MARKET INFRASTRUCTURE AND ITS IMPACT ON AGRICULTURAL PROFITABILITY IN MPANDA DISTRICT, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

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ABSTRACT

Several factors such as cost of inputs, unreliable rainfall and poor market infrastructures and road are known to affect the performance of the agricultural sector in Tanzania. Therefore, this study investigated the influence of roads on maize profitability in Mpanda district. Specifically the study examined the effect of road infrastructure on cost of input in areas with poor and good roads. Furthermore, the study examined the effect of market accessibility by roads on the profitability of maize farming and evaluated the factors influencing profitability of maize farming in the study area. Purposive sampling was employed to select five wards based on categorical difference in areas with good and bad roads. Simple random sampling was then applied to select 125 respondents. The study found that the mean cost of inputs in areas with poor road infrastructures were higher than that of areas with good roads. At the same time, maize farming was found to be more profitable in areas with relatively good roads than in areas with relatively difficultly passable roads. Farmers from areas with relatively good roads get an average gross revenue of 1 066 417 Tshs/ha from maize farming while farmers from areas with relatively poor roads get an average gross income of 356 905 Tshs/ha. The study also found an existence of significant relationship between maize profitability and several socio-economic factors that included gender, age, farm size, credit access market accessibility and price road conditions. However, few factors like availability of extension service and types of labour used were recommended for further investigations due to their inconclusiveness.

DECLARATION

I, Seif Mohamed, do hereby declare to the Senate of Sokoine University of Agriculture, that this dissertation is my own work done within the period of registration and that it has neither been submitted nor being concurrently submitted for degree award to any other institution.

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The above declaration is confirmed by

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Date

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DEDICATION

This dissertation is dedicated to my father the late Mr. Francis Omary Makome, my mother the late Mrs. Josephine Richard Sayavuli and my daughter Josephine Careen.

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LIST OF ABBREVIATIONS

ACT	Agricultural Council of Tanzania
ADB	Asian Development Bank
AfDB	African Development Bank
AMSDP	Agricultural Marketing System Development Programme
ATC	Air Tanzania Corporation
CARE	Cooperative for Assistance and Relief Everywhere
DADPS	District Agricultural Development Programs
DALDO	District Agricultural and Livestock Development Officer
DED	District Executive Director
FAO	Food and Agricultural Organization
GDP	Gross Domestic Product
IFPRI	International Food Policy Research Institute
JKNIA	Julius Kambarage Nyerere International Airport
KIA	Kilimanjaro International Airport
MAFSC	Ministry of Agriculture, Food Security and Cooperatives
MDC	Mpanda District Council
MIVARF	Marketing Infrastructure, Value Addition and Rural Finance Support
MOID	Ministry of Infrastructure Development
NABARD	National Bank for Agriculture and rural Development
NGOs	Non-Government Organizations
NSGR	National Strategic Grain Reserve
NSGRP	National Strategy for Growth and Reduction of Poverty
OECD	Organization for Economic Co-operation and Development

PASS	Private Agriculture Sector Support
PhD	Doctor of Philosophy
PMORALG	Prime Minister's Office- Regional Administration and Local Government
RFB	Road Fund Board
SNAL	Sokoine National Agricultural Library
SPSS	Statistical Package for Social Sciences
TANROADS	Tanzania National Roads Agency
TASAF	Tanzania Social Action Fund
TAZARA	Tanzania – Zambia Railway Authority
TRC	Tanzania Railways Corporation
TRL	Tanzania Railways Limited
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
URT	United Republic of Tanzania
WRS	Warehouse Receipt System

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Agriculture is the backbone of the Tanzanian economy. It contributes about 26.5% of GDP and 30 % of export earnings (URT, 2009a). The sector has been experiencing a dismal growth rate over time. However, there has been an overall increase of five year moving average agricultural GDP growth rates of about 3.3% (1991 – 2000) to 5% in 2001 to 2006. The sector provides employment to about 80% of the total labour force out of which 56% are women (URT, 2009a).

The crop sub-sector contributes about 35% of GDP and grows at 3.8% annually, and food crop production has grown at a rate of about 2.8% accounting for about 65% of agricultural GDP while cash crops account for only about 10% (Mwakalinga and Masawe, 2007). Maize is the most important food crop accounting for over 20% of total GDP (Mwakalinga and Masawe, 2007). Agricultural export crops have been growing at about 6 % while food crops have been growing at 4%. Food and cash crops account for about 70 % of rural incomes (URT, 2010). Tanzania agriculture is characterized by very low productivity, for example maize production at national level averages at 1600kgs/ha against a potential of more than 5000kgs demonstrated by some farmers. Among the major reasons has been heavy dependence on rain-fed agriculture, use of rudimentary tools such as hand hoe and low level of mechanization for most of the agricultural operations and unorganised market infrastructure including poor rural roads (URT, 2010). To the present, about 70% of our farmers use hand hoe for their cultivation, 20% use ox – ploughs and the 10% use tractors (Mwakalinga and Masawe, 2007). Other problems

facing the agriculture sector includes lack of credit facilities, low level of extension services and inadequate supply of agricultural inputs (Buttel, 1991).

All weather roads open distribution channels to the market thus reducing transport costs hence improving competitiveness in the market system. These in turn increase producer's prices and raise income of the poor (Berdegu, 2001; 2002). Furthermore, rural infrastructure has its impact on attitude and values of rural households as well. According to Ahmed and Hossain (1990) the most profound effect of infrastructure development could be on the attitude and values of rural households through enhanced mobility and increased information circulation. The World Bank (1997); FAO (2002c); FAO (2002e) underscores the gravity of rural infrastructure bottlenecks in Sub-Sahara, and suggests that improving rural infrastructure is an essential requirement for modernization and growth of agriculture. Bryceson (2000) cautioned that the impacts of better market incentives, especially those related to price and inputs will be decreased if the physical barrier and economic costs of infrastructure, for example, transporting agricultural products to and from local market, will remain high.

According to Cordula (2004) and UNESCO (2011) Tanzania's classified road network comprises about 86 000 kilometres, of which 44% are in good and fair conditions. The Highways Ordinance (Initiated in 1997) classified Tanzania's road network in five categories: (1) Trunk roads, (2) Regional roads, (3) District roads, (4) Feeder roads and (5) Urban or town roads. Trunk roads and urban roads which comprise a total of 28 933 kms are managed by TANROADS while 56 000 kms from district, feeder and urban/ town roads are managed by Local Government Authorities (Annex 1).

Following the stated paramount importance of rural infrastructure in agricultural services delivery and a widely coverage in rural roads network, this study assessed the influence of rural roads on profitability of maize to farmers, and recommend policy measures to improve the said subsector and hence, profitability to producers (Okoro, 2011).

It is a known fact that increased agricultural productivity enables farmers to produce more food, which translates into better diets and under good market conditions offers the farmers opportunity to earn more income (Dauda *et al.*, 2009).

One of the main features in agricultural production include, market infrastructure, empowering the farmers, supporting the provision of production inputs, improving rural communications, supporting rural farms and non-farm enterprises, focusing on the contribution of women and supporting increased food production in the rural areas (FAO, 2002d; FAO, 2002f).

1.2 Problem Statement and Justification

It is estimated that 15% of crop produce is lost between the farm gate and the consumer hence reducing income of farmers because of various reasons including dilapidated rural transportation infrastructure (Henson *et al.*, 2008; World Bank, 2007). In addition, several researchers asserted that increased crop acreage and opening of trade channels is a well-documented infrastructural achievement (URT, 2011). Thus, strengthening rural infrastructure especially roads can reduce income loss by reducing post-harvest losses, lower production costs which in turn stimulate agricultural production (Fabrizio *et al.*, 2001). Agricultural development is essential for economic growth, rural development, and poverty alleviation in low income developing countries (ADB, 1999). According to Skarstein (2005) productivity increase in agriculture is an effective driver of economic

growth and poverty reduction both within and outside agricultural sectors. Such productivity increase depends on good rural infrastructure, well-functioning domestic markets, appropriate institutions, and access to appropriate technology (Per Pintstrup and Shimokawa, 2006; Zeller, *et al.*, 1998). The state of rural infrastructure varies widely among developing countries; lower income developing countries suffer severe rural infrastructure deficiencies. Douthwaite (2002) noted that deficiencies in transportation, energy, telecommunication, and related infrastructure can easily translate into poorly functioning domestic markets with little spatial and temporal integration, low price transmission, and weak international competitiveness. Ibrahim and Bauer (2013) noted that financing Agricultural Marketing Systems Development Programme (AMSDP) successfully achieved its objectives in increasing the percentage of all-year passable rural roads and decrease in the number of households located more than 10kms from passable roads; increased volume of goods that moved within and out of the focal areas and access of farmers' produce to markets; and increased price of farmers produce and districts' revenue collection.

