other transaction costs. It is assumed that most ginners operate their business transactions on confidential terms; in order to avoid some payments on local government authority cess, cotton development trust fund levy and other government taxes. It is counteracted by interviewing more than one person in the ginneries. Therefore the researcher believes that the findings represent a true picture and recommendations made are relevant to planners, stakeholders and policy makers in the cotton industry in Tanzania.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1. Cotton Agronomy and History of Inputs Supply to Farmers

The study done by Musara *et al.* (2011) shows that cotton is generally a capital and labour intensive crop and its production is based on the ability of farmers to manage production cost throughout the season. According to Dawes (2008) the correct timing of farm operations is important to ensure maximum productivity. Inputs must be distributed at the right time to meet the peak period of use. Late supply of cotton seeds, application of agrochemicals, delayed weeding and cultural practices such as thinning can all negatively impact on yields.

Cotton is vulnerable to pests, especially when grown as a monoculture, resulting to significant use of agrochemicals and raises production costs, environmental and health risk to farmers. This is compounded by the need of family and hired labour to meet timely agronomic operations, hence contributing to increased transaction costs (Musara *et al*, 2011).

Bargawi (2008) denoted that cooperative unions were in charge on inputs provision through the village primary societies in 1970s and early 1980s. Their ability to supply these inputs came under increasing difficulty as financial woes intensified. A substantial reduction in aid from donor countries led to a drastic decrease of imports on agricultural inputs, including pesticide and fuel. With liberalization of Tanzania economy, the provision of agricultural inputs to farmers shifted to private sector. The increase of new traders in the industry has encouraged competition, which acts as a catalyst to increase production thus building a more competitive market system.

Stakeholders in the cotton subsector became aware on the current marketing system of cotton to be incompatible with the traditional system of inputs provision through the cooperative unions. Therefore a new framework for seed and pesticide provision in particular needed to be established, and came in 2000 in the form of the Cotton Development Fund (CDF). In this input scheme, farmers contributed a certain amount of money after selling cotton and ginners paid a certain levy equivalent to the quantity of cotton purchased. Farmers' received stamp in their passbook which entitles them to a value of seeds or chemical the next year proportional to the amount of cotton they sold (Kabwe and Tschirley, 2007).

In his initial report Bargawi (2008) highlighted that the distribution and access of these inputs shows some unevenness. There were problems related to ginners noting the incorrect amount in producers' passbooks, which limits their access in the following year. This is exacerbated by many producers' inability to read and write and therefore to verify the information noted down by ginners. Furthermore, CDF was unable to provide inputs unless cotton was produced in the previous season, making it difficult for those in more erratic production areas to participate in the scheme. As most farmers did not have access to credit to finance the purchase of inputs at market prices, use of inputs declined sharply resulting in lower yields. The collapse of input distribution scheme was most dramatic for insecticides, as the heavy competition for cotton made input credit recovery risky. Even seed distribution faced major problems, as investment in oil mills increased the processing capacity in the main production zone by 50%; with many ginners deciding to sell more seed to oil mills. The relatively easy entry for private actors favoured the emergence of small – scale traders not interested in providing credit on inputs (George, 2012).

2.2 Reforms in Cotton Industry and Input Distribution

Tanzania has embarked an ambitious path to comprehensive reform on its cotton sub-sector in an attempt to address the productivity and quality problems that have long prevented to exploit fully its potential (Tschirley *et al*., 2009). Institutional reforms on marketing and trade policies were done as part to reduce challenges through enactment of cotton industry legislation Act No. 2 of 2001 and amended Miscellaneous Act No. 20 of 2009. Section 5 (1) of the Act stipulates all functions of the Board on regulation, promotion, monitoring, advisory, coordination, protection, facilitation and representation of stakeholders in the cotton sub sector (Mwinuka and Maro, 2013).

Tanzania's cotton sub-sector is characterized by a high degree of competition ever since complete liberalization in 1994. According to George (2012) there is a large number of licensed seed cotton buyers amounting to more than 40, of which the top five accounts for about 40% of seed cotton purchases. However, the sub-sector has performed poorly in assisting producers to access quality inputs and extension services. Tschirley *et al*. (2009) developed the idea that economic systems benefit from both competition and coordination, but in the real world of imperfect markets and weak states there is likely to be a trade – off between them. The competition axis is based on the structure of the market for purchase of seed cotton and the regulatory framework in which farmers and firms operate. There is strong evidence that competitive sectors are more likely to undermine the provision of inputs credit and some level of extension advice, while repayment among farmers being low compared to concentrated sectors.

Various interventions on policy and project level have been implemented by the government of Tanzania to improve the cotton sub-sector, but there has been a continuous decline in access to agricultural inputs and declining output prices in remote areas

(Rweyemamu 2003). Persistent ginners under invest in production, which is compounded by under investment of growers themselves; either for lack of access to finance or preference of low – input extensive production, as a mitigation strategy against price and weather risk. Lack of transparency on transactions and investment within private partnership program exacerbated the whole saga (Coles *et al*., 2011). Establishing a link between sector organization and its contribution to poverty reduction is particularly difficult as such a contribution may always be mediated by exogenous factors.

The cotton stakeholders began to take a series of initiatives to stem the tide of decline, with the formulation of Cotton Sub-sector Development Strategy (CSDS I) in 2000 complemented by Mwanza Resolution (TCB, 2010). The second Cotton Sub-sector Development Strategy (CSDS II) adopted in the year 2010 intended to address these challenges by working with other stakeholders. Some of the measures taken include the introduction of contract farming and a specific industrial strategy for the development of textile and garment industries to process cotton fibre and yarn locally (Mwinuka and Maro, 2013). The aim is to improve the operational efficiency of the cotton sub-sector in order to have a self-regulatory framework in a competitive market structure; and increase cotton production capacity from the current 700 000 bales to 1 500 000 bales by the year 2015.

Some weaknesses were realized in CSDS I&II and Mwanza Resolution, with the lack of an elaborate operational plan on the responsibilities and obligations of stakeholders. The cotton industry implementation plan (CIIP) 2010/11 to 2014/15 was established as cotton stakeholders' joint plan of action in the implementation of CSDS II. CIIP interprets the goals, objectives and targets of CSDS II, with respect to every stakeholder, into quantifiable programs, projects and activities, and their related cost estimates (TCB,

2010). CSDS I, CSDS II and CIIP were expected to boost the performance of the sub sector, by improving the cotton yields from the current 750 kg per hectare to 1 500 kg per hectare by 2015.

2.3 Contract Farming as a Tool for Input Supply to Farmers

Contract farming is increasingly gaining reputation in the eyes of development partners on maximizing the inclusion of benefits for smallholder farmers in the value chain. Melese (2012) has shown on the confinement of contract farming to the attention of the private sector; as it provides tools which enables to respond efficiently to changes in the global arena; driven by competition, consumer demand and domestic policies that require strict quality standards and corporate social responsibility for the business to retain its viability.

Contract farming was first promoted in western cotton growing areas by Rural Livelihood Development Company (RLDC) in 2006/07 cropping season. Its project incentivized five ginning companies to mobilize farmer groups for contract farming and providing them with a range of services such as inputs, implements, extension and storage facilities on credit basis. It demonstrated that contract farming could be an effective means of tackling the main bottlenecks of the subsector (George, 2012).

The Tanzania Cotton Board and the Tanzania Gatsby Trust, a subsidiary of the Gatsby Charitable Foundation entered into an agreement to improve cotton subsector with a wide range of sub programs. Although the other goal of this agreement was to improve the production and price which would result into increase in overall income of the small scale growers, the government on its side would also benefit by collecting taxes and export of cotton (Valerian, 2012). In 2008/09, a pilot project was launched in three districts of Mara

region; namely Bunda, Musoma Rural and Serengeti districts; and later the project was scaled up to include Bariadi and Kibondo districts. By 2010/11, TGT had linked over 37 951 farmers to seven major ginning companies (George, 2012).

2.4 Contractual Agreements

Contract Farming is one of the public private partnership programs implemented in Tanzania. Vermeulen and Cotula (2010) describes contract farming as an agreement between two parties; cotton farmers on one hand and ginning firms on the other. Usually local farmers grow and deliver agricultural produce in the specified quantity and quality at an agreed date. In exchange, the company provides upfront inputs on credit such as seeds, fertilizer, pesticides and technical advice and agrees to buy the produce supplied, usually at a specified price.

Most of the companies contract farmers who grow cotton which is an annual crop; and therefore have seasonal contract agreements (Dawes, 2008). The agreements entered are voluntarily with the intention of creating a legal obligation, which may have elements in writing. For the relationship to be successful, proper management and administration of the contract need to be exercised. This involves planning, organizing, coordinating, managing production, identifying suitable areas and organizing farmers into working groups (Eaton and Shepherd, 2001). The aim of contract farming was to find solutions that are based on mutual trust, and in order to be sustainable such agreements must be linked to the win-win situation.

The government support is another essential consideration, which includes political stability, general legislation, industry regulation, public utilities, community services and quarantine controls. The government is responsible to observe crop schedules, pricing

policies, extension services, contract formats, farmers' group formation, farmers' forums and research trials. Monitoring the program operations is important in order to provide feedback to both farmers and ginners, which may include contractual adjustments, innovations as well as adoptions (Valerian, 2012).

2.5 Formation of Farmers' Business Groups

Tanzania has a long history of producers' organizations; at the village-level there were primary societies and above was a second tier of organizations called cooperative unions (Uliwa and Fischer, 2004). At the national level, there was a national federation of cooperative unions, crop marketing boards for the export crops and parastatal processing industries for domestic products. Although this system has collapsed for many years, the remnants continue to affect any new initiatives to develop farmer owned producer organizations. Cotton growers across the western cotton growing areas were called upon to organize into farmers' business groups (FBGs), each comprising of between 50 and 70 cotton growers. With funding from TGT, district task forces were formed in 26 cotton producing districts to sensitize farmers and register newly formed groups. The fieldwork was carried out by Ward Agricultural Extension Officers (WAEO) under close supervision of Tanzania Cotton Board; and at the end of November 2011, 9 829 FBGs had been formed. Dawes (2008) has shown that group contracts place the responsibility for motivating farmers on the group leadership who may apply peer pressure to individuals to ensure compliance. Another advantage of group contracts is that they ensure that the contract has the support of the community leadership.

Techno serve, as a hired professional trainer using a TOT approach, was in place to build the capacity of FBGs on agricultural business management and good agronomic practices. The vision was to make the groups creditworthy and commercially viable agribusiness

entities, with leadership empowered to make marketing, investment and production related decisions on behalf of their respective members. FBGs would negotiate contracts with and collect, bulk, store and transport cotton to ginners, and reduce transaction costs of service delivery to farmers.

In order to avoid the problem of side selling and credit default that had ridden past experiments in contract farming, TCB opted for a particular type of zoning system in implementing its new policy. The approach consisted of dividing the western cotton growing areas into 12 clearly delimited zones. Ginners were invited to express their interest, and licensed to enter into production contracts and purchase seed cotton in a maximum of five zones. Ginners compete for contracts in their allocated zone on the basis of inputs and services they are able to provide. Farmer business groups provide a collective action and are a possible way of reducing transaction costs through improving production, marketing and livelihood (Fischer and Qaim, 2011). Getting together with others also can allow individuals to better cope with risk, particularly when neither the private sector nor the government provides any means of insurance against risk (Kariuki *et al*., 2004).

2.6 Cotton Companies Operation on Input Loan Delivery

Zoned cotton companies become the sole providers of credits to farmers by pre financing all their direct costs of growing cotton including land preparation and input costs. According to George (2012) ginners capitalize production through input loan; deliver embedded services such as extension support and farm machinery. The group leaders are in charge of distributing inputs and implements from ginners to the FBG members. Siliki (2010) stipulates that with the additional resources and determination, smallholder

farmers can set up viable income generating activities in order to reduce their vulnerability and combat poverty.

The operations of cotton companies in seed cotton production involve a huge investment of funds, especially in pre-financing farmers (Issah, 2011). Inputs loan management must attempt to balance profitability and liquidity. Many business organizations that extend credit facilities to their customers liberalize their credit terms to generate more sales, but towards possible profit. The lower the credit recovery, the greater will be the amount of defaulters and the larger the possible strain on the ginning firm's liquidity (Dawes, 2008).

2.7 Challenges on the Provision of Input Loans to Contracted Cotton Farmers

2.7.1 Production and marketing risks

Agricultural income is generally considered to be volatile due to its vulnerability on production and market risks (Weber and Musshoff, 2012). Many ginning companies provided cotton farmers with inputs support on belief they would improve yields through increased inputs availability.

It was noted that the yield values reflected the situation at a single site thus were not necessarily a true representation of the entire smallholder cotton production base. Dawes *et al*., (2009) revealed that farmers were producing less than 50% of the yield potential for cotton. The poor performance of smallholder cotton producers can be linked to three main reasons; resource limitations, poor agronomic management, lateness of operations and weather associated risks. This affects the share of income available for loan repayment by borrowers, which can lead to higher loan defaults.

2.7.2 Extra contractual marketing channels

It describes the practice when a contracted cotton farmer sells the produce to a third party in breach of contractual agreement. The main reason was related to price, as farmers were tempted to sell outside the contractual agreement when competitors offered more money than the contracting company. By harvest time, many farmers have no access to income for a long period and side selling is more likely when there is an urgent requirement for the money; and hence results to partial deliveries to companies which were actively collecting the produce on the buying posts. The remainder of the crop is then sold locally at or below the farm gate to assist cash flows until the arrival of company payments (Dawes *et al*., 2009). Also, farmers with very low yields are unable to repay their input loans and when faced with the prospect of indebtedness they will often choose to sell the crop elsewhere. Low yields also result on farmers becoming dissatisfied with the contract price.

Side selling is a major problem in western cotton growing areas in Tanzania, with 60% of the ginning companies being affected by the incidence on the harvested cotton produce (Mwinuka and Maro, 2013). It results in the reduction of quota delivery to the company, decreased processing efficiency and increased production costs.

Swinnen *et al.* (2011) argues that in the absence of a formal enforcement mechanism, contract compliance can be ensured only by making the contract self-enforcing. This implies that ginner might have to increase the price paid to cotton farmers so as to incentivize the latter to comply with the contract. The farmer will participate in the contract if the expected return exceeds the payoff from compliance, and is at least higher than payoffs from inputs diversion and side selling.

2.7.3 Ginners exploitation on business monopoly

When farmers operate in the environment in which a ginner has monopoly, the business practices of the company can have negative tendencies. According to Minot (2011) contract farming seems to be exploitative because of unequal relationship between farmers and large agribusiness firms. In such circumstances the government should have a role in harmonizing the situation in order to protect the interest of farmers. Eaton and Shepherd (2001) suggest that the ideal venture should be private in a well-managed monopoly under strict public regulation.

2.7.4 Political interference at the expense of contract agreement

Local political support is very important because there is a danger of contract farming operations being derailed when politically connected farmers become discontented with the company. Dorward (2009) argues that political economy difficulties are particularly problematic in poor rural societies, as the potential personal and political gains from inputs credit are very large relative to other income opportunities, so incentives for political manipulation are strong. Another possible scenario is political authorities wanting to gain popularity at the expense of the contract agreement (Dawes *et al*., 2009).