Despite the efforts made by the government to improve rural infrastructure; the present state of infrastructure is inadequate to stimulate additional agricultural production in rural areas. Although there is evidence that in general rural roads in Tanzania have been improved, agricultural production is still poor and crop price differential are rampant. There is limited research that has examined the impact of rural market infrastructure on agricultural production in terms of market margin as well as price and productivity differentials at various levels and locations (Gabagambi, 1998; 2003). In the study area, little is known on how infrastructures have impacted on agricultural productivity especially on the extent of profitability, input and output prices. For this case, the study

took maize enterprise as a case study where Mpanda District one of best maize producers in Tanzania is selected to be a research area.

1.3 Significance of the Study

This study sought to analyse the impact of market infrastructures specifically roads and market facilities, on profitability. Findings of this study provided useful information to planners, policy makers, extension agents and NGOs on important aspect pertaining inputs distribution, transportation and marketing. This study aimed at analysing the profitability on maize, marketing margins and how they are affected positively or negatively by infrastructure and recommend the policy measures while identifying the areas for improvement. The study will provide useful information to policy makers and development stakeholders by highlighting areas that need improvement in order to get rural roads and market infrastructure to contribute to agricultural development by allowing smooth movements of inputs, outputs and manpower, hence improvement of rural lives.

1.4 Study Objectives

1.4.1 General objective

To examine the influence of market infrastructure on maize profitability to producers, and recommend policy measures to improve rural roads and profitability

1.4.2 Specific objectives

i. To examine the effect of road infrastructure on cost of input in areas with poor and good road infrastructure in the study area;

ii. To calculate the effect of market accessibility by roads on the profitability of maize enterprise

iii. To evaluate other factors influencing the profitability of maize farming in Mpanda district

1.4.3 Hypotheses

i. Costs of inputs does not vary with quality of roads

ii. Good roads have no significant effect on maize profitability

iii. Social, physical and market factors do affect significantly the maize profitability in Mpanda District

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Road infrastructure development in Tanzania

The geographical nature of Tanzania especially its large size, climatic diversity and population dispersion give roads a special position in integration of the national economy. Roads improvement is therefore, paramount in order to serve the rural areas where more than 70% of population that almost entirely rely on roads as the prime mode of transport. Therefore, in Tanzania over 80% of passengers and over 75% of freight traffic annually are estimated to be moved by roads annually (URT, 2009b). TANROADS (2009) reported that Tanzania has an estimated road network of 86 472 km of which about 7% is classified as paved while roads are classified as national road was 29 847; trunk road was 10 601 km regional roads 19 246 km which falls under TANROADS management. According to United Nations Educational Science and Cultural Organisation (2011) there are 56 625 km of urban, district and feeder roads which are looked after by the Prime Minister's Office Regional Administration and Local Government (PMORALG).

In the past five years, there has been a steady improvement in the conditions of trunk and regional roads and it has helped to reduce infrastructure problems that faced many people in most parts of the country. Overall, road condition showed that 73% were good, 23% were fair and 4% were poor in comparison to 25% good, 40% fair and 35% poor in December 2001 (UNESCO, 2011). Despite the efforts, the road national network is still inadequate, and this inadequacy is partly caused by insufficient funds allocated for Rehabilitation, upgrading and for routine maintenance (TANROADS, 2009).

2.2 Infrastructure Development

De Janvry and Sadoulet (2001) noted that infrastructure especially roads is central in promoting economic growth particularly in rural areas with wide ranging impacts on individuals, households and communities both in terms of income and other poverty indicators. According to Douglas and Rogers (2010) roads have both direct and indirect benefits on development and therefore it is important to consider the both benefits in decision-making about infrastructure projects for example roads. There are also strong social benefits from infrastructure that need to be taken into account. Per Pintstrup and Shimokawa (2006) highlighted the economic benefits derived from improved roads as increased income, employment, productivity gain, better income distribution and opportunity for diversification. Social benefits such as time savings, school enrolment levels, access to health services, environmental improvement, skill development, capacity building, improved information and gender impacts are less transparent, but in the longer term may be as or more effective in poverty reduction because they lead to sustained improvements in quality of life independent of income sources Local Government is responsible for the management of infrastructure projects in poor rural areas (Dauda, 2012).

2.3 Transport Infrastructure in Tanzania

Road infrastructure sector is a prime mover of economic transformation in the country (Gabagambi, 2003). Tanzania's transportation network, a legacy of the colonial era, serves Tanzania's narrow bundle of raw material exports from hinterlands to ports, and has very limited inland interconnections. Failure to develop new networks is at the core of the roads and railway problems experienced to date (OECD, 2001).

The overall structure of the transport sector in Tanzania consists of four main sub – systems, which include (a) a road network criss–crossing the country (b) two railway systems – the Tanzania – Zambia Railway Authority (TAZARA), which links Dar es salaam with Zambia, and the Tanzania Railways Corporation (TRC) but now days known as Tanzania Railways Limited (TRL) which serves the central, northern and lake regions (c) the four main seaports of Dar es Salaam, Zanzibar, Tanga and Mtwara and (d) a civil aviation sub sector consisting of Air Tanzania Corporation (ATC), several small airlines, two international airports of Julius Kambarage Nyerere International Airport (JKNIA) and Kilimanjaro International Airport (KIA), and more than 60 smaller domestic airports and airstrips (Temu *et al.*, 2005: Gabagambi, 2001). An in –depth separate account of the road sector's contribution in the Tanzanian economy is hampered by data inadequacy. Estimates shows that road transport is the dominant mode of transport which accounts for about one – third of the cargo handled in the country and account for more than 70% of the total internal traffic flows.

2.4 The role of Roads in Tanzanian Economy

Transport in general and more specifically road transport plays an important part of the daily activities of the people and the entire economy of the country (AfDB, 2009: NABARD, 2004). According to Gabagambi (2003) the contribution of the roads sector to the Tanzanian economy may not be easily separated out from that of the whole transport sector in general. Its dominance, however, is well documented, mainly in the areas of contribution to GDP, employment, capital formation, provision of intermediate inputs to all the other sectors of the economy, and poverty reduction in the sense of unlocking areas offering economic opportunities (McKinnon *et al.*, 2008).

2.4.1 Road networks in Tanzania

Tanzania has four major road networks: The Tanzania – Zambia highway; the central line, the North Eastern highway and the lake zone network. These high ways link to trunk, rural and feeder roads in the hinterlands Temu *et al.* (2005). Although feeder roads are more important for connecting remote smallholder rural agricultural producers to markets and services, available data at national level focuses mainly on paved and unpaved trunk roads (URT, 2009). In summary, the country has a very low road density, estimated at below 0.05 km per km^2. There are 85 000 kms of road comprising 10 300 highway and trunk roads, 24 700 kms regional roads, 20 000 kms district roads, 30 000 kms of feeder roads and 20 000 kms are of an unclassified category (UNESCO, 2011). Transportation is crucial for timely delivery of productive and consumption commodities. Rural roads, and in particular district and feeder roads, deliver goods and services required for agricultural production to remote areas. In Tanzania rural roads are predominantly impassable during the rainy season (UNESCO, 2011).

2.4.2 Road classification

According to Vandhiyan report (2012) roads can be classified in different ways. The classification based on speed and accessibility is the most generic one. In the study area, roads were classified based on some other criteria. Based on usage, this classification is based on whether the roads can be used during different seasons of the year.

i. All weather roads (Good roads): Those roads which are passable during all weathers, except at major river crossings where interruption of traffic is permissible up to a certain extent, are called good roads.

ii. Fair-weather roads: Roads which are negotiable only during fair weather are called fair weather roads.

iii. Bad roads: Roads which are passable only during good weather are called bad roads.

2.5 Importance of Market Infrastructure

Market infrastructure is essential to support commerce, economic activity and development, or whatever other activities are facilitated by the system it operates (Rainsudin, 1996). According to NABARD (2004); Izuchukwu (2011) adequate and quality infrastructure is a sine qua for sustainable development of agriculture. Strengthening rural infrastructure like, markets, roads and bridges, market facilities, post-harvesting facilities, results in improved productivity, efficiency, reduced production costs, and post-harvest losses, which further enhance income and employment for the rural farming community (Rainsudin and Hassain, 1990).