2.8 Inputs Loan Repayment in Cotton Subsector

The cotton farmers are expected to pay the cost of inputs through seed cotton they in turn offer to the company during the purchasing season. The group is responsible to buy seed cotton from its members where one of the group members apply for the position of an agent and being given capital to buy seed cotton from farmers (Dawes, 2008). The ability of a farmer to pay back the loan depends to a large extent on the volume of seed cotton produced for sale to the company supplied credit. Loan repayment conditions offered by

the program have a great influence on the sustainability of the revolving inputs and on relationships with the farmers (George, 2012).

Rweyemamu, (2003) showed that the interlocking of input and output transactions is a common way of raising repayment rates. In a stable economic environment it is possible to advise farmers on the price they can expect during the marketing season. This is a good practice which enables farmers to calculate cash-flows and potential profitability. However, Dawes (2008) shows that it is not possible under unstable prevailing cotton market prices; and farmers are often left at the mercy of the contracting company. The value of inputs set against revenue of outputs has made its use unprofitable, making it too expensive to recoup the cost. Weber and Musshoff (2012) noted that it needs to be combined with a degree of competition among traders to maintain attractive output prices for producers. The sharing of information on previous default plays a key role here, as it builds a working relationship based on trust.

2.9 Theoretical Framework on Input Loan Repayment

The recent theoretical work in economics done by Kohansal and Mansoori (2009) show that lenders lack sufficient information from being able to discriminate between high and low risk clients. Due to this, the lender places all borrowers in one risk group, and charge the same interest rate. If the markets were perfect, the lender would separate them into two groups with two different interest rates respective of their risk.

Simtowe *et al.,* (2008) reported that prior to the use of micro credit; farmers in developing countries were faced with the problems of credit rationing. At a given interest rate a borrower would like to borrow more, but is refused by the lender. Though low interest

rate seems like a positive effect, credit rationing reduces the potential for poverty alleviation, as it provides less credit than the market equilibrium dictates.

Natarajan (2004) revealed that borrowers have little wealth to put forward as collateral, hence there is little way for the lender to recoup their costs in the event of default. The borrower may have sufficient incentive to run off with the loan and not pay back the lender if he knows the lender will have difficulties in finding him. The author also suggested that there is always the risk of involuntary default where unexpected events may prevent the borrower from repaying the credit. Such events may be associated with previous season's weather, changes in global prices and prevailing policy and political dispensation processes which may affect the decision making of the borrower.

Rweyemamu (2003) suggested that some group-lending model like the Promotion of Rural Initiatives and Development Enterprises (PRIDE) – Tanzania, cannot be easily applied to rural areas. This is due to high costs of operations, the population is more scattered and demands frequent meetings with borrowers.

2.10 Review of Similar Studies Using Probit Model

Loan delivery to clients is a risky operation, and calculating the probability of returning a loan needs a sound statistics and econometrics to be applied (Vasilev, 2014). In order to find an appropriate model, a comparison of binary logit and probit models was done (Cakmakyapan and Goktas, 2013). Both models are appropriate when the dependent variable is binary, but probit models is most widely used in institutions dealing with credit provision. Probit model is part of the qualitative response regression, in which the dependent variable for the probability of returning a loan has two values of 1 for defaulters and 0 for non-defaulters.

Vitor (2012) employed probit model to investigate factors that influence farmer's loan repayment default in Brong Ahafo region of Ghana. The results showed that farm size, and engagement in offfarm income generating activities reduces the likelihood of loan repayment default significantly. Also, larger loan amount and longer repayment period as well as access to training are more likely to reduce loan repayment default.

Wongnaa and Vitor (2013) analyzed the factors that are critical in improving loan repayment by yam farmers in the Sene district of Ghana using probit model. The results show that education, experience, profit, age, supervision and off-farm income have positive effects on loan repayment performance. Conversely, gender and marriage have negative effects on loan repayment while the effect of household size was found to be ambiguous.

Vasilev (2014) looked on the approach of calculating the probability of returning a loan by applying probit and logit models in loan management institutions. It is proved that the month of signing a contract, the year of signing a contract, the gender and the age of the loan owner do not affect the probability of returning a loan. It is proved that the probability of returning a loan increases with the increase of the given sum, decreases with the proximity of the customer, increases for people born in the beginning of the year and decreases for people born at the end of the year.

2.11 Synthesis of Reviewed Literatures on Input Loan Repayment

From the empirical literatures reviewed, numerous factors have been identified to influence loan repayment. All the studies reviewed were conducted in different socio-economic activities, cultural environment and geographical locations which possibly can

influence the repayment rate of loan beneficiaries. Considering the socioeconomic and environmental uniqueness across the areas, it is therefore necessary to carryout thorough study on various aspects of loan default because of its importance to farmers, policy makers and ginners.

Hence, the major concern of this study is supplementing previous research and bridging the knowledge gap through replication of the study in Bariadi district, which produces a large share of cotton in western cotton growing areas. According to Onyeagocha *et al.,* (2012) one way to tackle the loan repayment problem is to examine the factors which affect it.The aim is to ascertain major factors on farmers' personal and farm attributes, other income generating activities, input loan requisition, use and repayment that affect loan repayment capacity of cotton farmers.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Conceptual Framework

The government of Tanzania promotes the necessary strategies towards the transformation of cotton subsector. The approach is designed through the public private partnership being implemented with cotton stakeholders; particularly the local government authorities, the private sector and farming communities. The strategies are embedded on major reforms on regulations, licensing, institutional framework and the development of markets for key agricultural inputs.

Stakeholders meeting in May, 2011 agreed to roll out contract farming model on the provision of input to cotton farmers starting in the 2011/12 cropping season as demonstrated in figure 1. The regulatory framework for operations of the program was managed by TCB, TGT, CDTF and local government authorities.

All information of the transactions was recorded into the PambaNet database to aid all stakeholders keep track of reciprocal commitments and the enforcement of regulations and monitoring. PambaNet was also used to send text messages to FBG leaders' mobile phones in order to keep growers informed on prices among other things.

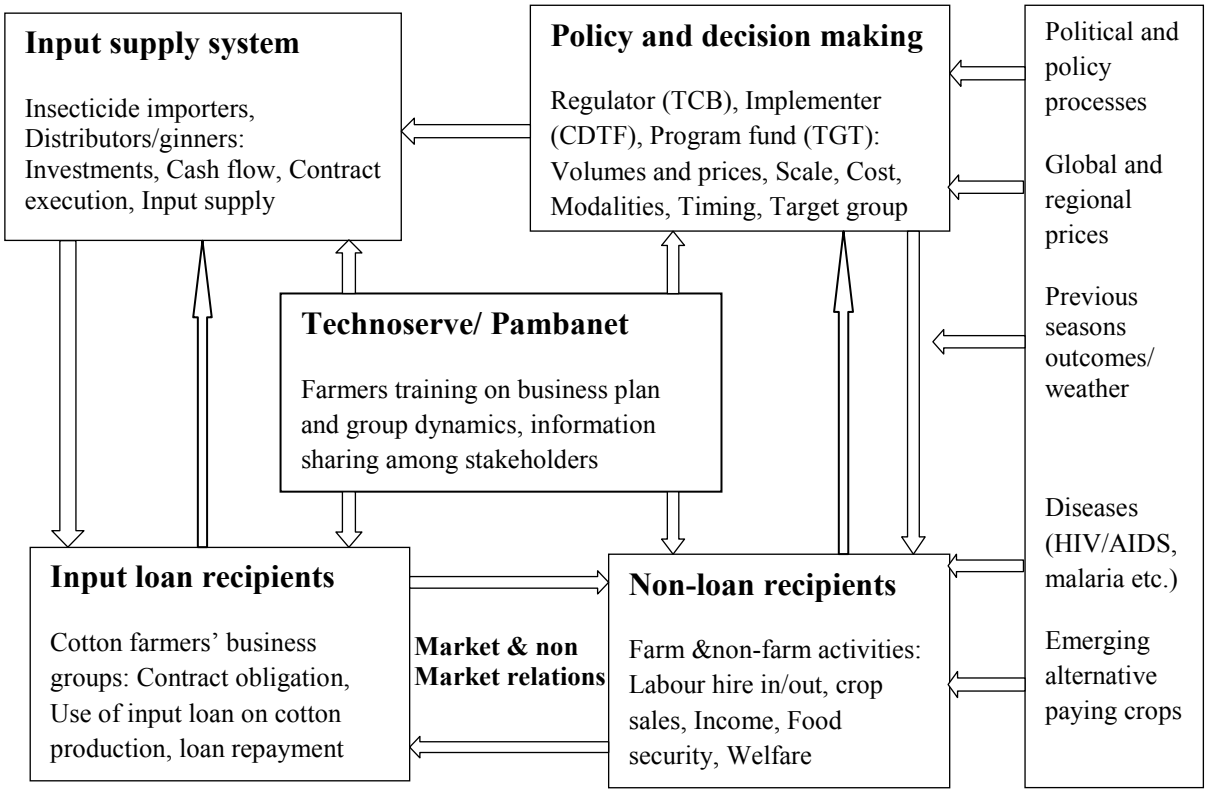

Figure 1: Inputs distribution under contract farming model
Source: Adopted and modified from Dorward (2009)

Under contract farming arrangement, farmers obtain input loans through their respective FBGs. Based on the above model for input loan delivery, the conceptual framework for this study was hypothesized. This paves the way to get on modelling factors for repayment of input loans in contract farming configuration.

Variables of concern which have influence on repayment of input loan by smallholder cotton farmers were derived, indicating the direction of their relationships. The dependent variable in this study is input loan repayment, which is related to independent variables included in the econometric model as indicated in the following conceptual framework in figure 2.

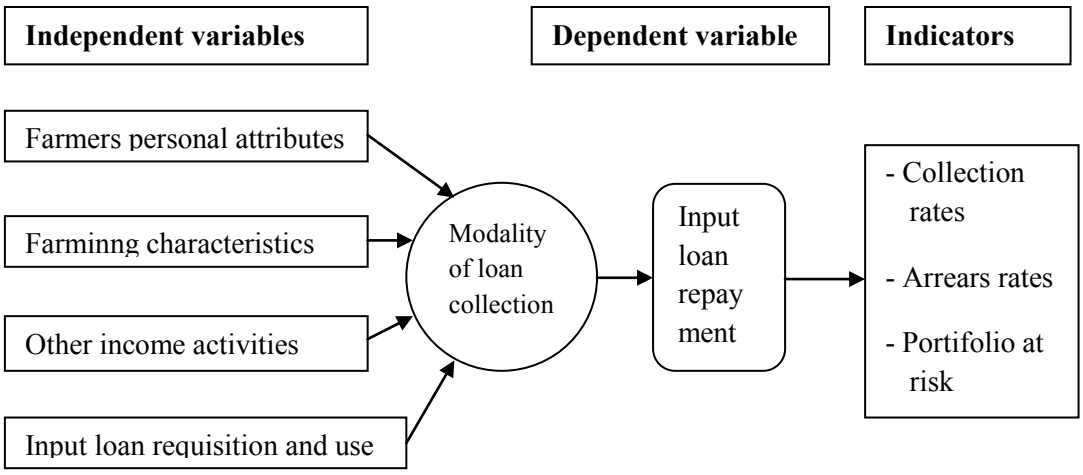

Figure 2: Conceptual framework on input loan repayment

3.2 Research Design

The study adopted a cross sectional descriptive survey design using quantitative approach to data collection. The design consists of asking questions from a selected representative members of the farmers' business groups at a single point in time.

The aim is to determine the current situation of loan portifolio with respect to variables under investigation and ensured complete description of the situation. According to Cooper and Schindler (2008) stipulates on minimizing bias in the collection of data and obtain the needed sample of respondents in an economical way.

3.3 Description of the Study Area

Bariadi District is one of the five districts of Simiyu Region in Tanzania. The district is located between Latitudes 2^0 60' and 3^0 85' South of the Equator and Longitude 33^0 10' to 35^0 22' East of Greenwich as indicated in fig.3. The total area covers 9 446 km^2 (944 570 ha) of which 4 592 km^2 (459 170 ha) is arable land suitable for agriculture and livestock keeping. According to 2012 census, the district population size was 736 810 inhabitants;

with population growth rate of 2.15% and average household size of seven members (URT, 2013).

Bariadi is a leading producer among the 26 cotton-growing districts in the western cotton growing areas. Most farmers engage in cotton cultivation and it contributes 70% of the income generated in the district. This has been possible due to the existence of varying ecological zones, fertile soils and intensive use of ox-drawn ploughs which promote increase in cotton production.

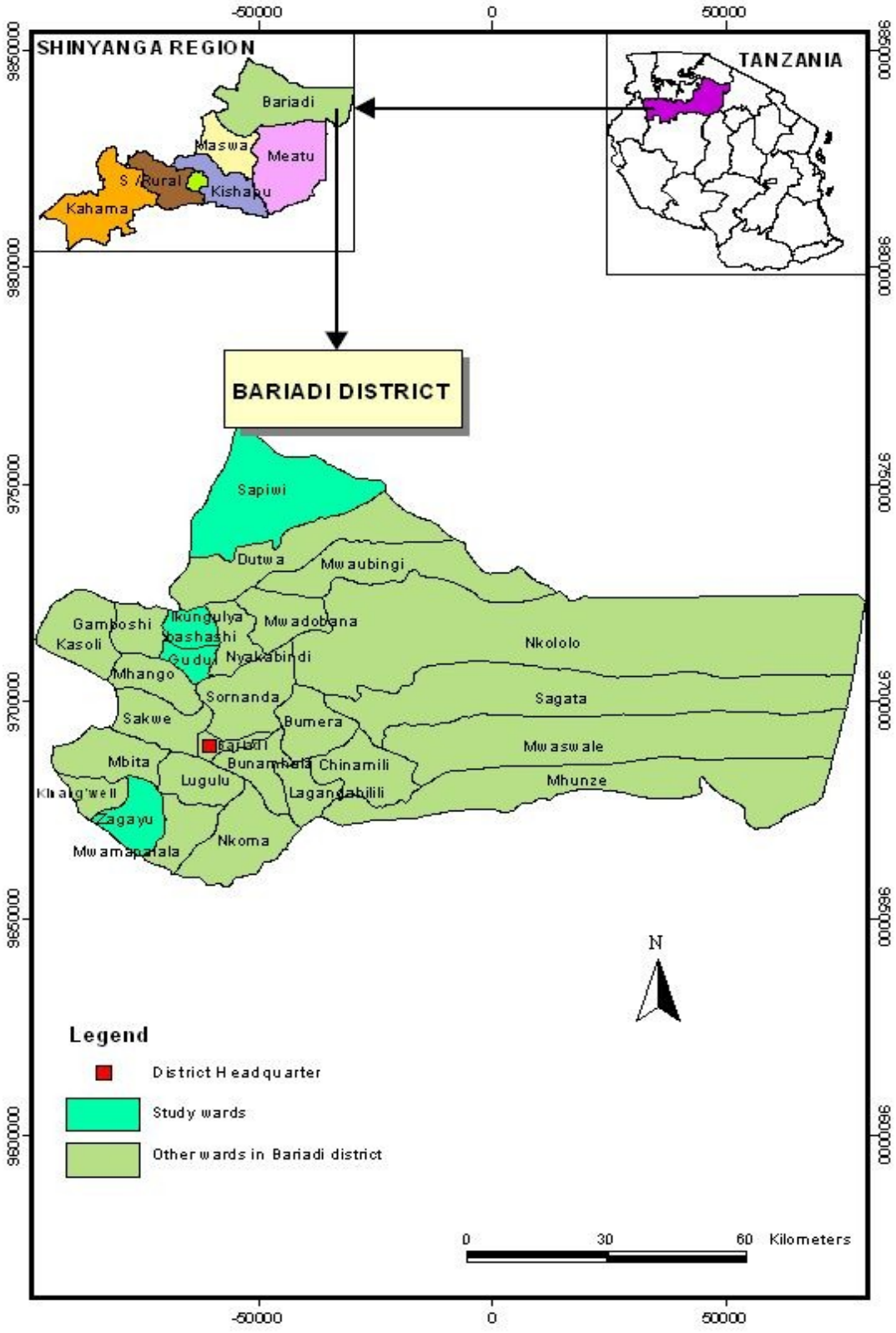

Figure 3: Map of Bariadi district showing geographical distribution of study wards

3.4 Sampling Procedure

The study had two phases:

(a) The first phase constituted on pre-testing of questionnaires to cotton farmers, where 16 input loan recipients were randomly selected from Kashishi village in Zagayu ward. The aim was to check the relevance and validity of the questions to the intended respondents. The errors revealed from some of questions during pre-testing were corrected and incorporated into the questionnaire.