2.6 Market Facilities

Shilpi and Umali-Deininger (2008) noted that any improvement in the market facility and road infrastructure can induce a multitude of responses from the farmers. It can encourage farmers to change cropping patterns, to increase amount of sales and to take products to the marketplace instead of selling at the farm-gate. The poorer farmers can benefit from an improvement in the market facility if it improves their access to congested market and induces them to sell at the market. Infrastructure facilities lead to reduction in marketing costs which is crucial for increasing the realization of growers and reducing the costs to the consumer (Everrat and Zulu, 2001).

2.7 Review of Empirical Studies

2.7.1 Infrastructure is essential for agricultural development

The importance of good infrastructure for agricultural development is widely recognized. In this study will examine how physical infrastructure contributes to agricultural

development in Mpanda District. (Van Compenhout, 2007; FAO, 1996) concluded that roads, electricity supplies, telecommunications, and other infrastructure services are limited in all rural areas, although they are of key importance to stimulate agricultural investment and growth.

According to Dercon, *et al.* (2007) communications such as roads and telecommunications are a key requirement of agricultural productivity. They reduce transportation cost, increase competition, reduce marketing margins, and in this way can directly improve farm incomes and private investment opportunities. These conclusions are supported by several studies of infrastructure in developing countries (Antle, 1983; Binswanger *et al.*, 1993; Fan and Zhang, 2001). These studies demonstrate that investment in infrastructure is essential to increase farmers' access to in and output markets, to stimulate the rural non-farm economy and vitalize rural towns, to increase consumer demand in rural areas, and to facilitate the integration of less-favoured rural areas into national and international economies.

2.7.2 Market infrastructure development

Development of economic infrastructure is central in promoting economic growth. Infrastructure conditions especially in rural areas impact farmers' economies at households and communities levels (Zorya and Mahdi, 2009). The effect is normally wide ranging from income generation and distribution to overall livelihood improvement (Ellis, 1998; 1999, 2000). Generally, infrastructure in one way or another impact development and it is therefore, important to consider broadly the effect of infrastructure during any decision making process (Minten, 1999). Positively, infrastructure impact the economy through increased income, productivity gain, even in income distribution and enables agriculture diversification in terms of crop produced. Additionally, according to (Per

Pintstrup and Shimokawa, 2006) positive social impacts include employment creation, easy of travel, improved education, access to health services, environmental improvement, skill development, capacity building, improved information and gender impacts are less transparent, but in the longer term may be as or more effective in poverty reduction because they lead to sustained improvements in quality of life independent of income sources.

2.7.3 Agricultural productivity

Agricultural productivity refers to output per unit of input used and is usually expressed in tonnes, kilograms or grams per unit input. An immediate question arises as to how to best combine different agricultural products since summing over weights or volumes is not very meaningful (Rameshi *et al.*, 2011). One approach when dealing with crops is to convert them to a common physical unit, such as wheat or maize units (Hayami and Ruttan, 1985; Block, 1994). More commonly, aggregate output in agriculture is measured in monetary units as the sum of the value of all production in the agricultural sector minus the value of intermediate inputs originating within the agricultural sector (Shand, 1987; Abrew, 2003). Productivity measures are subdivided into partial or total measures. Partial measures are the amount of output per unit of a particular input. To account for a total measure of productivity, the Total Factor Productivity (TFP) was devised. TFP is the ratio of an index of agricultural output to an index of agricultural inputs (Ahearn *et al.*, 1998; Anerson and Feeder, 2003).

According to Mwakalinga and Masawe (2007) the average productivity of maize between 1998/99 and 2004/05 was 1269.42kgs/ha. In contrast, productivity in US is about 7000kgs/ha while in Europe it is more than 10 000kg/ha. If we could double productivity to 2538kgs/ha there is likely to be a surplus of about 3 million metric tonnes from existing

economic value of selected area while factors that affect the maize farming in Mpanda District was examined using a specified regression model.

3.5.1 Road infrastructure and cost of input

In order to establish the effect of road infrastructure on costs of inputs, production cost of individual farmers were established prior to establishing the mean average cost per hectare for each study cluster for comparison purpose. Thereafter, the statistical significance in difference of the effect of road infrastructure on input cost in areas with poor roads and those with good roads was established using an independent t-test for equality of mean.

3.5.2 Market accessibility and profitability of maize

Gross Margins Analysis was used to establish a non-parametric difference in the profitability of maize production for the two groups involved in this study. Gross margin was employed in order to measure the value of an enterprise less the variable cost (Msangi, 2000). Furthermore, the effect of market accessibility caused by road conditions for two underlined mean income of the two sampled study populations was statistically tested using *t*–test for independent sample means. This was done in order to establish whether there is a significant difference in mean income between the two study strata. The study hypothesized earlier that poor road conditions is the source of significant reduction in the economic gains realized by farmers in these areas. Therefore, this study assumed that farmers in the research area exist in two mutually exclusive groups namely farmers with good access to market made possible by presence of accessible roads and farmers farming in area that is without good roads thus having difficult in accessing market.

The formula for calculating gross margin is given below:

GM = TR- AVC .....(1)

Whereby

GM = Gross Margin in Tshs/ha

TR = Total Revenue in Tshs/ha

AVC = Average Variable cost in Tsh

Nevertheless, Mutayoba (2005) and Kabbiri (2009) highlighted a number of limitations associated with Gross Margin analysis. Firstly, he concluded that the Gross Margin cannot be treated as a profit figure because fixed costs have to be covered by Gross Margin in order to derive the profit figure. In his second conclusion he observed that Gross Margin can vary widely from one year to the next due to the fluctuation in market prices and efficiency. Kabbiri (2009) concluded that, Gross Margin analysis is static and therefore, do not no consider any variation in money value over time.

3.5.3 Factors influencing the profitability of maize farming

Multiple regression models was used to fit an equation which was used to examine the functional relationship between factors that were assumed priori to have significant effect on the profit of any farmer participating in Maize farming. Therefore, variables included in the model were those thought in advance to be capable of affecting level of profit of maize realized by farmer which is represented by maize output as a proxy. Maize output in this study is specified as dependent variables while the independent variables include farm size (acre); capital investment (Tshs); labour; access to credit; price of maize; availability of extension services and roads access dummy.

The model is of this form:

$\ln Y = \alpha + \beta_1 X_1 + \beta_2 X2 + \beta_3 X_3 + \beta_4 X4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$.....(2)

Whereby:

α	=	Intercept when all independent variables are equal to zero.
Y	=	Profitability (TShs/ha)
X_1	=	Farm size (ha)
X_2	=	Type of labour used
X_3	=	Capital invested (Tshs)
X_4	=	Road conditions
X_5	=	Market access
X_6	=	Credit access
X_7	=	Price of maize (Tshs)
X_8	=	Availability of extension services
$\beta_1 - \beta_8$	=	coefficients of determination of independent variables
$\mathcal{E}$	=	Stochastic disturbance (Error term)

Description of variables in regression model

Farm Size

This study assumed an increase in farm causes an increase in farm yield ceteris paribus. Farm size determines farm income (Devereux, 2001). Similar to this study, most scholars have used gross margin to establish farm income as it is free from influence that can originate from any structural change or farm size that can occur in the farm settings during the analysis. This variable was assumed to a continuous variable and was expected to be significant and carry a positive sign.

Type labour used

This variable was employed as a categorical variable to account for advantages accrued to farmers employing to categories of farm labour available within the study area. Type of labour used here stands for either hired or family labour; a farmer who relies heavily on family labour was expected to have limitation on the size of land he can cultivate. Farmers using hired labour were assumed to have an advantage to increase maize productivity thus were assigned a value of 1 and used as a control group. Meanwhile, farmers who used family labour were assigned a value of 0 as it was a assumed that farm labour is limited and not always available and prone to fluctuation due to other family commitments. Therefore, farmers who depend and use hired labour are expected to generate higher income than their counterparts. Therefore, this variable is anticipated to significantly affect farmer's income and carry a positive sign.

Capital invested

An increased capital outlay of a farmer increases ability of a farm to invest as a farmer would be able to cover almost all the variable cost involved with maize farming which subsequently translates into increased farm profit. The higher the capital invested in farming the higher the yield. The capital outlay allows a farmer to timely cover the necessary farming costs (Corbertt, 1988). This study employed this variable as a continuous entity in order to capture its direction and magnitude of its effect on income realised by a farmer. Thus, the study expected apriority that an increased capital outlay available to famer has significant effect on the net income of the respective farmer. Therefore, the relationship between net income and capital investment is supposedly a positive coefficient.