(b) The second phase was based on formal survey, which involved interviewing respondents using a semi-structured questionnaire. Purposive sampling was used to get four wards; namely Guduwi, Ikungulyabashashi, Sapiwi and Zagayu. Two stage stratified sampling was employed to obtain respondents depending on the proportion of loan due owned by farmers to the total loan received for each ward (Table 1).

Table 1: Sample wards and the number of respondents

Ward	Default proportion	Total number of respondents
Guduwi	0.2855	32
Ikungulyabashashi	0.4359	48
Sapiwi	0.0588	6
Zagayu	0.2198	26
Total	**1.0000**	**112**

The sample size of 112 respondents was assigned to 11 villages and 23 loaned farmers' business groups involved in contract farming in Bariadi district for 2011/12 cropping season. It based on the percentage of default and recovery of input loan, categorized into 70 defaulter and 42 non-defaulter farmers (Table 2).

Table 2: Sample distribution of villages, FBGs and category of loaned farmers

Ward	Villages	Names of FBGs	Defaulter	Non-defaulter	Total
Guduwi	Ditima	Ditima madukani	4	1	5
	Guduwi	Guduwi madukani, Upendo	11	4	15
	Mbugani	Mbugani centre	4	7	11
	Yeya	Lead farmer	1	0	1
I/bashashi	I/bashashi	Balimi, Mapambano, Uhuru, Upendo	19	6	25
	Lulayu	Igunabahabi, Mwabalimi, Mwendamkono	5	3	8
	Mkuyuni	Nguvukazi, Mwenge, Mkombozi	6	9	15
Sapiwi	Igegu	Ngemelo	4	2	6
Zagayu	Kabale	Tuamke, lead farmer	0	3	3
	Mlimani	Ukombozi Lubaga	1	3	4
	Zanzui	Jembe ni mali, Ukombozi A, Pamba dhahabu nyeupe, Igembensabo	15	4	19
Total	**11**	**23**	**70**	**42**	**112**

3.5 Data Collection

3.5.1 Primary data

Primary data were collected from respondents through formal personal interviews using semi-structured questionnaire (Appendix 1). It is composed of both open and close ended questions which were asked to cotton farmers, FBG leaders and lead farmers who received inputs on credit. Open ended questions were used to get in depth information from the respondents. The questions focused to obtain information on farmers' personal and farm attributes, other income generating activities, input loan requisition, use and repayment for the 2011/12 cropping season.

3.5.2 Secondary data

Secondary data were obtained from four cotton ginning companies; namely Alliance Ginning Co. Ltd, NGS Investment Co. Ltd, Nsagali Co. Ltd and Olam (T) Ltd. These ginners provided input loan to cotton farmers' business groups for 2011/12 cropping

season. The information collected was related to the amount of loan disbursed to farmers, loan paid back to lenders and cotton deliveries obtained from research areas.

3.6 Data Analysis

3.6.1 Descriptive statistics

Descriptive statistics such as charts, frequency tables, means, standard deviations and percentages were computed to summarize the data collected from variables of the sampled respondents. Chi-square and t-test techniques were the fact statistics employed to compare defaulters and non-defaulters on various explanatory variables.

3.6.2 Model specification

The choice of explanatory variables considered for inclusion in the analytical loan repayment model was guided by evidence from past studies on loan repayment behaviour and hypothesized relationships with the dependent variable. Once a farmer faces a choice, he has a reaction threshold yielding a binary dependent variable which takes on the value of 0 if the farmer honour his loan obligations and 1 if he defaults. The study adopted probit as the analytical model, using Stata 11 software, because of its ability to constrain the utility value within 0 and 1.

A latent variable is assumed to exist as shown in equation 1

$$Y_i^* = \alpha + \sum_{i=1}^{n=20} (\beta_i X_i + \delta_i D_i) + \varepsilon_i \quad \text{.....(1)}$$

$$\varepsilon_i \approx N(0, \sigma^2)$$

Where:

Y_i^* = threshold value of input loan defaulted,

X_i = continuous explanatory variables,

D_i = dummy explanatory variables

β_i and δ_i = estimated coefficients of continuous and dummy explanatory variables

α = Constant

ε_i = error term.

The observable outcome of the binary choice problem is represented by a binary indicator variable Y_i that is related to the unobserved Y_i^* variable as indicated in equation 2.

$$Y_i = \begin{cases} 1 \; if \; Y_i^* > 0 \\ 0 \; if \; Y_i^* \leq 0 \end{cases} \quad \text{.....(2)}$$

The probability of farmers to default their loan is given in equations 3 (a) and 3 (b).

$$\Pr(Y_i = 1 | X_i) = \Pr(Y_i^* > 0) \quad \text{.....(3}a\text{)}$$

$$\Pr(Y_i = 1 | X_i) = \Phi(\alpha + \beta_i X_i + \delta_i D_i) \quad \text{.....(3}b\text{)}$$

Where Φ represents the cumulative normal distribution function.

Since the probit model measures the change in the unobservable Y_i* associated with a change in explanatory variables; the magnitude of coefficients is interpreted using marginal and impact effects.

The marginal effects of a probability on loan default when there is a small change of continuous explanatory variables are expressed in equations 4 (a), 4 (b) and 4 (c).

$$\frac{\partial P(Y_i = 1 | X_i)}{\partial X_i} = \frac{\partial [E(Y_i)]}{\partial X_i} \quad \text{.....(4}a\text{)}$$

$$\frac{\partial \Phi(\alpha + \beta_i X_i + \delta_i D_i)}{\partial X_i} \quad \text{.....(4}b\text{)}$$

$$\phi(\alpha + \beta_i X_i + \delta_i D_i).\beta_i \quad \text{.....(4}c\text{)}$$

Where ϕ denotes the standard normal probability density function on loan default.

The impact effects of a probability on loan default under a small change of dummy explanatory variables is the difference when D=1 and D=0 as specified in equations 5(a), 5(b), 5(c) and 5(d).

$$\Pr(Y_i = 1 | X_i) = \Phi(\alpha + \beta_i X_i + \delta_i D_i) \quad \text{.....(5}a\text{)}$$

$$\Pr(Y_i = 1 | D = 1) = \Phi(\alpha + \beta_i X_i + \delta_i) \quad \text{.....(5}b\text{)}$$

$$\Pr(Y_i = 1 | D = 0) = \Phi(\alpha + \beta_i X_i) \quad \text{.....(5}c\text{)}$$

The impact effect of change= $[\Phi\ (\alpha + \beta_i X_i + \delta_i) - \Phi\ (\alpha + \beta_i X_i)]$ …….. (*5d*)

3.6.3 The definition of variables used in probit model

There are a variety of variables which are involved in the study; a brief explanation of variables and their likely influence on inputs loan default are presented below.

Dependent variable (Y_i*)

The dependent variable of the probit model for this study is the latent value of input loan cotton farmers defaulted during the given period of repayment. The borrower farmers who did not repay their loans are considered as defaulters and take the value of 1. On the other hand, those farmers that repaid all the borrowed input within the stated period are considered as non-defaulters and take the value of 0.

Independent variables

Age of the respondent farmer (X_1): It is the number of years of the respondent farmer since birth to when the survey was conducted. It is a continuous variable measured by years. Increase in age may prompt farmers to accumulate more wealth than younger ones. This variable is considered to have a negative impact on loan default by respondents. However, it happens when there is insufficient labour in the households, older farmers in

rural areas are discredited in undertaking heavy physical labour required in cotton production. Each additional unit increase in age after some point would thus add less to household income leading to high rates of loan default. Hence, the expected effect of age on loan default could be negative or positive ($\beta<0$ or $\beta>0$).

Marital status (D_1):

It is a dummy variable represented by 1 if the respondent is married, 0 if is single, divorced or widowed. It is assumed that married respondent farmers can handle and manage their farm activities and social duties better than those who divorced, widowed, or single. Therefore, married respondents repay their loan more actively than those who are divorced, widowed or single ($\delta<0$).

The education level of the household head (D_2): This is a dummy variable measured by 1 whether a respondent farmer attended to formal schools and 0 did not attend. Education may enable farmers to be more aware of the importance of formal loan and hence may reduce deliberate default. Therefore, *ceteris paribus*, education is expected to reduce the rate of loan default ($\delta<0$).

Family size (X_2): It is a continuous variable, which denotes a number of family members residing with the respondent available to use as labour force in farming activities. Based on this, families with sufficient labour-force would be expected to have a low probability of defaulting. Contrary, since the food requirements increase with the number of adult equivalent in the family, most of the produce is used for consumption as the number of family members relatively increase. It is expected that family size increases loan default of farmers (Mijena, 2011). The coefficient of this variable may appear with negative or positive effect on loan default of respondent cotton farmers ($\beta<0$ or $\beta>0$).

Experience in farming cotton (X_3): It is a continuous variable which shows the number of years in which respondent farmers have been involved in the enterprise of cotton production. Through time cotton farmers acquire experience in the farming business and loan use. Therefore, this variable is considered to have a negative impact on loan default of respondents ($\beta<0$).

Land cultivated cotton during 2011/12 season (X_4): It refers to individual farm holdings (in hectares) of respondent farmers cultivated with cotton during the stated period. It is argued that farmers with large farm size have better chance of earning more income which in turn enables them to repay input loan. This variable is hypothesized to have negative impact on loan default ($\beta<0$).

Amount of seed cotton harvested (X_5): It is a continuous variable which depicts to the amount of seed cotton harvested (kg) by respondents from the cultivated farms during the 2011/12 cropping season. It is argued that farmers who obtained sufficient seed cotton generated more income which enables them to repay their loan. Thus, it was hypothesized to be negatively related to loan default ($\beta<0$).

Regular access to extension services (D_3): This is a dummy variable, which takes a value 1 if the respondent farmer receives extension service and 0 otherwise. It is hypothesized that this variable influences negatively loan default ($\delta<0$).

Other income generating activities (D_4 & D_5): This is defined as the participation of respondent farmers in income generating activities other than cotton production, which may include rearing of animals, petty trading, maize production and casual labour. It is a dummy variable which takes the value of 1 if yes and 0 if the answer is no. Most

probably, repayment starts immediately after a peak harvesting time when the price of cotton is low. During this time, farmers who practice other income generating activities can easily repay their loan on time than those who do not. It is assumed that the variable has a negative impact on loan default ($\delta<0$).

The input loan supplier company (D_6): It is a dummy variable which shows the level of commitment of ginning companies on credit delivery to sampled respondent farmers. The company is valued 1 if it is NGS Investment Co. Ltd and otherwise is 0. Most of the respondents received their input loan from this ginner, and according to the level of repayment we expect to have a positive impact on default ($\delta>0$).

Type of inputs farmers received (D_7): It is a dummy variable which denotes on the type of inputs farmers received on credit from ginners. It takes the value of 1 if insecticides and 0 otherwise. The value of insecticides recommended for a minimum input package (MIP) per acre is low and affordable than when in combination with other types of input. With this variable, the assumption is to have a negative impact on loan default ($\delta<0$).

Total value of input loan (X_6): It is the sum of the value of all input loan (Tshs) respondent farmers received from ginners. Usually, it encompasses inputs supplied under MIP and other farm operation costs agreed upon between respondent farmers and ginners. If the amount of loan released is enough for the purposes intended, it will have a positive impact on the borrower's capacity to repay. If the amount of the loan exceeds what the borrower needs and can handle, it will be more of a burden than help and extra funds may go toward personal use, thereby undermining repayment and the expected sign is positive ($\beta>0$).

Sufficiency of input loans received (D_8): It refers to how farmers reflect on the quantity inputs supplied by ginners to meet their farm requirements. Easy accesses of input loan motivate farmers to produce more cotton. It is a dummy variable which takes the value of 1 when it satisfies and the farmer responded to the yes answer, otherwise 0. It is anticipated that satisfaction of farmers to the loan facility contributes to more recovery, hence the attribute had a negative effect on default ($\delta<0$).

Timeliness delivery of input loan to meet farm application (D_9): It is a dummy variable which shows the response of sampled farmers to the trend of inputs delivery to meet the farm calendar. The response takes the value of 1 if the farmer received on time and otherwise 0. It is expected that timely delivery maximizes satisfaction of inputs use by farmers hence have a positive impact to loan recovery and reduce the default level ($\delta<0$).

Alternative sources of loan (D_{10}): The easiest forms of loan for cotton farmers in villages come from merchants, community financial services and well off farmers who provide a small amount of loan with expectations to repay after harvest. These are apparently simple and low cost transactions for farmers, which are used to supplement the formal input loan given by ginners. It is a dummy variable which takes the value of 1if a farmer obtained supplementary loan from village financial sources and otherwise 0. In rural areas, sometimes loan is used to smooth consumption, so farmers take out loans that can be repaid, but with no intention of investing. With many sources of loan, it causes enormous increase in the opportunity costs to default the loan, hence we expect to have a positive effect on default ($\delta>0$).

Perception of farmers on repayments of input loan (D_{11}): Cotton farmers' perception may be a driving force on input loan use in cotton production and successful repayment or diversion into other purposes. It is dummy explanatory variable which takes the value of 1 when farmers perceive good to received loan and 0 otherwise. It is anticipated that this attribute can have a negative impact on loan default ($\delta<0$).

Borrower training on input loan repayment (D_{12}): Training is one of the important requirements for the success of farming and loan facility. It is a dummy variable which specifies if the borrower received it =1 otherwise is 0. If the lender provides various training, the clients will be able to understand the rules and regulations easily. It also involves capacity building on how to undertake farming business and handle financial transactions. Training has a positive contribution to repayment and decreases the default rate ($\delta<0$).

The modality used by ginners to collect input loan (D_{13}): The standard repayment method used by cotton industry was farmers to submit cash payment to FBG leader and appointed company agents. It is a dummy variable which is designated to 1 if farmers submitted their cash loan to FBG leaders and otherwise 0. In many group lending programs, participation of recipients on loan recovery increases the level of performance, hence we expect to have a negative attribute on loan default ($\delta<0$).

Time interval applied to visit farmers during loan collection (D_{14}): It is a dummy variable which is denoted by 1 if daily otherwise 0. Close monitoring of credit transactions is crucial for the client to utilize the loan efficiently to the intended purpose. There is a possibility to remind the obligation and motivate the borrowers for repaying the loan. Mijena (2011) realized that frequent follow-up and visits helps to decrease the

default rate. Therefore, it is expected to have a negative relationship with the dependent variable ($\delta<0$).

The satisfaction of conditions imposed to enable loan repayment (D_{15}): There are factors and best practices that companies may want to consider when contracting farmers' business groups at a given village. These conditions have a great influence on loan recovery and relationships with farmers. It is a dummy variable which is valued at 1 when farmers accept and feels good to the conditions, otherwise is 0. It is assumed to have a negative impact on loan default ($\delta<0$).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Descriptive Analysis

The descriptive analysis used mean, percentages, standard deviation, maximum and minimum techniques; and the t- and chi-square statistics to compare defaulter and non-defaulter respondents. The key study characteristics were on demographic, farming, socio-economic, institutional and inputs credit requisition, use and repayment.

4.1.1 Demographic characteristics

4.1.1.1 Age of respondents

Age of cotton farmers is an important aspect in agriculture because it determines the experience one has in cotton production activities. It becomes even more difficult to produce when the farmer is either very old or very young member who cannot assist farming business.

According to sampled farmers, their age ranged from 18 to 80 years with a mean of 38 years and a standard deviation of 11. The average age of defaulters was 40 years while that of non-defaulters was 34 years. The survey result shows that the mean difference between defaulters and non-defaulters with regard to age was statistically significant ($p<0.01$) (Table 3). This indicates that defaulters are more aged than non-defaulters, implying that older borrowers may have many commitments to undertake, hence diverting the money to repay inputs to other issues than younger ones. In some cases aged people engage in a political dispensation process in villages where ginners have loaned farmers and if there is ideological differences or confusions on the program, they may affect the decision making of borrowers to repay the credit.

Table 3: Age distribution of sampled respondents

Characteristic	Defaulters (n=70)		Non defaulters (n=42)			Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.	t-value	Mean	Std. Dev.
Age of respondents	40	11	34	10	3.081***	38	11
Maximum	80		58			80	
Minimum	19		18			18	

*** Significant at $p<0.01$

4.1.1.2 Marital status of the respondents

The marital status of input loan beneficiaries is usually used to determine the stability of a household in African families. It is normally believed that married household tends to be more stable in farming and related activities than unmarried ones. In consideration to marital status of the total sampled respondents about 14%, 79%, 5% and 2% were single, married, divorced and widowed respectively. The marital status of defaulters is 7%, 83%, 7% and 3% are single, married, divorced and widowed respectively, while for the non-defaulters were 26%, 72%, 2% and 0% in the same order. The results found significant differences ($p<0.05$) between the two groups (Table 4). As indicated, the percentage of married respondents' was high in defaulters than in non-defaulters. This implies that defaulters were more likely to be married, this may be exacerbated by the fact that married families have large family size so much of the produce is directed to sustain the household rather than repay the loan. Mijena (2011) noted that with large family size, some of the loan funds may be diverted to other use other than utilization in the production of cotton.

Table 4: The sample distribution of respondents by marital status

	Defaulters		Non defaulters			Total	
	(n=70)	%	(n=42)	%	χ^2-value	(n=112)	%
Single	5	7	11	26	9.414**	16	14
Married	58	83	30	72		88	79
Divorced	5	7	1	2		6	5
Widow	2	3	0	0		2	2

** Significant at p<0.05

4.1.1.3 Education level of respondents

The survey results show that on the sampled respondents, 37% did not attend to school in their lifetime, 55% were primary school leavers while 7% and 1% are secondary and college/university graduates respectively. Averagely, with an increase in the level of education decreases the borrowers to become defaulters with significant difference (p<0.1).

Table 5: The sample distribution on education level of respondents

	Defaulters		Nondefaulters			Total	
	(n=70)	%	(n=42)	%	χ^2-value	(n=112)	%
Did not attend to school	32	46	9	21	7.638*	41	37
Primary education	33	47	29	69		62	55
Secondary education	4	6	4	10		8	7
College/university	1	1	0	0		1	1

* Significant at p<0.1

4.1.1.4 Family size of respondents

The size of the sampled respondent families ranged from 1 up to 14 persons, with an average family size of 4 and a standard deviation of 3. The average family size of the defaulters and non-defaulters were 5 and 3, with standard deviations of 3 and 3 respectively.

Table 6: Distribution of respondents by family size

Characteristic	Defaulters (n=70)		Non defaulters (n=42)		t-value	Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
Family size	5	3	3	3	3.239***	4	3
Maximum	14		12			14	
Minimum	1		1			1	

*** Significant at p<0.01

Therefore, family size between the two groups was statistically significant (p<0.01) (Table 6). With many family members, food requirements increase and most of the produce is used for consumption. Therefore, there is a high possibility of increase in expenditure of any income earned on food security and hence increase the risk of default.

4.1.2 Farming characteristics

4.1.2.1 Experience in farming enterprise

Experience in cotton farming is very important because it links the farmers on the effective use of inputs in order to maximize cotton yields. The sampled respondents cultivating cotton have experience varying between 2 to 54 years with an average duration of 16 years and a standard deviation of 11. The average experience of years in cultivating cotton for defaulters was 18 with a standard deviation of 11, while that of non-defaulters was 13 with a standard deviation of 10. There was a significant difference (p<0.05) related to experience in cotton farming between defaulters and non-defaulters (Table 7).

Table 7: The experience of respondents in cotton farming enterprise.

Characteristic	Defaulters (n=70)		Non defaulters (n=42)		t-value	Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
Experience in farming	18	11	13	10	2.338**	16	11
Maximum	54		37			54	
Minimum	2		2			2	

** Significant at p<0.05

4.1.2.2 Land cultivated with cotton

The land size of sampled respondents cultivated with cotton varies between 0.4 to 8.1 hectares with an average holding of 1.9 hectares and a standard deviation of 1.3 hectares. The average size of land cultivated with cotton for defaulters was 2.1 hectares with a standard deviation of 1.4 hectares, while that of non-defaulters was 1.6 hectares with a standard deviation of 1.2 hectares. The size of cultivated land was statistically significant (p<0.1) related to defaulters and non-defaulters (Table 8).

Table 8: Distribution of cultivated land among sampled respondents

Characteristic	Defaulters (n=70)		Non defaulters (n=42)			Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.	t-value	Mean	Std. Dev.
Land cultivated cotton	2.1	1.4	1.6	1.2	1.6755*	1.9	1.3
Maximum	8.1		4.5			8.1	
Minimum	0.4		0.4			0.4	

*Statistically significant at p<0.1

4.1.2.3 The amount of seed cotton farmers harvested

The production capacity of farmers in the study area is determined by the quantity of seed cotton delivered to ginnery by the buyer for 2011/12 cropping season (Fig.4). From the

result, it was observed that the mean seed cotton harvested by defaulters and non-defaulters were 1380 and 1376 kg, respectively and is statistically insignificant (Table 9).

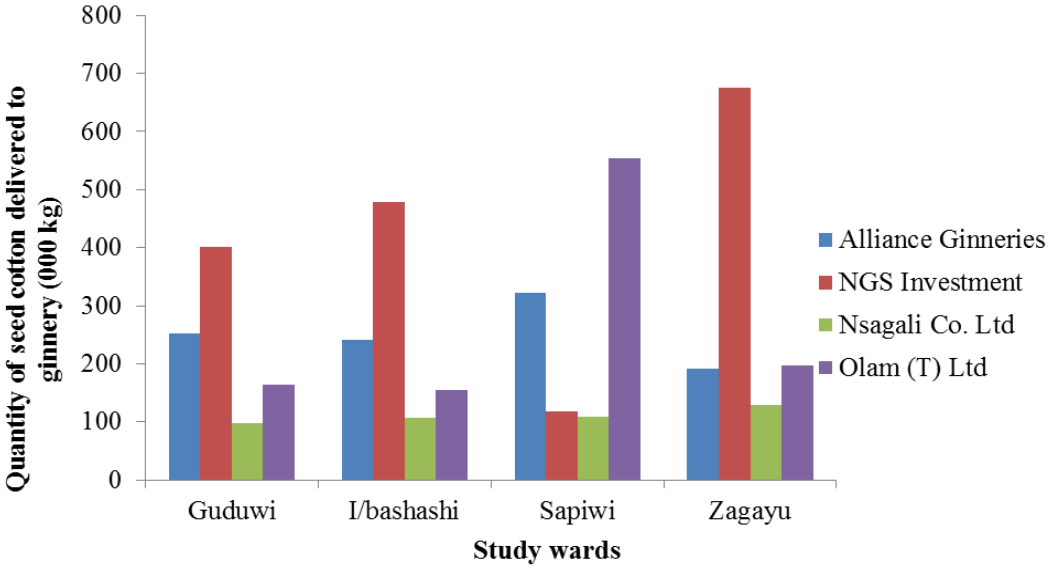

Figure 4: Performance of seed cotton delivery to ginneries from the study wards

According to the survey, seed cotton harvested varies from a minimum of 267 kg to a maximum of 5700 kg for the whole respondents and from 267 kg to 3981 kg for defaulters whereas from 267 kg to 5700 kg for non-defaulters. The amount of seed cotton harvested is generally far below the global average yield of more than 1000 kg per acre (Mwinuka and Maro, 2013).

Table 9: Distribution of seed cotton harvested among sampled respondents

Characteristic	Defaulters (n=70)		Non defaulters (n=42)		t-value	Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
Seed cotton (kg)	1380	962	1376	1236	0.0199	1379	1067
Maximum	3981		5700			5700	
Minimum	267		267			267	

Statistically insignificant at p>0.1

4.1.2.4 Regular access to extension services

Extension officers are considered to be the most crucial source of information among farmers. In Bariadi district, it has been noted that cotton farmers who have access to extension services rely more on the government extension services than private extension services. The results of the survey indicated that 64 % of respondents have received enough extension services on proper inputs usage from extension agents, while 36% did not have any education from extension agents. Group wise, 56% of the defaulters and 79% of non-defaulters reported that they had extension services.

Table 10: Regular access to extension services

	Defaulters		Non defaulters			Total	
	(n=70)	%	(n=42)	%	χ^2-value	(n=112)	%
Yes	39	56	33	79	5.973**	72	64
No	31	44	9	21		40	36

** Significant at $p<0.05$

The chi-square value reveals significant differences ($p<0.05$) between the two groups (Table 10). Nonetheless, farmers with access to government extension services explained that the extension workers are not consistent and some of them rarely visit their villages.

4.1.3 Other socio-economic characteristics

4.1.3.1 Engaging in other income generating activities

Generally, cotton farmers utilize the opportunity cost of land and potentiality of available resources to engage in other economic activities other than growing cotton. The sampled respondents indicated that 57% participate in other income earning activities while 43% engage in cotton production only. The other income generating activities undertaken by respondent farmers are rearing of farm animals (34.4%), petty trading (23.4%), production of other crops (35.9%) and casual work (6.3%).

From the observations, 51% and 67% of defaulters and non-defaulters engage fully on income earning from other opportunities respectively. However, the study revealed no significant difference between defaulters and non-defaulters with regard to engaging in other income generating opportunities (Table 11). This implies that income generated from other activities have less contribution to repayment of inputs credit cotton farmers received.

Table 11: Engaging in other income generating activities

	Defaulters		Non defaulters			Total	
	(n=70)	%	(n=42)	%	χ^2-value	(n=112)	%
Yes	36	51	28	67	2.489	64	57
No	34	49	14	34		48	43

Statistically insignificant at p>0.1

4.1.4 Inputs loan requisition and use

4.1.4.1 The input supplier companies

After signing contract, zoned cotton companies become the sole providers of credit to farmers by financing all their direct costs of growing cotton (fig. 5).

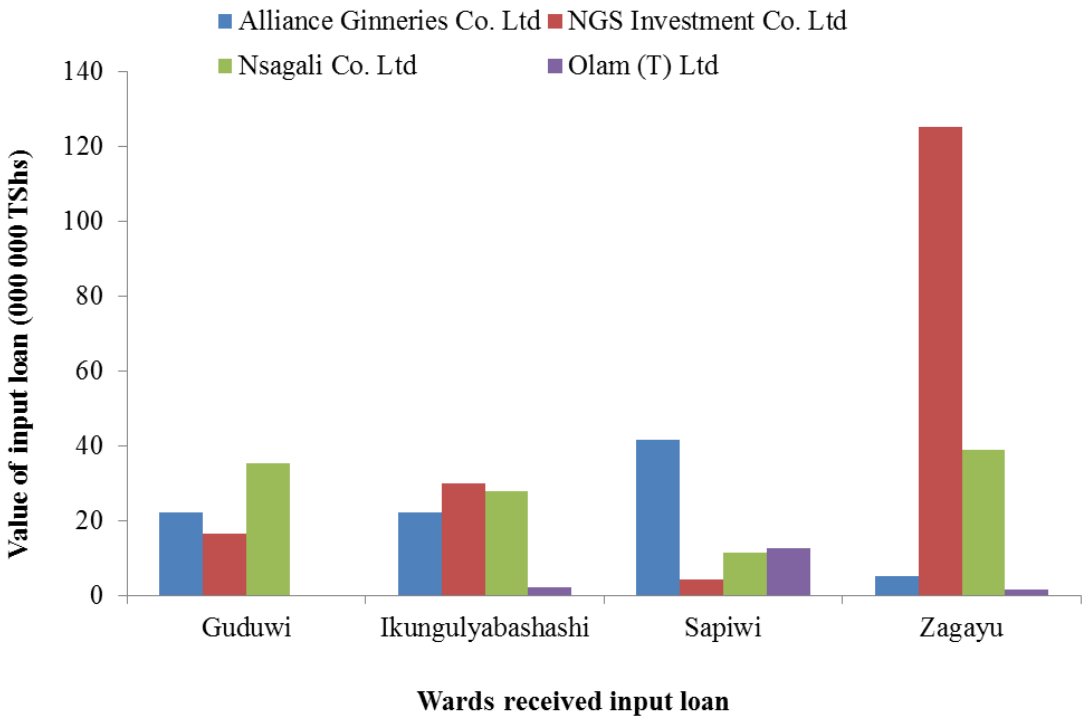

Figure 5: Value of input loans delivered by stakeholders to wards under study for 2011/12 cropping season

The study shows that among the sampled loan recipients, 26% of farmers received their inputs from Alliance Ginneries Co. Ltd, 36% obtained from NGS Investment Co. Ltd, 27% received from Nsagali Co. Ltd and 11% from Olam (T) Ltd. This is ascertained by the number of FBGs which signed contract with the respective input supplier.

Among the companies which delivered inputs on credit to cotton farmers, chi-square statistic indicates significant difference ($p<0.05$) between defaulters and non-defaulters (Table12). It revealed that with an increase in the loan recipients and value results in the rise of default level. Issah (2011) suggests that the ginning firms could achieve their objectives in whatever activity they engage in managing the borrowed funds effectively and efficiently while minimizing the use of its resources.