Road conditions

This variable was assumed a prior to have a significant positive influence of the net farm income realised by a farmer. Farmers in area that this study categorised as having good roads were assumed to enjoying some production advantages therefore, were expected to have an increased farm income. Thus, this group was assigned a value of 1 and used as a control. Meanwhile, famers from area with bad roads were herewith assumed to lack that categorical advantages associated with presence of good roads.

Market access

According to Minten (1999) hard infrastructure determines price levels of a farm products, soft farming infrastructure that include credit access, communication and possibility of choice between traders are as well. Therefore, Market access tends to be associated with improved prices for agricultural products while also ensures availability of major input at affordable prices. This study assumed that famers who are located in areas with difficult passable roads lack the advantage mentioned by (Minten, 1999; Kydd and Dorward, 2004) thus tend to realise reduced farm income. Therefore, famers from areas with good roads were categorised as a control group and were assumed to have all the advantages accrued to by good roads. Thus, the good roads farmers were assigned a value of one (1) while farmers from bad roads were assigned a value of zero (0) to account for the lack of the market access advantage.

Credit Access

Access to credit increases farmer's capital outlay, adequate capital outlay places a farmer in a position where he is able to cover all variable costs related to maize farming. Access to credit is a key factor for improving farm profits and rural living standards in developing countries. He further noted that credit had a positive impact on production

(Fengxia *et al.*, 2010). Meanwhile, Rahji *et al.* (2010) argued that farm credit is not only necessitated by dismal self-finance, but also by uncertainty arising to the level of farm inputs and output and the time lag between inputs and output acquisition. This situation causes rural households to resort to balancing their budgets during off peak season when revenue is small and not enough to cover the sky high cost of input as well as home consumption. In this way, the lack of access to credit caused by a struggle to balance the budget becomes a hindrance to improved agricultural production. Therefore, credit access crucially effects agricultural production. Zeller *et al.* (1998) noted that participation in an agricultural credit program was able to raise the cropping share for maize and tobacco had therefore there was a sizable effect on crop income as well. Therefore, due to this undisputed importance of credit access the study assumed this variable as categorical with farmers who have access to credit assigned a value of 1 and used as control. Meanwhile, farmers with no credit access were assigned a value of 0 to signify their lack of credit access. Thus, this variable was expected to be significant and carry a positive sign.

Price of maize

Laoubi and Yamao (2008) found that selling price seriously affects the farm profitability. They found that farmers selling their produce at farm level rather than market place realize reduced price and are characterised with low income. Minten (1999) found that communities with all season access to roads received higher prices than communities that have only access to seasonal roads or communities that do not have access to roads. Consequently, the lower the farm gate price for produces the lower the income realized. Therefore, this variable was expected to significantly affect the farm profit and carry either a positive or negative sign.

Availability of extension services

This is a dummy variable that indicated whether a farm household does or does not receive extension service (Received extension sevice = 1, Otherwise = 0). According to Temu (2005), there is a positive relationship between access to agricultural information and adoption behaviour of farmers in most developing countries. Thus, this study hypothesized that access to information through extension will increase farm profits in agricultural activities. Temu *et al.* (2005) found that extension services have significant effect on the profitability of farm profit especially on food crop. Therefore, extension services remain vital components of agricultural productivity improvement. Any scenario that leads to dismal provision of extension services would therefore hinder agricultural productivity improvement. This variable was therefore expected to carry a positive sign and have a significant effect (Qamar, 2001; 2002).

3.6 Limitation of the Study

Although this study was completed according to the requirements, a number of limitations were principally recorded. Owing to lack of proper record keeping, the collection of primary data largely depended on respondents' ability to recall past events. This was difficult on the part of respondents to give a correct account of household important information; triangulation method was used to ascertain information which deemed to be affected by the inability of the respondent to recall past events. This was done by asking another member of the household to give classification to assist in providing answers or to respond to questions stated in the questionnaire. Therefore, this way, the surveyor managed to capture all necessary information, justifiable to draw scientific conclusion.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-economic Characteristics of Respondents

4.1.1 Gender of respondents

The majority of the respondents (58.40%) were males while the rest (41.60%) were females (Table 1). Gender disparity is a determining attribute in agriculture for farmer's access; control and ownership of resources especially land. For Tanzania, in both smallholder and large farms men and women carry out different types of works therefore; men and women are rewarded unequally by the agricultural system, with women mostly realizing fewer returns when compared to their male counterparts (CARE, 2010). This is done despite the fact that women are key producers in agriculture, playing a multiple roles of ensuring smooth and healthy prospering of their homes (Adeoti, 2006; Adeleke *et al.*, 2008). However, the level of participation of women in Mpanda is relatively low due to cultural settings that place women as housekeepers while men carry out farm work.

4.1.2 Marital status of respondents

It was found that 79.20 % of respondents were married (Table 1). According to Liberio (2012) a higher household heads with married status are associated with increased crop production a factor that Liberio (2012) dedicated to availability of that can be exploited for during production without considering variations in farm size. However, it was observed the society in which the study was carried out was dominated by men who are left with almost entirely decision making with regards to production. The studied communities had that very few (approximately 9%) were single; 10% and 1% were either widowed or divorced. This indicated that in order to guarantee for food availability for their expected families, most married take agriculture more seriously than those who are

still single. This is evidenced by results which show that non married farmers account for at least 20% when counted together. In additional to marriage the study also shows that 96.8 % of farmers were also employed workers while 3.2% were found to be fully engaged agricultural (Table 1).

4.1.3 Occupation of respondents

The study also showed that most of the respondents 96.8 % were full time farmers while 3.2% were part time farmers and were employed workers but engaged in agricultural activities (Table 1). It was said that more than 80% of the rural Tanzanians are living in rural areas, where their principal activity is agriculture. This number in the study area is significant to conclude that the area is dominated by agriculture and its related activities, justifying a purposive effort of improving infrastructures.

Table 1: Distribution of farmers by sex, marital status and occupation

Variable	Counts	Percent
Gender		
Male	73	58.4
Female	52	41.6
Total	**125**	**100.0**
Marital Status		
Married	99	79.2
Single	11	8.8
Widow / Widower	12	9.6
Divorced / Separated	3	2.4
	125	100.0
Occupation		
Agriculture	121	96.8
Formal Employment	4	3.2
Total	**125**	**100.0**

4.1.4 Household size

The study showed that 56% of farmers had family size ranging from six and ten members. As noted according to Ngeleza *et al.* (2011) maize is the labour intensive crops with labour requirement of 531 man–hours per hectare which cannot readily be supplied by an average household that consist 6-10 members (Fig. 2). Therefore, the result implies that maize production relies heavily on hired labour or volunteering services from other farmers. Additionally, it was observed during research that: most interviewed farmers use mechanized equipment to supplement the deficit in labour requirement. The results show that such kind of demand for labour can be achieved by current family size by more than half.

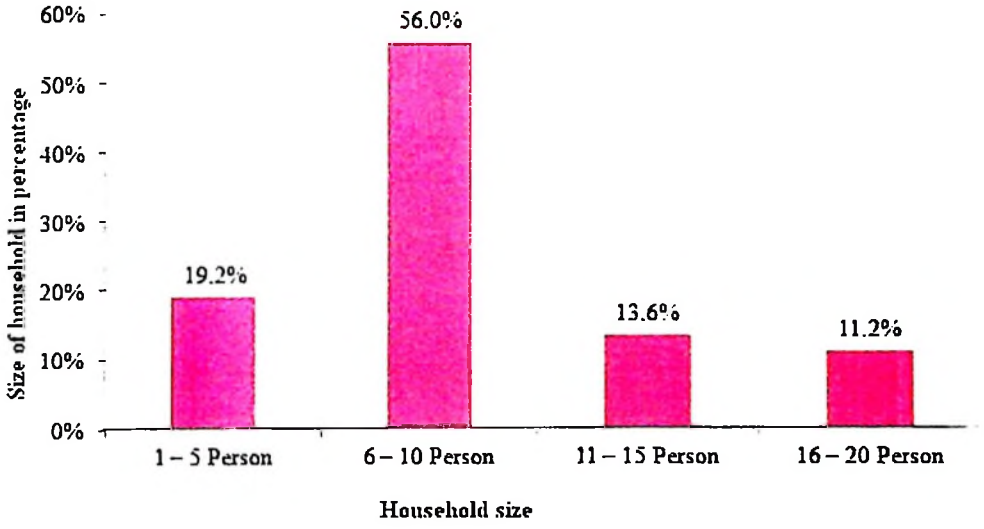

Figure 2: Distribution of respondents by household size

4.1.5 Education level of respondents

On the important part of education as one of the determinants of efficiency, it was revealed that 78.4% of the interviewed farmer's attained primary education. However, approximately 12% of respondents attained no formal education level, while 4.8%

possessed secondary and tertiary education respectively. Mukwenda (2005) contends that education accounts for 50% variation in agriculture output in Tanzania. Thus the high education level of interviewed respondent can also be exploited to boost maize productivity by more than 50%. This fair education level can be used as a long –term asset in improving maize productivity through community easiness in adoption of new innovation (Fig. 3) while opportunity for policy makers to plan for training that will be easily understood especially on modern agricultural practices (Binswanger, 2007).

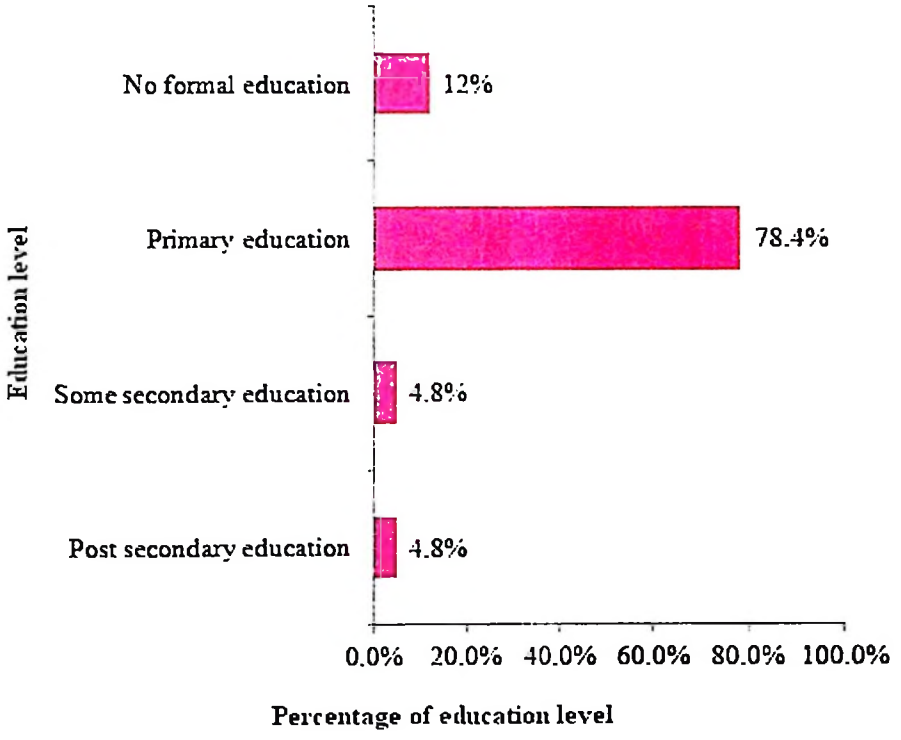

Figure 3: Distribution of farmers by educational levels

4.1.6 Age of respondents

Moreover, results on Fig.4 shows an approximately 50% of the respondent were found to be within 31 – 45 years of age group. The results to larger extent corresponds with those

of national population 2002 census whereby Mpanda District Council was found to comprise nearly 50% of the working group aged between 25 - 44 years.

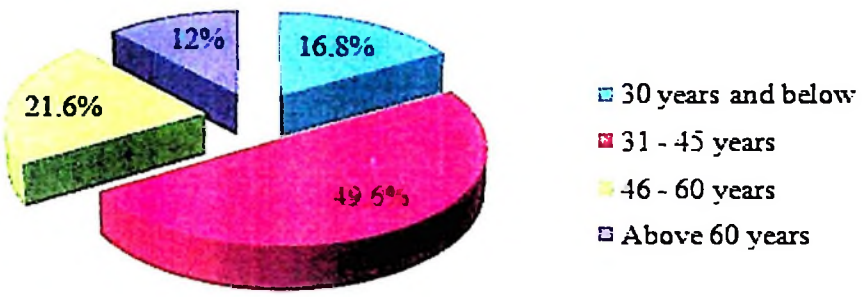

Figure 4: Different age groups of farmers

The results further revealed that farmers with age 45 -60 were 21.6% and farmers with 31 years and below were found to be 16.8%. These findings differ slightly with those of Byron *et al.* (2005) who found out that elderly farmers seem to be less inclined to participate in technology development than younger farmers This implies that. dependency ratio is big. entailing that few people produce to feed many people. This underscore the need to improve productivity in farming systems by using appropriate and modern agriculture technology as well as high yielding seeds and fertilizers (Carlson *et al.*, 2006). However these findings support results found by Matata *et al.* (2010). who reported that majority of farmers who practiced improved agriculture had the age between 20- 40 years.

4.2 Maize Production as an Enterprise

4.2.1 Maize yield

Production of maize ranges from a minimum of 630 kg/ha to a maximum of 19 800 kg/ha with a mean of 3978 kg/ha per season per farmer and standard deviation of 4407. The

Availability of extension services

This is a dummy variable that indicated whether a farm household does or does not receive extension service (Received extension sevice = 1, Otherwise = 0). According to Temu (2005), there is a positive relationship between access to agricultural information and adoption behaviour of farmers in most developing countries. Thus, this study hypothesized that access to information through extension will increase farm profits in agricultural activities. Temu *et al.* (2005) found that extension services have significant effect on the profitability of farm profit especially on food crop. Therefore, extension services remain vital components of agricultural productivity improvement. Any scenario that leads to dismal provision of extension services would therefore hinder agricultural productivity improvement. This variable was therefore expected to carry a positive sign and have a significant effect (Qamar, 2001; 2002).

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majority of farmers (7.2%) produced an average of 1 350 kg/ha. This result is somewhat similar to approximately 1735kg/ha according to World Bank (2007) report. However, this deviates significantly from the productivity recommended by report (2009) of about 2 400 000 in areas with good climatic conditions in Tanzania including Rukwa. Regardless, there is still room for productivity improvement from the present yield of 1400 kg/ha to the recommended 2800 kg/ha. (Table 2).

Table 2: Distribution of maize yield by respondents

Item measured	Output of Maize (kg/ha)
Mean	3 978
Mode	1 350
Minimum	630
Maximum	19 800

4.2.2 Mode of Land acquisition and use

Most of the farmers acquired land through inheritance. The study revealed that 57.6% got land was owned socially from their parents and grandparents. Only 19.2 % of the respondents were given land by the village government, and 6.4% land owned were purchased while 16.8% were hired. In his article, Mkude (2003) wrote that most of the farmers in rural Tanzania own land through inheritance, the statement proved by these results (Table 3). This often led to land defragmentation and small farm size among the offspring. When a person with a large family size is deceased, his properties including land is inherited by children, since land size is fixed, and each child inherit smaller part of that land. As a result, land becomes a limiting factor in terms of crop production.

Table 3: Distribution of respondents by mode of land ownership and farm size

Type of Land Ownership	Counts	Percentage
Inherited	72	57.60
Bought	8	6.40
Given by Village Government	24	19.20
Hired	21	16.80
Total (n = 125)	**125**	**100**

Furthermore, the study results show that maximum maize farm was 4.05 ha; minimum was 0.30 ha while average farm size was 1.22 ha. The findings are in line with those of Gabagambi (2003); Mkude (2003) and Ashimogo (1997). Furthermore, the finding concur with URT (2001) study which found in table 4 that, approximately 85% of the arable land in Tanzania is used by smallholder farmers who operate between 0.2 ha and 2.0ha and that per capita average land holding is 0.12ha. According to PASS (2001) most of the maize crop is grown by smallholder farmers in plots of about 0.5 to 5 hectares per household.

Table 4: Distribution of land acquisition and use

Farm size	Counts	Percent
< 1 - 2 ha	106	84.8
> 2 - 3 ha	17	13.6
> 4 ha	2	1.6
Total	**125**	**100.0**

The study also revealed that farmers with large area of land prefer to practice monoculture type of farming while small farmers with small areas use more intergraded planting system to increase returns per unit area of land. Farmers are planting few maize plants per

4.2.4 Access to market infrastructures

Majority of respondents claimed that a small number of market infrastructures impede the production of crops especially maize since farmers do not have place to sell their product in the midst of low bargaining power for price. The study found that areas with fair or good roads which are Mamba and Kibaoni had at least a large proportion of farmers who accessed market infrastructures (Fig. 5). Karema was the worst among them as only four interviewed farmers reported that they access the market infrastructures.

As noted by Bingen (1998) that better market access can a boost yields by making farmers able to transport their surpluses quickly and cheaply to points of sale or storage. they have incentives to increase production. This will take market development policies. transport regulation reforms to introduce competition. and substantial investment in rural roads. information technology. railways and warehouses (UNDP. 2012).