Table 12: Input loan supplier companies

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Alliance Ginn. Co. Ltd	14	20	15	36	9.992**	29	26
NGS Investment Co. Ltd	30	43	10	23		40	36
Nsagali Co. Ltd	15	22	15	36		30	27
Olam Tanzania Ltd	10	15	2	5		12	11

** Significant at p<0.05

4.1.4.2 Type of input loan received from ginners

The ginning companies are committed to supply farmers in contract with the minimum inputs package (MIP), which include cotton seed, pesticides, sprayer pumps, and packing bags. The additional inputs such as financial support to tillage, weeding and harvesting operations depend on the financial liquidity of supplier, which is regarded as incentives to attract more FBG to enter into a contract with them. However, farmers know exactly in advance the price and when these inputs will be provided. Cotton farmers were expected to deliver for sale, cotton harvested to the respective ginner who supplied them with inputs, and pay back the loan later after selling cotton.

Table 13: Distribution of sample respondents by type of input loan received from ginners

	Defaulters		Non defaulters			Total	
	(N=70)	%	(N=42)	%	χ^2 -value	(N=112)	%
Insecticides	4	6	5	12	2.113	9	8
Seeds	3	4	2	5		5	5
Insecticides and seeds	50	73	27	64		77	69
Insecticides, seeds and field operations	12	17	8	19		20	18

Statistically insignificant at p>0.1

The survey results show that among sampled cotton farmers who received insecticide, seed, insecticide and seed; insecticide, seed and field operations were 8%, 5%, 69% and

18% respectively. Although the data revealed many respondent farmers borrowed insecticide and seed, there is no significant different between defaulters and non-defaulters who obtained different types of inputs (Table13). This implies that the attitude to default or not is irrespective of the type of input loan received.

4.1.4.3 Total input loan farmers received

The average amount of input loan respondent received was Tshs 75 124 with a standard deviation of Tshs 87 096. The mean input loan of defaulters was Tshs 84 403 with a standard deviation of Tshs 93 659 and that of non-defaulters was Tshsh 59 660 with a standard deviation of Tshs 73 365. However, the results indicate that there is no significant difference between defaulters and non-defaulters in terms of the amount of input loan farmers received (Table 14).

Table 14: Distribution of respondents by loan amount received

Characteristic	Defaulters (n=70)		Non defaulters (n=42)		t-value	Total (n=112)	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
Loan received	84 403	93 659	59 660	73 365	1.463	75 124	87 096
Maximum	470 000		396 000			470 000	
Minimum	0		0			0	

Statistically insignificant at p>0.1

4.1.4.4 Sufficiency of loan provided to farmers

George (2012) observed that sometimes there is market imperfection on inputs loan provision, where borrowers would like to borrow more, but gets less loan than the market equilibrium dictates. It is the challenge of providing public goods such as seasonal input loan in a competitive setting with incomplete property rights.

The survey result indicates that 71% of the total sampled respondents who received loan were satisfied while 29% needed more to meet their requirements. Among the groups who were happy with what they received, 62% are defaulters while 86% were non-defaulters. Farmers who were unhappy with the loan delivered, 38% were defaulters and 14% were non-defaulters. There is a highly significant difference ($p<0.05$) in loan satisfaction between defaulters and non-defaulters (Table 15). The result implies that the minimum inputs package need to be adjusted in order to supply more inputs than the current quantity which is allocated to cotton farmers. Valerian (2012) insists that easy access to inputs motivate farmers to grow more cotton and increase production, which enable them to raise their income through selling of cotton to the respective ginners.

Table 15: Sufficiency of input loan received by respondents

	Defaulters		**Non defaulters**			**Total**	
	(n=69)	**%**	**(n=42)**	**%**	**χ^2-value**	**(n=111)**	**%**
Yes	43	62	36	86	6.965***	79	71
No	26	38	6	14		32	29

*** Significant at $p<0.05$

4.1.4.5 Timeliness delivery of input loans to meet farm use

Valerian (2012) stipulated that proper timing of farm calendar is important in order to obtain good yields. Some farmers have been complaining about the delay of inputs, which lead to a reduced quality and quantity of cotton produced. Moreover, there has been a shortage of inputs to FBGs, which might affect the quantity of cotton produced. Survey results show that 70% of credit beneficiaries admitted to receive inputs on time while 30% acquired it late.

Among defaulters and non-defaulters, the result has insignificant differences between the two groups. This implies that repayment of inputs credit was independent on how early or late cotton farmers received, but under long run it can impair with the suitability and sustainability of the program. When inputs are delivered late, farmers miss the opportunity to plant at the correct time and often obtain lower yields which compromise potential income and the ability to repay input loans. Farmers may have a negative attitude on input loans since it does not clearly explain what will happen to ginners who delay input supply.

Table 16: Distribution of sample respondents by timeliness of input loan delivery

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Yes	48	70	30	71	0.043	78	70
No	21	30	12	29		33	30

Statistically insignificant at p>0.1

4.1.4.6 Other sources of financial support to farm activities

There are special loans which farmers in rural areas can access. Loans under these schemes are often tied to particular activities or inputs, which have not been chosen by borrowers and may not be suitable for them (Issah, 2011).

With adverse selection and moral hazard, some farmers have distanced themselves from the opportunity of formal lending. This lack of formal lending forces those in need of loan to suffer the effects of credit rationing and shift to informal lenders, at their own expense and risk (Natarajan, 2004).

According to the survey results, 85% maintained their input loan source from ginners, 6% supplemented the loan deficit from well off farmers and 9% from local financial services.

For other sources of loan to defaulters, well off farmers accounted to 10% and local financial services share was 12%, while for non-defaulters the distribution on the source of other financial support is 0% and 5% in the same order. The results found significant differences ($p<0.05$) between the two groups (Table 17). As indicated, the percentage of defaulters and non-defaulters who secured other source of credit was high to local financial services than well off farmers. It may be accounted by the nature of loan conditions imposed, which attract more farmers to the earlier than that of well off farmers. This implies that future inputs loan components to cotton farmers of the area may be fused to local credit financial services to improve the repayment rate at current levels. Informal lenders may have deeper local knowledge than formal lenders, hence are more able to discriminate between risk types, as well as being able to generate higher returns from any potential collateral.

Table 17: Distribution of sampled respondents by other sources of financial support to farm activities

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
No other source	54	78	40	95	6.502**	94	85
Well off farmers	7	10	0	0		7	6
Local financial services	8	12	2	5		10	9

**Statistically significant $p<0.05$

4.1.5 Input loan repayment characteristics

4.1.5.1 Perceptions on repayment of input loans

Willingness of cotton farmers to repay the loan at a time of harvest can be ascertained from poor yield, diversion of seed cotton or confronted perceptions of loan as a grant. However, survey results revealed that cotton farmers who received inputs loan, 29% had very good perception on the loans; pointing out that it is very essential for increased

production and enables borrowers to expand their working capital on farming enterprise; 48% responded good, 20% as fairly and 3% of the respondents perceived badly. The perceptions on repayment of defaulters were such that 21%, 49%, 26% and 4% scored it very good, good, fair and bad respectively, while for non-defaulters were 43%, 48%, 9% and 0% in the same order.

Table 18: Distribution of respondents by perception on input loan repayment

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Very good	14	21	18	43	10.067**	32	29
Good	34	49	20	48		54	48
Fairly	18	26	4	9		22	20
Bad	3	4	0	0		3	3

** Significant at p<0.05 confidence interval

There is a significant difference (p<0.05) between the two groups (Table 18). As indicated, the percentage of defaulters who perceived very well and good were low compared to non-defaulter respondents. This implies that defaulters with negative perceptions may be receiving input loan for use in other purposes other than cotton production. This may be accelerated by the cheap price of inputs and the readily available markets to farmers who grow horticultural crops to the neighbouring regions such as Arusha, Manyara and Kilimanjaro.

4.1.5.2 The amount of loan defaulted by sample respondents

Most of Farmers' Business Groups do not fully repay their input loan. In this study out of 112 interviewed respondents, 70 (63%) were defaulters who did not repay their loans in 2011/12 cropping season and the remaining 42 (37%) were non-defaulters (fig. 6).

Among the defaulters, 14 (20%) were complete defaulters with a mean of Tshs 88 336 and standard deviation of Tshs 79 045, while 56 (80 %) repaid part of their credit with a mean of Tshs 28 055 and standard deviation of Tshs 29 730.

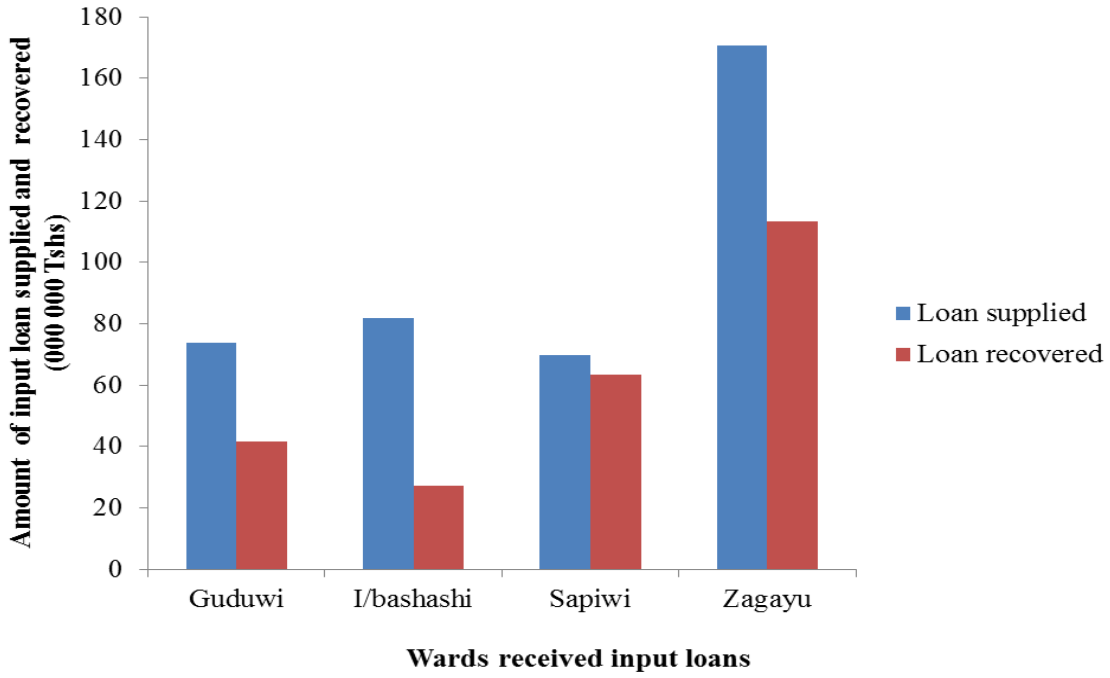

Figure 6: Performance on input loan supply and recovery in wards under study for the 2011/12 cropping season

On average, they defaulted Tshs 40 111 with a standard deviation of Tshs 49 714; with maximum and minimum amount of defaulted money being Tshs 292 100 and 4000 respectively (Table 19).

Table 19: Comparison of sample respondents by the amount of loan defaulted

Characteristic	Absolute defaulters (n=14)		Partial defaulters (n=56)		t-value	Total (n=70)	
	Mean	Std. Dev.	Mean	Std. Dev.		Mean	Std. Dev.
Credit defaulted	88 336	79 045	28 055	29 730	4.617***	40 111	49 714
Maximum	292 100		159 000			292 100	
Minimum	4 500		4 000			4 000	

*** Statistical significant at p<0.01

4.1.5.3 Borrower training

Dawes (2008) recognized that the success of inputs credit scheme is dependent on training given to cotton farmers. Smallholder farmers may also need technical services and training in order to set-up effective associations. The use of participatory training is necessary to teach skills needed to operate market-oriented associations, such as managing budgets and contracts.

About 72% of the borrower respondents received training, while 17% received less and the remaining 11% did not have the opportunity for training. The findings indicate that defaulters who received training amount to 62% and that of non-defaulters is 88%, with significant difference ($p<0.05$) (Table20). This implies that increase of training to input loan recipients may reduce the default level.

Table 20: Distribution of borrowers training on input loan

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Yes	43	62	37	88	9.124**	80	72
Little	15	22	4	10		19	17
No	11	16	1	2		12	10

** Significant at $p<0.05$

4.1.5.4 The input loan repayment modality used by ginners

At the beginning of the cotton marketing season, farmers bring their seed cotton to the buying posts for sale. In order to secure the contracted crop, it is important to pay farmers in such a way that they could access the money quickly. The standard repayment method designed by cotton industry stakeholders was to direct farmers on cash payment after selling their seed cotton. The cash is submitted to FBG leaders who are were involved in buying members seed cotton or appointed company agent collecting inputs credit at the buying posts.

Survey statistics show that 94% of interviewed respondents repaid their loan to FBG leaders, 3% to company agents and 3% to both FBG leaders and company agents. There were insignificant differences between defaulters and non-defaulters who repaid their loans either to FBG leaders or company agents Table 21).

Table 21: Modality used by ginners to collect input loans

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
FBG leaders	64	93	40	95	0.323	104	94
Company agents	3	4	1	3		4	3
FBG leaders & Company agents	2	3	1	2		3	3

Statistically insignificant at p>0.1

This implies that the tendency to default was much within the cotton farmers' vicinity; one of it is side-selling practice where a contracted farmers supplied with inputs loans sells their produce to a third party in breach of the contractual agreement. Farmers were more likely to side-sell when a history of discontent with the contracting company made them feel justified for their actions.

4.1.5.5 Time interval applied to visit farmers during loan collection

Ginning companies are required to develop sound monitoring and tracking system of input loan, by regular visits of the field officers to their respective loaned cotton farmers. On the survey outcome, 63.8% of sampled respondents indicated that the schedule for loan collection was set on daily basis, while 36.2% were on weekly terms. However, there was an insignificant difference between defaulters and non-defaulters on the scheduled interval for loan retrieval. This implies that most of the loan was collected through FBG leaders, being facilitated by living close to the same area.

Table 22: Time interval applied to visit farmers during loan collection

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Daily	44	64	32	76	1.865	76	69
Weekly	25	36	10	24		35	31

Statistically insignificant at p>0.1

4.1.5.6 The satisfaction of conditions imposed on timely loan repayment

Loan repayment conditions offered by companies have a great influence on the sustainability of the revolving credit program and on relationships with the farmers. However, it was also important that farmers were advised on input cost calculations to avoid the common perception that companies were profiting from these programs.

According to the survey output, 48.6% of the sampled respondents were satisfied while 51.4% farmers were discontented with the loan conditions imposed. It was indicated that among defaulters and non-defaulters, 23.2% and 90.5% were satisfied respectively, while 76.8% and 9.5% were discontented to input loan recovery in that order. Therefore, the satisfaction of conditions between the group had a negative impact to default and statistically significant at p<0.01 (Table 23). This implies that it needs a sound policy for supporting measures, like the possibility of contract enforcement on credit repayment conditions. The cotton industry should lobby the government to introduce legislation to assist them with the rampant loan defaults that threatens to derail the industry. It is also important to assess the level of support from the national level, local government and traditional leadership.