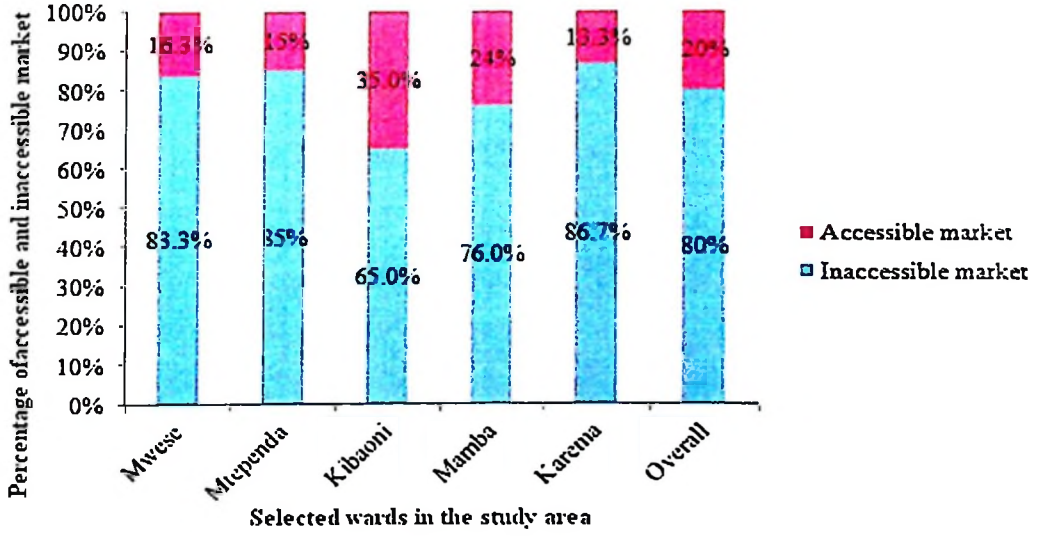

Figure 5: Distribution of respondents by access to market

unit of area in order to accommodate other crops such as sunflowers, sesame and groundnuts; however this practice affects maize yields. Yields from intercropped system are usually lower than from pure stand system due to plant competition for moisture and other plant nutrients.

4.2.3 Distribution of labour

Labour is one of the most important factors of production. The unique factor supplied by human being, which determines the use of all other factors. It was found that 74.4 % use family labour and 5.6% use hired labour. Besides, 20% used both family and hired labour during the 2010/11 cropping season (Table 5). The results were different from that reported by URT (2010) which shows that 52.3% of the households in Rukwa Region used both family and hired labour. There were some challenges of using family labour, and one of them is competition of using it in maize production at the expense of other crops. Some crops found more profitable like paddy and tobacco use the same resource competitively, while its supply is limited by available number of people. Young generation who are energetic in production prefers formal works than agriculture, creating artificial deficiency and hence, rising cost per man hour. Usually the use of hired labour is limited because most of household are unable to pay labour charges since most of families are engaged in farming.

Table 5: Type of labour used by respondents

Type of Labour Used	Counts	Percentage
Family Labour	93	74.4
Hired Labour	7	5.6
Both	25	20
Total (n = 125)	**125**	**100**

4.2.5 Access to credit

The survey result indicates that only 32.8% of the total households interviewed in the study area had access to credit. However, it was further noted that out of 32.8% of farmers who access credit only 3.2% were from the formal lending institutions (Table 6) while very few farmers (6.4%) obtained credit from informal lending institutions and Other farmers (23.2%) accessed loans from relatives. The majority of households (67.2 %) used own capital for investment in maize production activities (Table 6). This study noted that difficult in accessed credit significantly affect farmers maize as observed (Malemi 2008; Dorward *et al.*, 2009) who also found that lack of credit access limits the farmers' ability to expand maize production thus loosing the advantage related to increasing return to scale of operation and on the household income. Credit facilities can increase affordability of farm inputs such as seeds and fertilizers and hence enhances productivity.

According to Temu (1994) small farmers do not receive direct credit; more crucial is the fact that most farmers are unaware of institutional credit. This leads to conclude that small farmers everywhere in the country do not have easy access to direct formal credit.

Table 6: Access to credit to farmers

Type of Credit	Counts	Percentage
No Access	84	67.2
Formal Institutions	4	3.2
Informal Institutions	8	6.4
Relatives	29	23.2
Total (n = 125)	**125**	**100**

Kashuliza (1993) noted that credit markets, like all financial markets, work imperfectly largely due to unreliable and costly information. Problems associated with credit accessibility greatly affect Agriculture productivity in Tanzania. Limited credit and high interest rates impedes agricultural development by inhibiting the acquisition of capital needed for modernisation of agricultural systems. Therefore, lack of credit access leads to inadequate capital investment in agriculture improvement which in turn results to low household income. Households with credits access tend to be better off compared to households without credit access. Difficult in accessing credits can also be attributed to lack of collateral thus, making most farmers ineligible to access loans from formal financial institutions (Amani, 2005). Improvement of infrastructure particularly rural roads may significantly contribute to increased credit access in rural areas farmers as it will encourage financial sector investors and capital owners to open institutional branches in rural areas thus engaging themselves in agriculture. As noted in URT (2010) roads improvement increases efficiency in production through easy input and output delivery by reducing transport cost and opening up new markets.

4.2.6 Agricultural extension services

In this survey, it was noted that 75.2% of the interviewed respondents had accessed extension services while 19.2 % did not access with 5.6% confirmed to be even unaware of existence of extension services in the year 2010/11 and 2011/12 (Fig. 6). Regardless of good extension service provision found by this study, the deficit in extension service provision still exist in Tanzania. Agriculture and Livestock policy reckons the role of extension is to improve agriculture productivity However, to present the biggest problem is not only provision of extension service but failure to convert agricultural Extension services into instrument of agriculture growth (URT, 1997). This explains well the

existence of discrepancy between good level of extension services (78.6%) yet the product is still well below 4 – 6 tonnes per ha recommended by URT (2010).

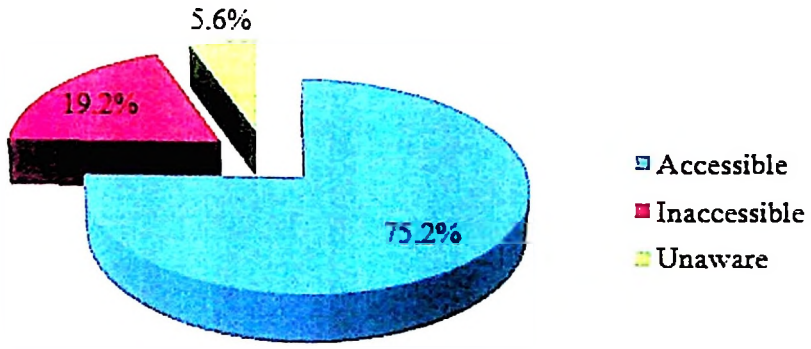

Figure 6: Provision of extension services to sampled farmers

According to Anyonge *et al.*, (2001): Anyonge (2002) there are several factors that are included in reassessment of extension, including the fiscal crisis that has made it hard for governments to provide adequate resources for extension and pressures towards more participatory approaches that allow farmers to influence the design, implementation and evaluation of extension activities. Extension service providers now include NGOs, farmers' organisations and the private sector. Financial pressures have led to exploration of ways to reduce government costs by decentralization, privatizing extension services and cost-sharing arrangements with NGOs and farmers organisations (Birkhaeuser, 1998).

4.3 Agricultural Resource Endowment

4.3.1 Crop production

Maize is the main crop grown in the study areas, followed by paddy, cassava, beans and sunflower. Tobacco ranks higher among cash crops production. Other crops include coffee, bananas, groundnuts, cowpeas, potatoes, sesame, sorghum and vegetables (Fig. 7).

In the study area, paddy is regarded as cash crop as well as food crop and the main staple food is maize. Few farmers are growing paddy due to differences in land quality and access to wetlands, but maize production is a characteristic of every household.