Table 23: Satisfaction of conditions imposed to enable timely credit repayment

	Defaulters		Non defaulters			Total	
	(n=69)	%	(n=42)	%	χ^2-value	(n=111)	%
Yes	16	23	38	91	47.318***	54	49
No	53	77	4	9		57	51

*** Significant at p<0.01

4.1.5.7 Reasons for the default of input loan

During harvesting time, many farmers had not access to income for a long period. If the company did not collect the crop soon after harvest, farmers were tempted to sell to middlemen who are common to the place during the marketing season. Side-marketing was more likely when the farmer had an urgent requirement for money (Dawes *et al*., 2009).

Farmers were asked to give reasons for defaulting input loans, and survey findings revealed that 37% were prompted to sell outside the contract agreement when competitors offered a higher price than the contracted company. In cases where the difference was very significant farmers felt justified in their actions because they believed that the company was maximizing profit. Other respondents indicated that a certain degree of default which accounted to 22% was due poor credit recording, handling and submission of loan collections among FBG leaders and company agents, to ginners as shown in fig. 7.

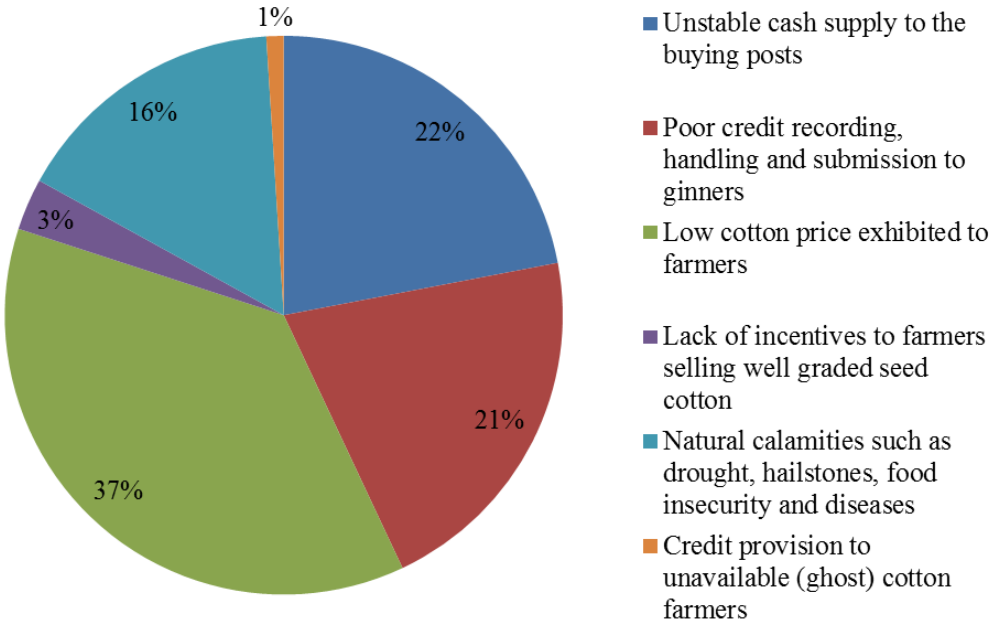

Figure 7: Reasons for the default of input loans

A history of unstable cash supply and delayed payments at the buying posts (21%), natural calamities such as drought, hailstorms, food insecurity and diseases (16%), lack of incentives to farmers selling well graded seed cotton (3%), and loan provision to unavailable (ghost) cotton farmers (1%) were among the reported reasons for default by farmers. This implies that farmers who anticipated long payment delays made partial deliveries to companies whose income flow was constant. Unavailability of funds at the early period of the trading cycle tends cotton farmers to miss revenue opportunities in terms of prices. Farmers with very low yields were unable to repay their input loans and when faced with the prospect of indebtedness they often choose to sell the crop elsewhere. Low yields also result in farmers becoming dissatisfied with the contract price, which seems unreasonable to unproductive farmers. It is in the company's best interests to do all that is possible to assist farmers to achieve high yields and raise their input loans repayment capacity.

4.2 Results of the Econometric Model

Prior to running the probit model, the hypothesized explanatory variables were checked by doing diagnostics for the existence of multicollinearity and heteroscedasticity before interpreting the model's estimates, explanatory power, and significance of the regression coefficients.

4.2.1 Multicollinearity

Multicollinearity problem arises when at least one of the explanatory variables is a perfect linear combination of the others. The existence of multicollinearity might cause the estimated regression coefficients to have low z values leading to erroneous conclusions. The approach often used to test the presence of multicollinearity is variance inflation factor (VIF) for association among the explanatory variables. As a rule of thumb, if the VIF of a variable exceeds 5, there is a severe multicollinearity problem.

In the diagnostics it was observed that age and experience in the cotton farming enterprise had high VIF values of 14.22 and 13.24 (Appendix 2); hence there is a linear relationship with these variables. The remedy was made by dropping experience in farming, since age of respondents do mean both life time length of birth and experience in farming. The result of values obtained after remedy are expressed in table 24 with mean VIF value of 2.05. All other explanatory variables were included in the model.

Table 24: Variance inflation factor for explanatory variables

Variable name	Variance Inflation Factor (VIF)
Age of respondents, continuous	2.99
Marital status, married=1	1.43
Education, attended to school=1	1.87
Family size available, continuous	2.63
Land cultivated cotton, continuous	3.93
The amount of seed cotton harvested, continuous	3.34
Regular access of farmers to extension services, yes=1	1.24
Engaging in other income activities, yes=1	1.92
Type of other income generating activity, rearing of farm animals=1	1.71
The input supplier companies, NGS investment=1	1.96
Type of input loan received, insecticide=1	2.09
Total value of loan respondent farmers received, continuous	3.00
Sufficiency of the input loan received, yes=1	1.83
Timely delivery of input loan to meet farm application, yes=1	1.48
Alternative source of loan, local financial services=1	1.65
Perception on input loan received, good=1	1.35
Borrower training on input loans, yes=1	1.33
The repayment modality used by ginners, FBG leaders=1	1.61
Time interval used for loan collection, daily=1	2.12
The satisfaction of conditions imposed on input loan repayment, yes=1	1.49
Mean VIF	2.05

4.2.2 Heteroscedasticity

Cross sectional data are usually plagued by the problem of heteroscedasticity. This statistical deficiency has implications on the results of binary choice models. The assumption of homoscedasticity of residuals (ε_i) is likely to be violated if they do not have a constant variance (var $\varepsilon_i \neq$ var ε_s); and the estimated parameters are inefficient, though they are consistent (Green and Hensher, 2009). The presence of heteroscedasticity in the model was tested using a scatter plot of Pearson residuals and fitted values of predicted probabilities on loan default as indicated in fig.8. Two distinct patterns of residuals for Y=1 and the other for Y=0 with the probits are definitely heteroskedastic.

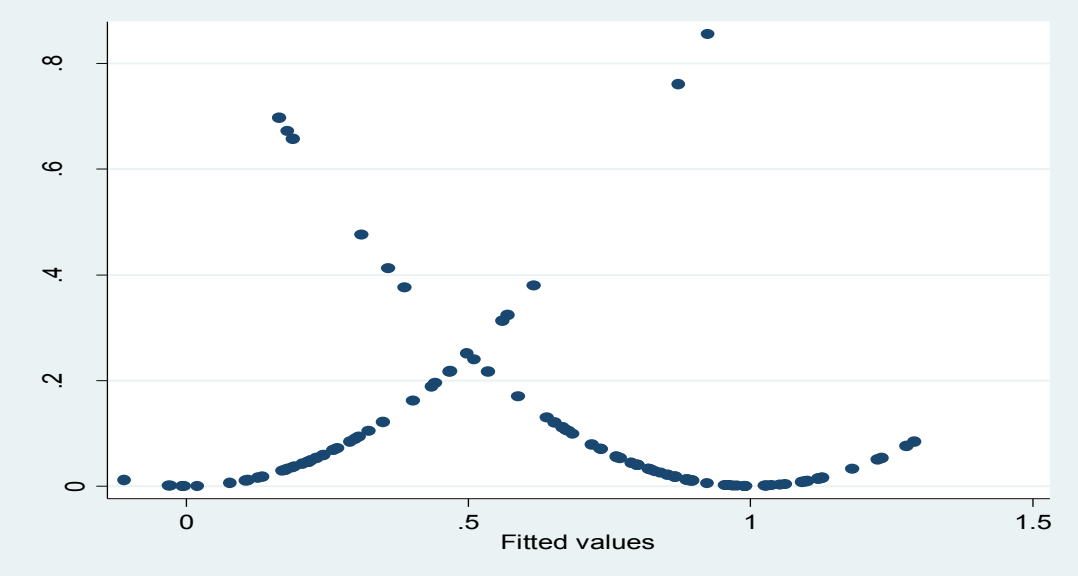

Figure 8: Scatter plot of Pearson Residuals vs Predicted Probabilities

Large residual points were found on the predicted probabilities of Y=0, as compared to that of Y=1. Thus, the problem of heteroskedastic residuals in the model was eliminated through the use of robust standard errors in estimating model parameters.

4.2.3 The goodness of fit of the probit model

Parameters were obtained by maximization of the log likelihood function in which six iterations were necessary for the model to converge at -31.31. The measure of goodness of fit used in the binary choice model is the pseudo R^2 which, according to the model results is 0.58. It attempts to provide information similar to that provided by R^2 in OLS regression; however, cannot be interpreted exactly in the same manner (Freese and Long, 2006).

The constant term was 3.77; meaning that if the entire model predictors are kept constant at zero, the predicted probability of default will increase with p-value of 0.08. The Wald

chi-square is 57.49 with a p-value of 0.0000, which tells us that our model as a whole fits significantly better than a model with no predictors.

The model result reveals that the probit regression model correctly predicted 90.18% (Appendix 2) of the sample respondent farmers in the defaulter and non-defaulter groups (Table 25).This prediction is better than just assigning randomly 50% of explanatory variables in predicting defaulters and non-defaulters (Greene and Hensher, 2009; Reta, 2011).

Table 25: Probit model prediction for input loan default

Classified	Default	Non-default	**Total**
+	63	4	**67**
-	7	38	**45**
Total	**70**	**42**	**112**

4.3 Determinants of Low Loan Repayment on Input and Intensity of Loan Recovery

The estimated results of the probit model are shown in Table 26. A total of 20 explanatory variables were considered in the econometric model, out of which eight variables were found to influence significantly the probability of being defaulter or non- defaulter at different significance levels. The significant variables were the amount of seed cotton farmers harvested (X_4), type of input loan farmers received (D_4), the input loan supplier companies (D_6), timeliness delivery of input loan to meet farm application (D_9), perception on input loan repayment (D_{11}), borrower training on input loan repayment (D_{12}), time interval used for loan collection (D_{14}) and satisfaction of conditions imposed on input loan repayment (D_{15}). Among the eight variables which were found to be significantly affecting input loan default, the coefficient of three significant variables

were positive while the other five were negative, implying that most of these variables had a significant impact in enhancing loan recovery.

The amount of seed cotton harvested was found to have a negative sign of the coefficient as expected, which means an increase in seed cotton harvests among farmers is most likely to decrease the probability of being a defaulter (Table 26). This variable was found to significantly influence ($p<0.05$) input loan repayment. Each additional kilogram of cotton harvested was likely to decrease the probability of default by 0.014% (Table 27). The implication is that farmers who obtain good harvests are in a position to have high returns from the sale of seed cotton, and meet their responsibility to repay their loans.

According to the results, borrowers who obtained input from NGS Investment Co. Ltd were significantly ($p<0.05$) most likely to increase the defaults than borrowers who received the loan from other contracting companies (Table 26). An increase in one farmer who received input loan from NGS Investment increases the probability of default by 24.66% (Table 27). Dawes *et al*., (2009) showed that loan repayment approach implemented by the company has a great influence on the relationship with farmers and the sustainability of the revolving input program.

Table 26: Maximum likelihood estimates of the probability to default on explanatory variables

Explanatory Variables	Estimated Coefficients	Robust Std. Err.	Z-value
Age of respondents	-0.0133788	0.0234471	-0.57
Marital status of respondents	-0.3428192	0.5877703	-0.58
Education level	-0.1333635	0.5091999	-0.26
Family labour available	0.1381337	0.0982147	1.41
Land cultivated with cotton	0.1684813	0.1069572	1.58
The amount of seed cotton	-0.0005182**	0.0002563	-2.02
Regular extension services	-0.2881935	0.3787688	-0.76
Other income activities	-0.1081838	0.5916657	-0.18
Type of other income activities	0.1375029	0.499259	0.28
The input supplier company	1.031717**	0.5075323	2.03
Type of input received	1.111505**	0.4650465	2.39
Total value of loan received	1.08×10^{-6}	3.22×10^{-6}	0.34
Sufficiency of input loan	-0.2927505	0.4942654	-0.59
Timeliness of input loan supply	2.01468***	0.5944915	3.39
Alternative source of loan	0.2149608	0.5938739	0.36
Perceptions on repayment	-1.214391**	0.5584079	-2.17
The borrower training to beneficiaries	-2.943408***	0.9443787	-3.12
Modality of loan collection	0.2809736	0.5814419	0.48
Time interval for loan collection	-0.9980624*	0.5340992	-1.87
Conditions on loan retrieval	-2.446861***	0.5123167	-4.78
Constant	3.772054*	2.151506	1.75

***, **, * Significant at $p<0.01$, $p<0.05$ and $p<0.1$.

Farmers were more likely to default when a history of discontent with the contracting company made them feel justified for their actions. It was expected that company employees could be well trained to cope with contract agreements and real situations prevailing among farmers. The problem is that farmers genuinely do not appreciate the consequences of their actions; the solution will be laid on training and enforcement through appropriate legislation.

Cotton farmers received various types of input loan services from ginning companies like insecticides, cotton seeds, field cultivation and cash for other on farm operations. Most of the loan recipient farmers who obtained insecticides were likely to increase the probability of default than those who received another type of input, and were significant ($p<0.05$). An additional farmer who receives input loan in the form of insecticides

increases the probability to be defaulted by 36.47% than other type of inputs (Table 27). This implies that when companies supply input to farmers, the purpose is to maximize yield and quality of cotton. In the course of acquisitions, insecticides are more likely to be diverted and sold or used for other crops. At one of the sites farmers reported instances which had occurred when neighbours had signed a contract with no intention of growing cotton.

The provision of input loans is one of the main reasons why contract farming is attractive to farmers. However, farmers reported that inputs would often arrive late or not at all. When inputs are delivered late, farmers miss the opportunity to plant at the correct time and often obtain lower yields which compromise potential income and the ability to repay input loans (Dawes *et al*., 2009). Survey results indicated that farmers who admitted to receive inputs timely were most likely to increase the probability of default than those who were supplied late with highly significant at ($p<0.01$) (Table 26). This result is in contrast with the finding of Afolabi (2010) who reported that a delay in loan disbursement to small scale farmers in Nigeria may be responsible for the strong disagreement over the loan repayment. An increase in one farmer who received input loans on time increases the probability of default by 63.49% than those who responded on the delay of delivery to recipients (Table 27). This implies that as farmers are supplied with inputs earlier, they divert into other uses and at the end of cotton harvest the potential to repay their loans could reduced. Dawes *et al*., (2009) suggests that inputs diversion can be minimized by increasing management and extension support. The next tranche of input distributions would only be approved once farmer fields had been assessed. In some cases the input pack would be reduced to match the actual crop area.