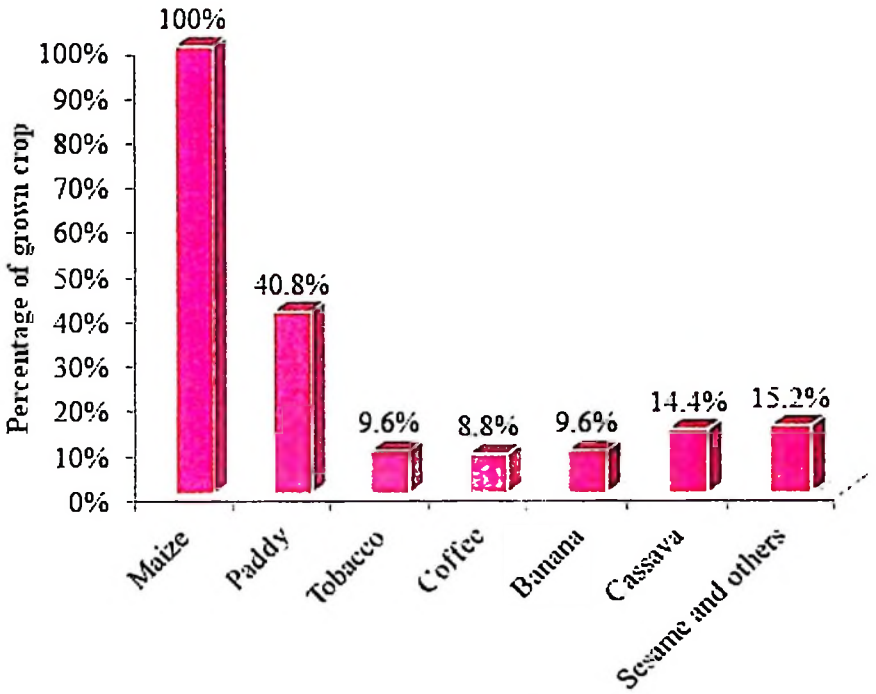

Figure 7: Distribution of crop grown by respondents

Further, the study revealed that in the category of crop production, maize is grown by all respondents (100%) followed by rice (40.8%). Other crops which showed the popularity for most of interviewed farmers were cassava (14.4%), either of the sunflowers, sesame, beans, vegetables, sorghum, potatoes, groundnuts or cowpeas (15.2%), tobacco and bananas 9.6% and coffee (8.8%). Crops like bananas, cassava and either of sunflower, sesame, beans, vegetables, sorghum, potatoes, groundnuts or cowpeas were less popular among the interviewed farmers (Fig. 7). The study found out that maize, cassava, bananas, potatoes and common legumes were grown for food. Moreover, sesame, rice, grounds

nuts and vegetables are grown for food and cash crops; while coffee, sunflowers and tobacco were grown as cash crops.

4.3.2 Methods of grain storage

Interview with key informants showed that majority of respondents in study area use traditional storage structures not because they like using the structures but simply because they don't have enough money to purchase insecticide and polythene bags. The results is similar to the one reported by Mapunda (2007). Interviewed farmers were also found to be unable to afford storage charges in warehouses as there were no enough warehouses in their villages which can be used to store their agricultural products. Therefore, most farmers were forced to sell their produced prematurely in order to avoid storage expenses.

4.3.3 Warehouse receipt system

Interview with key informants in the study area indicated that, the use of warehouse as delivery locations allows transparent trade in maize marketing by reducing the length of marketing chain and narrowing distribution margins. According to FAO (2002a); FAO (2002b) farmers are able to defer the sales of produce by making use of inventory credit to satisfy immediate consumption needs and credit of inputs during planting periods. By attracting deposits from small farmers, the system help to formalize trade transactions, enabling a database on their activity to be generated, which assist banks in evaluating loan requests. Availability of risks associated with movable collateral is reduced by primary cooperative society's guarantee of the produce from a stated location, and simplifying the closure which leads to low cost. Banks no longer need to monitor a large number of farmer borrowers, because cooperative societies assure loan repayment mainly due to economies of scale (FAO, 2002g).

4.4 Problems Encountered in Maize Production

4.4.1 Production problems

The major production problem in the survey area was high cost of inputs, explained by 86.4% of the respondents. As shown in Table 7, about 81.6% of respondents pointed at poor road conditions as the primary cause of lack of reliable market access. In addition, 76% of interviewed farmers agreed that high transport cost is one of major problem affecting maize enterprise in Mpanda while 84.8% of respondents agreed to presence of delayed supply of agricultural inputs that affect maize productivity. The interview with respondents further revealed that most roads in Mpanda district are difficultly passable especially in the rainy season; this cements the position taken by most interviewed farmers that road conditions affect the production of maize. This results concur with Skarstein (2000) who noted that the presence of good infrastructure especially roads can improve productivity which in turn the earning of income. Nonetheless, other factor that were also identified as hindrance to maize profitability by key informants include; low producer price, lack of market structures and facilities, delay of agricultural inputs, very high price of inputs and lack of market structures and facilities.

Table 7: Problems encountered in maize production

Problems encountered	Yes		No		Total	
	f	%	f	%	f	%
Poor road accessibility	102	81.6	23	18.4	131	100
High transport cost	95	76.0	30	24.0	125	100
Delay of agricultural inputs	106	84.8	19	15.2	125	100
Low produce price	107	85.6	18	14.4	125	100
Lack of market structures and facilities	90	72.0	35	28.0	125	100
Very high price of inputs	108	86.4	17	13.6	125	100

4.4.2 Problems related to marketing

Majority of the respondents (85.6%) pointed out that low produce prices is among the major problems in production. This problem could also be the problem of marketing. The results revealed that most of farmers (88%) complained on the increased production cost while 85.6% pinpointed that decreased producer price is a problem which results into low incomes from their sales. Moreover 74.4% of respondents claimed that there were insufficient market facilities which in turn decrease the earning of farmers since there is no precision in measurement equipments. Furthermore, although increased production cost and insufficient of market facilities were mentioned as factors which hold back the profitability of maize for farmers, there factors such as low rate of competitive buyers and unreliable markets where also cited by 76.8% of respondents; while lack of credit services was mentioned by 78.4% of respondents (Table 8). All these factors cause the decrease in the productivity of agricultural products (Karugia *et al.*, 2004).

Table 8: The marketing problems

Problem encountered	Yes		No		Total	
	f	%	f	%	f	%
Insufficient Market facilities	93	74.4	32	25.6	125	100
Increased production cost	110	88	15	12	125	100
Low rate of Competitive buyers	96	76.8	29	23.2	125	100
Lack of credit services	98	78.4	27	21.6	125	100
Unreliable market	96	76.8	29	23.2	125	100

The study further revealed that 76% of farmers claimed that price offered by maize traders is low compared to the price offered by the National Strategic Grain Reserve (NSGR) Table 9. Maize farmers indicated also that price fluctuation as a problem to them. Coulter and Onumah (2002) noted that in order to solve the problem of maize marketing and credit facilities there is a need to adopt the Warehouses Receipt System (WHRS), which could thereby offer marketing and credit facilities. Furthermore interview with key informants showed that farmers in areas where WHRS is implemented applicable have a good performing marketing chain compared to their counterpart in areas where this system is non-existent.

Table 9: Comparison of prices of maize offered by NSGR and traders

Buyers' price	Low price		High price	
	n	%	n	%
Price offered by traders	95	76	30	24
Price offered by NSGR	16	12.8	109	87.2

4.4.3 Suggested areas of improvement

It was noted that farmers have diverse ideas on the areas for improvement in maize production. Majority of farmers (92.8%) suggested improving the roads conditions since they mentioned that poor roads hinder the agricultural production including maize (Fig. 8). The reduction of input cost is one of the solutions to maize farming, explained by 85.6% of respondents. Timing of input delivery rank the second by 88.8% of respondents; where other suggested otherwise on the side of produces, that its price should be higher to compensate farmers. About 91.2% indicated that produce price should be raised, 88% of respondent suggested provision of credit. The results further revealed that 84.8% of the

respondents suggest the construction and improvement of market structures and facilities where by farmers and buyers can meet at one point for trading agricultural produce.