The importance to match the farming calendar is well stipulated in contract farming in order to obtain good yield. For example, crops need to be sprayed with insecticides at the right time to minimize pest populations below threshold levels. This requires regular scouting activities to determine insect levels in the crop. In the event of an excessive pest outbreak threatening the crop, delay of the contracting company to provide them with the chemicals can be a major source of discontent.

Failure to source and deliver inputs can make a huge difference between success and failure of seed cotton harvests, and compromise a negative attitude towards loan repayment. According to survey results, good perception of farmers on repayments of input loans received contributed to decrease on the default significantly ($p<0.05$) than farmers whose perception was in a bad terms. Each additional farmer who perceived well on loan repayment decreased default by 24.38% than those who perceived badly.

Farmers gain experience in carrying out field activities following a strict cotton growing calendar imposed by regulations. But there is a need for companies to perform a full training and extension needs analysis. Effective training not only ensures that farmers receive information required to successfully grow the crop, but also allows the company to monitor farmer production and look after the company material input investments. The survey analysis revealed the coefficient for training variable to be negative and significant ($p<0.01$). The finding is comparably favourable to results of Roslan and Mohd Zaini (2009) and Vitor (2011) who found that training reduces loan default among inputs loan beneficiaries in Malaysia and Ghana. This shows that cotton farmers who received training organized by the cotton industry through Techno Serve have about 30.02% lower probability to default in loan repayment compared to those farmers who did not undergo any training.

In seasonal loans, farmers borrow at the same time and face similar risks; so that in a bad year group liability may encourage default. To avoid this, regular monitoring of farmers' production activities, loan use and repayments is needed by ginning companies to comprehend its relevance to agricultural production (Issah, 2011).

Survey results indicated that the probability of cotton farmers to default decreased when the interval of time for input loans recovery was on a daily basis, and was found to be significant ($p<0.1$) (Table 26). A day interval applied to retrieve input loans by FBG leaders and company agents have the potential to decrease default by 23.17% compared to weekly basis (Table 27). This signifies the need to institute close loan supervision and follow-up to reduce the problem of mounting overdue and bad debts. Strong and well-organized loan supervision is increasingly important as ginning firms' must concentrate in the rural areas where it has signed a contract with cotton farmers' business groups.

Table 27: Marginal and impact effects on continuous and dummy variables

Explanatory Variables	dF/dx	Robust Std. Err.	Z-value	X-bar
Age of respondents	0.0036721	0.0062885	-0.57	37.5446
Family labour available	0.0379138	0.0271747	1.41	4.35714
Land cultivated with cotton	0.0462434	0.0293788	1.58	4.69643
The amount of seed cotton	-0.0001422**	0.0000727	-2.02	1378.56
Total value of input received	2.97×10^{-7}	8.91×10^{-7}	0.34	75124.1
Marital status of respondents	-0.0860064	0.1327424	-0.58	0.785714
Education level	-0.0360318	0.1353104	-0.26	0.633929
Regular extension services	-0.0762219	0.0976604	-0.76	0.642857
Other income activities	-0.0304297	0.1713033	-0.18	0.232143
Type of other income activities	0.0380527	0.1396511	0.28	0.571429
The input supplier company	0.2465733**	0.0981856	2.03	0.357143
Type of input received	0.3647216**	0.1658275	2.39	0.767857
Sufficiency of input loan	-0.0761035	0.1210671	-0.59	0.705357
Timeliness of input loan supply	0.6348833***	0.1604968	3.39	0.696429
Alternative source of loan	0.0551351	0.1410830	0.36	0.151786
Perceptions on repayment	-0.2438306**	0.0734865	-2.17	0.767857
Borrower training on input loan	-0.3001588***	0.0516308	-3.12	0.883929
Modality of loan collection	0.0848409	0.1921338	0.48	0.928571
Interval for loan collection	-0.2316857*	0.1042622	-1.87	0.678571
Conditions on loan retrieval	-0.635817***	0.0999248	-4.78	0.482143

***, **, * Significant at $p<0.01$, $p<0.05$ and $p<0.1$ respectively.

A major source of market failure in credit markets is that a lender cannot apply financial sanctions against poor people who default on a loan. The most applicable approach is through social cohesion and proper incentives to use information among group members which encourages borrowers to repay their loans without the lender imposing costly sanctions (Fischer and Ghatak, 2010).

In the cotton industry regulations 2011, it is stipulated that input borrower who fail to repay their loan because of risks and uncertainties would be granted an extension upon amicable agreements between the parties. It is difficult to distinguish between such borrowers, and the legislation might lead to market distortions on implementing to input loan recipients and stakeholders.

The findings from the study revealed that a coefficient on satisfaction of conditions imposed to enable timely loan repayment is significant and negative ($p<0.001$). This indicates that borrowers who agreed upon the recovery conditions instituted by different zoned companies were less likely to encounter any repayment problems (Table 26).

However, it is noted that an increase of a cotton farmer who abide to repayment conditions and other loan arrangements decrease the probability to default by 63.58% compared to those who disagreed on the loan facility (Table 27). Tundui and Tundui (2013) suggests that the focus on joint liability can help to achieve better screening, encourages peer monitoring and gives group members incentives to enforce loan conditions. The scheme may draw on the advantage of close ties among members to attain the benefits obtained from loan facility.

CHAPTER FIVE

5.0 CONCLUSION, RECOMMENDATIONS

5.1 Conclusions

The performance of the cotton sub-sector in terms of both production and productivity in Tanzania is poor and commercially viable yields have not been attained. This might be related to inadequate use of agricultural inputs such as insecticides, improved seeds, chemical fertilizers and farm implements.

The use of agricultural inputs demands more capital than what cotton farmers can afford. Hence, there is a wide gap between owned and required capital to finance sustainable cotton production, since the revenue from current cotton harvests have no much surplus beyond family consumption and other basic obligations for the majority of cotton farming households. In cotton production, there is a time gap between incurring production expenses and realizing income from farm harvest.

These attributes in their totality called for the external sources of inputs in the form of credit to fill the gap of capital deficiencies. The salient feature of contract farming is to supply input loan to cotton farmers by ginning companies through joint group liability approach on farmers' business groups. The loan is extended up to harvesting season when cotton farmers are obliged to sell their seed cotton to the company which supplied the credit and subsequent repay the loan.

This study was intended to examine personal, socio-economic, farm, loan acquisition, use and repayment characteristics; and analyse factors responsible for input loan default in Bariadi district for the 2011/12 cropping season.

Results showed that there were significant t- and chi-square differences in the production characteristics of cotton farmers who obtain input loans. Statistics revelead differences between defaulters and non-defaulters with respect to age, marital status, education, family size, experience in farming, land size cultivated cotton and regular access to extension services.

The study had also noticed that results on the attitude of beneficiaries on input loan acquisition, use and repayment shows significant differences. The attributes of paramount importance were input supplier company, sufficiency of loan received, other sources of financial support to farm activities, perception on loan repayment, borrowers training and conditions imposed on loan repayment.

The probit econometric model also show that out of 20 explanatory variables used; eight variables are hypothesized to explain the factors that affect loan repayment of cotton farmers in Bariadi district. The three significant variables were positive while the other five had a negative influence on loan repayment of sample respondent farmers.

The findings lead to the conclusion that the idea of cotton industry stakeholders to promote input loan facility to cotton farming households through cotton ginning companies require conscious use of policies to focus on significant differences on the attributes between defaulter and non-defaulter groups and apply it on the input loan scheme arrangements.

Further more, the signs of the variables obtained in the econometric model should be devised a mechanism to address and revise the input loan eligibility criteria. It would be logical for ginners to use negative coefficients; on inputs acquisition, use and repayment

aspects to encourage the present level of recovery and modify the positive attributes on default.

Improved production, good perception on loan repayment, sufficient training to farmers, close monitoring of input loan and conditions imposed on loan repayment would enhance the recovery of loan facility. In the same vein, factors which resulted to positive coefficients; namely the type of input loan received, input supplier company loan and timely delivery of input loan need remedial measures to comprehend the performance obtained from the previous attributes. The aim is to increase beneficiary farmers' access to basic inputs and improve farm management opportunities. This would lead to higher productivity and improved standard of living among cotton farming households.

5.2 Recommendations

Based on the significant findings of the study, the following policy recommendations were advocated for better achievement of the credit facility.

i. Promoting establishment of stable farmers' business groups

The remnant of previous primary societies and cooperative unions continue to affect any new initiatives to develop farmer owned producer organizations. The current approach of FBG formation should be revised by cotton stakeholders in order to exclude opportunists who are easily attracted to form and join the groups just because of input loans, while in reality they never had even a cotton farm. The most probable approach is to start with farm scouring from close vicinity to get farmers who will form few FBGs. Scaling up to new FBGs should base on the performance through loan scouring of previous loaned cotton farmers.

ii. Increase investment in the production of better yielding varieties

Good harvests in seed cotton have shown a great potential of decreasing input loan defaults among cotton farmers. Hence, investment in research should be increased to produce better yielding varieties which adopt different biotic and abiotic environments in WCGA than the current UK 91, UK 0.8 and UKM 0.8. The aim is to reduce production risks and increase harvest from seed cotton, which would enhance repayments from incurring input loans.

iii. Ensuring sufficient training to cotton farmers

It has been highlighted in the study that the use of participatory training is necessary to impart skills needed to operate a market-oriented associations, such as managing agribusiness transactions and contracts. Efforts should be devoted to the provision of enough training to loan beneficiaries to increase the awareness, adhere to best agronomic practices, entrepreneurial habits and motives to better living standards through acquisition and repayment of loans. The aim is to reduce the human factor on deliberate and unintentional defaults.

iv. Development of sound monitoring and tracking system for input loans

Close monitoring of loan transactions is crucial for the client to utilize the loan efficiently for the intended purpose. Frequent visits and supervision should be instituted to cotton industry stakeholders on cotton acreage, crop development, inputs use and repayments in order to constrain farmers who jeopardize the merits of the loan facility on input supply to farmers at a time of financial woes. This would promote the effective use of input loans to cotton farms at the appropriate time and reduce the diversion of the loan facility to unintended crop and beneficiaries.

v. Development of risk and uncertainty mitigation strategies

Future market trends should be employed by cotton industry stakeholders to confine market risks; on the fluctuation of cotton prices and modify the conditions for loan repayment. The introduction of price stabilization fund would serve whenever price drops and the farmer cannot meet repayment conditions in place. The industry should also consider insuring on inputs and crops in the field to help the scheme reaching the ultimate goal of improving the Subsector.

5.3 Areas of further research

The commitment of ginners is of paramount to the success of input loan facility. The study showed that some of the variables, such as the type of input loan received, input supplier company and timeliness delivery of input loans contributed to poor input loan repayment. These attributes are related to lack of accountability of ginners; caused by unprofitable scale of operations, inadequate assets, defective management, shortage of skilled manpower, corrupt and dishonest staff.

Further studies should be done to ascertain the capacity of each ginner on handling input loans and optimize transaction costs in contract farming. This would increase the efficiency on the administration and liability of supervising the beneficiaries with a view of ensuring stability and continuity in the supply of input.

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APPENDICES

Appendix 1: Semi - structured Questionnaire for Cotton Farmers

Date……... Ward……

Name of respondent…….. Village……..

A. PERSONAL INFORMATION

1. Age of respondent……

2. Marital status

   1=Married ( ) 2= single ( ) 3=divorced ( ) 4=widow ( )

3. Education level

   1= Did not attend to school ( ) 3= Secondary education ( )

   2= Primary education ( ) 4= College/University education ( )

4. Family size available to use as manpower…….……

B. FARMING INFORMATION

5. How long have you been involved in cotton farming enterprise? ……Yrs

6. What is the area of land you cultivated cotton during the cropping season 2011/12?

7. What was the amount of cotton harvested from the cultivated farm?.....

8. Do you have a regular access to extension services to demonstrate on the effective use of inputs? 1= yes ( ) 2= no ( )

C. OTHER INCOME GENERATING ACTIVITIES

9. Do you engage in other income generating activities?

   1= yes ( ) 2= no ( )

10. If the answer is yes, specify the activities……

D. INPUT CREDIT REQUISITION AND USE

11. Which company supplied you with the input loans?.....

12. What type of input loan you received from ginners?

    1= Insecticides ( ) 2= Seeds ( )

13. What was the total value of inputs which were loaned to you?.....

14. Does the input loan received satisfy your farm requirement?

    1=Yes ( ) 2=No ( )

15. Were the input loan delivered to you timely to meet the farm application?

    1= Yes ( ) 2= No ( )

16. Apart from ginners, where did you get financial support to your farm enterprise?

    1= Saving and Credit Societies ( ) 3= Well off farmers in the area ( )

    2= Local community financial services ( ) 4= No other source ( )

E. INPUT LOAN REPAYMENT

17. How did you perceive on repayment of input loan you received from ginners?

    1= Very good ( ) 2= Good ( ) 3= Fairly ( ) 4= Bad ( )

18. Did you get any training related to input loan repayment in cotton farming?

    1=Yes ( ) 2=No ( ) 3=Little ( )

19. What modality was used by the ginner to collect loans?.....

    1= Use of FBG leaders ( ) 2 = Use of company agents ( )

20. What time interval was used by the creditor to visit farmers for loan collection?

    1=Daily ( ) 2= Weekly ( )

21. Were the conditions imposed satisfactory to enable you repay the loan timely?

    1= Yes ( ) 2= No ( )

22. If no, what factors were responsible for cotton farmer to default input loans?

…….

23. What are your comments on improving input loan delivery to cotton farmers

    ……..……

THANK YOU FOR YOUR COOPERATION!

Appendix 2: Stata probit regression outputs

```
Probit Creditstat1 AGE LABOUR FARMSIZE HARVEST LAONSIZE married1
Education1 Incomeact Loantype1 NGSinvest Satisfaction
Alternative1 Perception1 Training1 Model1 Interval1 Extension
Otherincom Timely Condition1, vce(robust)

Iteration 0:   log pseudolikelihood = -74.095083
Iteration 1:   log pseudolikelihood = -34.40792
Iteration 2:   log pseudolikelihood = -31.535733
Iteration 3:   log pseudolikelihood = -31.308487
Iteration 4:   log pseudolikelihood = -31.307667
Iteration 5:   log pseudolikelihood = -31.307667

Number of obs         = 112
Wald chi2 (20)        = 57.49
Prob > chi2           = 0.0000
Pseudo R2             = 0.5775
Log pseudo likelihood = -31.307667

                    Robust
Creditstat1 Coef.   Std. Err   z   P>|z|     [95% C.I]
-------------------------------------------------------
AGE       -0.013379 0.023447 -0.57 0.568 -0.059334  0.032577
LABOUR     0.138134 0.098215  1.41 0.160 -0.054364  0.330631
FARMSIZE   0.168481 0.106957  1.58 0.115 -0.041151  0.378114
HARVEST   -0.000518 0.000256 -2.02 0.043 -0.001021 -0.000016
LOANSIZE   1.08e-06 3.22e-06  0.34 0.737 -5.22e-06  7.38e-06
married1  -0.342819 0.587770 -0.58 0.560 -1.494828  0.809189
Education1-0.133364 0.509200 -0.26 0.793 -1.131377  0.864650
Incomeact -0.108184 0.591666 -0.18 0.855 -1.267827  1.051460
Loantype1  1.111505 0.465047  2.39 0.017  0.200030  2.022979
NGSinvest  1.031717 0.507532  2.03 0.042  0.036973  2.026462
Satisfact -0.292751 0.494265 -0.59 0.554 -1.261493  0.675992
Alternatve 0.214961 0.593874  0.36 0.717 -0.949011  1.378932
Perception-1.214391 0.558408 -2.17 0.030 -2.308851 -0.119932
Training1 -2.943408 0.944379 -3.12 0.002 -4.794356 -1.092460
Model1     0.280974 0.581442  0.48 0.629 -0.858632  1.420579
Interval1 -0.998062 0.534099 -1.87 0.062 -2.044878  0.048753
Extension -0.288194 0.378769 -0.76 0.447 -1.030567  0.454180
Otherincom 0.137503 0.499259  0.28 0.783 -0.841027  1.116033
Timely     2.01468  0.594492  3.39 0.001  0.849498  3.179862
Condition -2.446861 0.512317 -4.78 0.000 -3.450984 -1.442739
cons       3.772054 2.151506  1.75 0.080 -0.444820  7.988928
```

Probit regression, reporting marginal effects

dprobit Creditstat1 AGE LABOUR FARMSIZE HARVEST LOANSIZE married1 Education1 Incomeact Loantype1 NGSinvest Satisfaction Alternative1 Perception1 Training1 Model1 Interval1 Extension Otherincom Timely Condition1, vce(robust)

Iteration 0: log pseudolikelihood = **-74.095083**
Iteration 1: log pseudolikelihood = **-37.764315**
Iteration 2: log pseudolikelihood = **-32.703265**
Iteration 3: log pseudolikelihood = **-31.503292**
Iteration 4: log pseudolikelihood = **-31.314231**
Iteration 5: log pseudolikelihood = **-31.307674**
Iteration 6: log pseudolikelihood = **-31.307667**

Number of obs = **112**
Wald chi2 (**20**) = **57.49**
Prob > chi2 = **0.0000**
Pseudo R2 = **0.5775**
Log pseudolikelihood = **-31.307667**

Credistat1	dF/dx	Robust Std. Err.	z	P>|z|	x-bar
AGE	**-0.0036721**	**0.0062890**	**-0.57**	**0.568**	**37.5446**
LABOUR	**0.0379138**	**0.0271747**	**1.41**	**0.160**	**4.35714**
FARMSIZE	**0.0462434**	**0.0293788**	**1.58**	**0.115**	**4.69643**
HARVEST	**-0.0001422**	**0.0000727**	**-2.02**	**0.043**	**1378.56**
LOANSIZE	**2.97e-07**	**8.91e-07**	**0.34**	**0.737**	**75124.1**
married1*	**-0.0860064**	**0.1327424**	**-0.58**	**0.560**	**0.785714**
Education1*	**-0.0360318**	**0.1353104**	**-0.26**	**0.793**	**0.633929**
Incomeact*	**-0.0304297**	**0.1713033**	**-0.18**	**0.855**	**0.232143**
Loantype1*	**0.3647216**	**0.1658275**	**2.39**	**0.017**	**0.767857**
NGSinvest*	**0.2465733**	**0.0981856**	**2.03**	**0.042**	**0.357143**
Satisfactn*	**-0.0761035**	**0.1210671**	**-0.59**	**0.554**	**0.705357**
Alternative*	**0.0551351**	**0.1410830**	**0.36**	**0.717**	**0.151786**
Percepepton*	**-0.2438306**	**0.0734865**	**-2.17**	**0.030**	**0.767857**
Training1*	**-0.3001588**	**0.0516308**	**-3.12**	**0.002**	**0.883929**
Model1*	**0.0848409**	**0.1921338**	**0.48**	**0.629**	**0.928571**
Interval1*	**-0.2316857**	**0.1042622**	**-1.87**	**0.062**	**0.678571**
Extension*	**-0.0762219**	**0.0976604**	**-0.76**	**0.447**	**0.642857**
Otherincom*	**0.0380527**	**0.1396511**	**0.28**	**0.783**	**0.571429**
Timely*	**0.6348833**	**0.1604968**	**3.39**	**0.001**	**0.696429**
Condition1*	**-0.6358170**	**0.0999248**	**-4.78**	**0.000**	**0.482143**

obs. P | **.625**
pred. P | **.8064345** (at x-bar)
(*) dF/dx is a discrete change of dummy variable from 0 to 1

z and P>|z| correspond to the test of the underlying coefficient being 0

Classification of the predicted probabilities on default [lstat]

Probit model for Creditstat1

Classified	True D	True ~D	Total
+	**63**	**4**	**67**
-	**7**	**38**	**45**
Total	**70**	**42**	**112**

Classified + if predicted Pr(D) >= 0.5
True D defined as Creditstat1 != 0

Sensitivity	Pr(+| D)	**90.00%**
Specificity	Pr(-|~D)	**90.48%**
Positive predictive value	Pr(D| +)	**94.03%**
Negative predictive value	Pr(~D| -)	**84.44%**
False + rate for true ~D	Pr(+|~D)	**9.52%**
False - rate for true D	Pr(-| D)	**10.00%**
False + rate for classified +	Pr(~D| +)	**5.97%**
False - rate for classified -	Pr(D| -)	**15.56%**
Correctly classified		**90.18%**

Regression diagnostics: variance inflation factors for independent variables [estat vif]

Variable	VIF	1/VIF
AGE	**14.22**	**0.070303**
EXPERIENCE	**13.24**	**0.075502**
FARMSIZE	**4.01**	**0.249308**
HARVEST	**3.57**	**0.279821**
LOANSIZE	**3.00**	**0.333490**
LABOUR	**2.65**	**0.377967**
Interval1	**2.25**	**0.445306**
Loantype1	**2.09**	**0.479084**
Incomeact	**2.01**	**0.498332**
NGSinvest	**1.96**	**0.509385**
Education1	**1.84**	**0.542786**
Satisfaction	**1.83**	**0.545517**
Otherincom	**1.72**	**0.580334**
Alternative1	**1.67**	**0.599915**
Model1	**1.63**	**0.612457**
Condition1	**1.50**	**0.667927**
Timely	**1.48**	**0.674266**
married1	**1.45**	**0.689228**
Perception1	**1.35**	**0.738244**
Training1	**1.34**	**0.747171**
Extension	**1.24**	**0.806940**
Mean VIF	**3.15**	

Appendix 3: The minimum requirements of FBGs ginners were required to sign up in each zone

Zone	Minimum number of FBGs
Magu	23
Mara	100
Bariadi East	21
Bariadi West	21
Maswa	41
Meatu	23
Kishapu and Shinyanga Rural	32
Kwimba and Misungwi	55
Sengerema,Geita, Biharamulo and Chato	21
Bukombe and Kibondo	55
Kahama	37
Tabora and Singida	15

Appendix 4: Inputs credit distribution, levels of its recovery and deliveries of seed cotton from the respective wards involved in the study for a cropping season 2011/12

1. Inputs credit value (in TZS) supplied to farmers

	Ginner				
Ward	Alliance Ginneries	NGS Investment	Nsagali Co. Ltd	Olam (T) Ltd	Total
Guduwi	22 307 000	16 389 300	35 269 300	0	73 965 600
I/bashashi	22 196 000	29 893 600	27 750 100	2 086 500	81 926 200
Sapiwi	41 562 800	4 107 900	11 450 400	12 575 100	69 696 200
Zagayu	5 137 030	125 277 250	38 793 600	1 590 000	170 797 880
Total	91 202 830	175 668 050	113 263 400	16 251 600	396 385 880

2. Recovered value (TZS) of inputs credit by ginning companies from respective loaned wards.

	Ginner				
Ward	Alliance Ginneries	NGS Investment	Nsagali Co. Ltd	Olam (T) Ltd	Total
Guduwi	6 642 730	16 337 900	18 761 600	0	41 742 230
I/bashashi	4 433 310	7 683 500	14 189 350	1 112 500	27 418 660
Sapiwi	41 562 800	4 100 000	8 800 500	8 971 000	63 434 300
Zagayu	4 212 070	83 127 800	26 147 900	0	113 487 790
Total	56 850 930	111 249 200	67 899 350	10 083 500	246 082 980

3. Cotton deliveries (kg) to ginneries from the respective loaned wards

	Ginner				
Ward	Alliance Ginneries	NGS Investment	Nsagali Co. Ltd	Olam (T) Ltd	Total
Guduwi	253 118	400 786	98 330	165 000	917 234
I/bashashi	241 731	478 900	106 733	155 440	982 804
Sapiwi	322 229	118 900	109 293	553 320	1 103 742
Zagayu	191 903	674 700	128 308	197 820	1 192 731
Total	1 008 981	1 673 286	442 664	1 071 580	4 196 511

Appendix 5: Cotton Industry stakeholders

1. Tanzania Cotton Board (TCB)

A statutory body that promotes growth of production, processing and marketing of cotton, with the regulatory roles and legal framework to improve and develop the cotton industry. The Cotton Industry Act of 2001 gave the newly created Tanzania Cotton Board sweeping new powers as the only regulator of the industry. Among other things, the TCB is responsible for licensing buyers of seed cotton, exporters of cotton lint and gin operators; formulating regulations for cotton cultivation, marketing, processing, importation, exportation and storage of cotton seed/lint, establishing quality standards of cotton seed/lint as well as determining the quantity of cotton seed to be kept by ginners for planting the following season. Wholly funded by the government since 2010, the new body is led by a Board of Directors comprising of representatives of parliament, Ministry of Agriculture, Food Security and Co-operatives (MAFC), cotton buyers and farmers (usually an MP from a cotton growing region).

2. Cotton Development Trust Fund (CDTF)

The Cotton Development Trust Fund is an independent Tanzanian institution which brings together stakeholders of the cotton industry. It was established in April 2006 by the cotton industry stakeholders in Tanzania as an independent service delivery institution in the cotton industry to replace its forerunner, the Cotton Development Fund (CDF). CDTF was incorporated in 2007 under the Trustees Ordinance (chapter 375 RE 2002). CDF was established in mid – 1999 by the Tanzania Cotton Board (TCB) to involve stakeholder initiatives to restore order in the industry following the emergence of a host of problems which were caused by the 1990s liberalization of agricultural markets and government withdrawal from direct involvement in production and trading. Major functions of the Fund were to oversee cotton development, in particular through facilitation of the

importation and efficient distribution of inputs. Initially funded by a 3% levy on cotton exports, it finances the purchase of seeds and pesticides to be distributed to registered producers at below – market prices, with the fund making up the difference. A forced saving mechanism, the fund involved no subsidy, and was administered by the TCB. Since 2006, the trust fund collect contributions from ginners, commensurate to the amount of cotton purchased, but changing every year, to collectively import chemical insecticides and distribute them to buyers to be sold on to farmers. Linked to that fund, a passbook scheme was put in place to assist producers accessing pesticides. At the buying post, the quantity of cotton sold is recorded in a passbook owned by registered cotton producers. At the start of the following season, the producers are entitled to claim pesticides up to the value recorded in their passbooks. Even though it may have contributed to the bumper harvests of 2004/5, the system has been riddled with problems and has made a very limited contribution to the intensification of cotton production.

3. Tanzania Cotton Association (TCA)

The association comprises of persons, firms or corporate bodies holding licenses under the Tanzania Cotton Industry and Licensing legislature as cotton buyers and ginners. It is also consists of associate members who are individuals, associations, institutions, corporate bodies and exporters who are members for the purpose of supporting the objectives of the association materially and financially. It is the lobby of the Private Sector in the cotton industry and is represented in the meeting during

annual floor – price setting.

The objectives of TCA are:

- To ensure sustainable growth and development of the cotton industry
- To protect and promote the interests of those involved in cultivating, trading, ginning and export of cotton from Tanzania.
- To represent members in any matter pertaining to the cotton industry
- To collect and disseminate statistical and other information related to cotton industry transactions.
- To deal with matters related to grading and classification of Tanzania cotton and take action to encourage improvement in research and seed multiplication.

4. Tanzania Cotton Growers Association (TACOGA)

The Tanzanian Cotton Growers' Association was registered by personal initiatives of an ex- cooperative employee in October 2002, but funding to create a strong, grassroots organization has been lacking. TCB has provided some financial assistance to enable founder members to meet basic operations of the organization, and the benefits of membership are being promoted by lead farmers who have won awards in the annual best farmers' competition organized by TCB. The board of TACOGA is composed of 12 members elected by district representatives. As the apex organization of Tanzanian cotton producers, TACOGA holds two seats on the CDTF Board of Trustees, and is invited to the stakeholder meetings organized by TCB on a regular basis. In particular, TACOGA representatives are invited to commonly negotiate the floor price –setting for seed cotton that is defined every year at the beginning of the buying season, in a meeting involving TCB, TCA and government representatives. Currently, TACOGA is funded exclusively by the Cotton Development Trust Fund (CDTF) through a levy on all seed cotton purchased in the country. The last elections were held in March 2011, when about three quarters of the incumbent board members were replaced.

5. Tanzania Gatsby Trust (TGT)

The Tanzania Gatsby Trust has been registered as a charitable Trust in Tanzania since 1992 under the Trustees' Incorporation Ordinance, Cap 375 for poverty alleviation by enabling hundreds of Small and Medium sized Enterprises (SMEs) to carry out productive and profitable enterprises. Its Cotton and Textile Development Program was initiated from discussions between Lord David Sainsbury; the Settler of the UK Gatsby Charitable Foundation (GCF) and Tanzanian government officials. It is comprised of the following elements:

(a) Cotton sub sector study with a focus on the long term potential for a major increase in the output of Tanzania's cotton and textile sector with a view to maximizing its potential contribution to the generation of increased GDP, exports, farmer incomes and manufacturing employment

(b) A development strategy for Cotton and Textile Program with ambitious but achievable objectives:

i. Increase of cotton production from 700 000 bales to 1 500 000 bales per annum.
ii. Raise yields from 750kg/ha to 1 500kg/ha by 2010 and 2 500 kg/ha by 2015.
iii. Increase the proportion of lint consumed in the domestic textile industry from 30% to 90% by 2015.

(c) Conservation Agriculture (CA) to cotton growing households with the aims to Increase the productivity /yield at the farm level based on well –developed crop management practices for both cotton and food production. CA is a unique agricultural practice that involves simultaneously sustained use of four principles that are;

- Minimum soil disturbance (ideally no tilling and direct seeding)
- Permanent soil cover (ideally 100% + using crop residuals and/or Green manure cover crops)
- Multi – cropping (ideal crop rotation)
- The integration of crop and livestock production

(d) Strategy for Textile that envisages increasing the value chain addition, through domestic consumption of cotton lint. This requires a subsequent increase of both local and foreign direct investment. The potential is mainly on continued products (e.g. towels, bed sheets) and production of African based design themes for the export market. For this to be achieved there is a need to support the development of skills that will be able to support these production stages of textile engineering and design from the university to vocational college level. The rolling out of contract farming countrywide, including mobilization of cotton growers into FBGs is part of TGT's CDTF program that is being implemented jointly with the TCB.