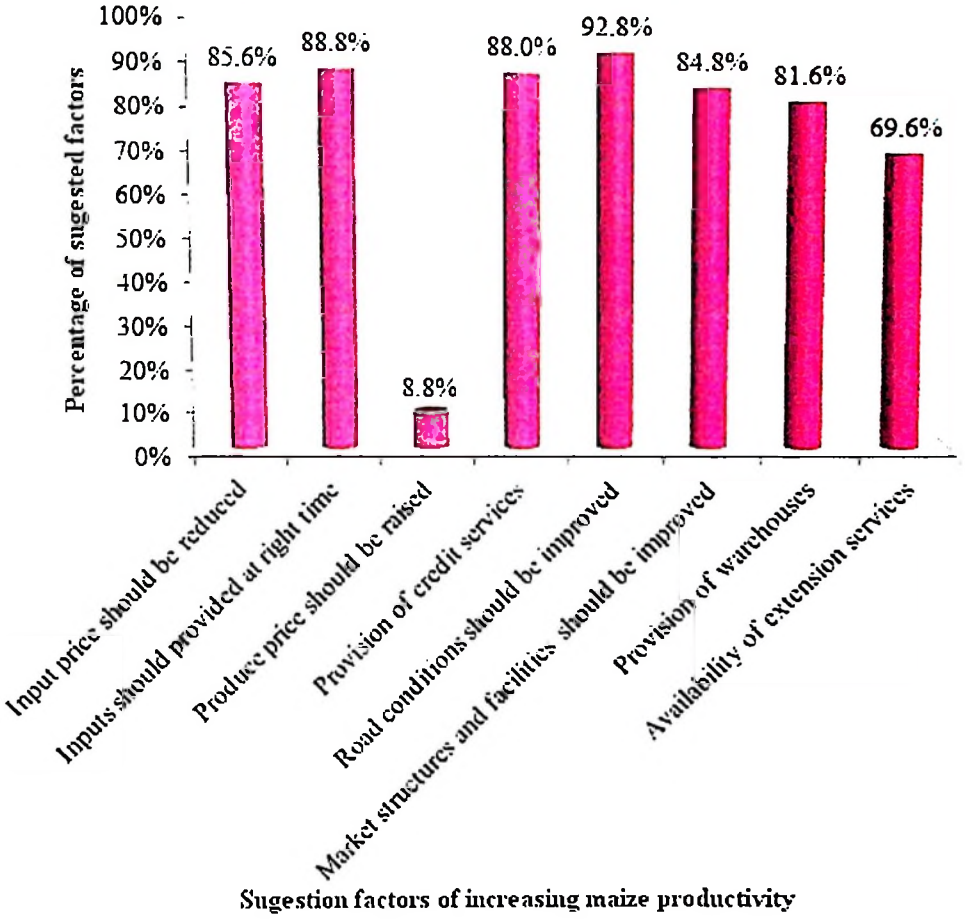

Figure 8: Distribution of respondents by solution to production challenges

4.5 Effect of Road Infrastructure on Input Cost

4. 5.1 Comparison of maize total revenue

The result of the study shown in Table 10 that maize farming generates different levels of average revenue per unit area in various places across Mpanda District. The areas where maize generates low amount of average total revenue were Mwese (569 802 Tshs/ha.); Mtapenda (757 710Tshs/ha) and Karema (610 440Tshs/ha). The low average revenue in

the three wards makes it difficult for the average family of 8 to live within the World Bank poverty line of 1 USD (1600 Tshs) per capita per day as this amount can be translated into Tsh 1561 (Mwese); 2080 Tshs (Mtapenda) and 1672 Tshs (Karema) per day. This is less than a minimum 1 US Dollar (approximately TShs 1600). However, maize production was found to generate high average revenue per ha in the two remaining wards of Mamba (2 847 132 Tshs/ha) and Kibaoni (3 233 655 Tshs/ha). Regardless, household members in the two respective wards are living slightly below the World Bank average poverty line per capita per day with Mamba (975Tshs = USD 0.6) and Kibaoni (1107Tshs = 0.7 USD). More results are presented in table 10.

Table 10: Total revenue from maize sales

Ward	Revenue			Revenue trend		
	Output	Average price	Revenue in Tshs	Minimum	Maximum	Average
Mwese	50 220.00	336.70	16 910 748	180 000.00	2 016 000.00	569 802.00
Mtapenda	44 550.00	336.30	14 982 165	216 000.00	1 425 600.00	757 710.00
Kibaoni	163 890.00	390.00	63 917 100	1 008 000.00	8 127 000.00	3 233 655.00
Mamba	178 650.00	397.60	71 031 240	583 200.00	7 560 000.00	2 847 132.00
Karema	59 940.00	303.00	18 161 820	189 000.00	1 512 000.00	610 440.00

4.5.2 Total revenue in relation to road conditions and distance

It was found that there is a relationship between the performance in maize profitability and infrastructure status in the study areas. Generally, areas with relative better roads were found to realize relatively high revenue; Kibaoni (Tshs 3 233 655.00) and Mamba (Tshs 2 847 132.00) Table 11. In contrary, areas which are not easily accessible by roads were found to have relatively lower revenue. In overall, this result indicates that traders prefer areas with relatively better roads and shun areas with poor road in order to minimize transportation cost. This in turn is translated into lack of market and falling prices of

maize which cause farmers to either abandon maize for other crops like tobacco, paddy, sunflowers, sesame and vegetables or cut down their maize production as noted also by Monlruzzaman *et al.* (2009). Additionally, this scenario has caused persistent poverty in area with bad roads when compared to areas with good roads.

Moreover, farmers in areas characterized with poor roads are faced with difficulties in accessing farm input like fertilizers, seeds and farm machinery. The road condition prevents timely delivery of this vital input and in case if delivery is successful the fertilizers is too expensive due to high transportation costs. For more results see Table 11.

Table 11: Revenues per wards

Ward	Distance from Mpanda Town	Road Condition	Average Revenue in Tshs
Mwese	140 km	Bad	569 802.00
Mtapenda	25 km	Fair	757 710.00
Kibaoni	105 km	Good	3 233 655.00
Mamba	160 km	Fair	2 847 132.00
Karema	130 km	Bad	610 440.00

4.5.3 Comparison of inputs costs

The study revealed the presence of a significant difference in mean cost of inputs per ha between the two study groups. The average input cost of 550 192. 20 TSh/ha (Table 12) implied that maize production in areas with difficultly passable roads is almost twice the cost of input in the area with good road conditions. This puts the overall study area well above the national average of USD 239 (approximately 382 400TSh/Ha) observed by

Odhiambo *et al.* (1996). With production cost per ha of US 390 (Tshs 624 000) in Kenya and USD 242 (Tshs 387 200) in Uganda; production of maize in Tanzania is still cheaper when compared to its East African counterparts. The rationale behind high input cost in area with bad roads include low maize price caused by lack of distant buyers, high transportation and storage cost for inputs and lastly lack of capital due to limited opportunities provided by financial institution which are not found in these areas (Zorya and Mahdi, 2009). Furthermore, two tailed and single tailed test were carried out to compare the mean costs of inputs in areas with good and poor roads respectively. Result showed that there was a significant relationship between level of road improvement and cost involved in maize production in Mpanda District ($F= 18.397$ at $p<0.05$) (Table 12). Thus the results reject the null hypothesis that cost of inputs varies as per quality of roads. Reduced transport costs also lower the costs and profitability of supplying modern inputs such as fertilizers, seeds, extension services and other technologies (Ahmed and Hossain, 1990). Therefore, high input cost was conclusively associated with the presence of poor infrastructure especially roads.

Table 12: Results for independent t test for input comparisons

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	18.397	0.000	4.759	118	0.000	$3.1x10^5$	65 286.08	1.8×10^5	4.4×10^5
Equal variances not assumed			4.759	69.301	0.000	$3.1x10^5$	65 286.08	1.8×10^5	4.4×10^5

4.6 Effects of Roads Infrastructure on Maize Farming Profitability

The results in Table 13 showed that, farmers from areas with relatively good roads realize an average gross revenue of 1 066 417Tshs/ha from maize farming while farmers from areas with relatively poor roads posted an average gross income of 356 905 Tshs/ha. This implies that maize farming in areas with relatively good roads is far more profitable than in areas with relatively difficultly passable roads. If these gross incomes are divided by three hundred and sixty five days (one year), it means an average household of 6 persons realizes approximately 2 922 Tshs/ha per day in good road area while for poor roads household is 978 Tshs/ha per. In the light of the above, farmers in areas with good roads and bad roads are still below US $1(Tshs 1 600) per day poverty threshold as suggested by the United Nations). A family size of six will have less than 400 Tshs/day per capita to spend daily. Nevertheless, maize farming still remains central to in ensuring poverty is alleviated among the rural poor (World Bank, 2009).

Table 13: Gross margins of easy accessed versus difficult accessed areas

Item	Difficult access area	Easy access area
Average Revenue in TSh/ha	636 175.00	1 425 636.00
Average Variable cost (TSh/ha)		
Seeds	21 766.00	24 470.00
Fertilizers	41 675.00	42 225.00
Manure	6 344.00	6450.00
Pesticides	537.00	450.00
Herbicides	387.00	4586.00
Storage	2 011.00	20 000.00
Security	3 347.00	4 500.00
Labour cost	182 951.00	203 800.00
Machine cost	6 300.00	18 024.00
Oxen	13 952.00	34 714.00
TAVC	**279 270.00**	**359 219.00**
Profitability (Gross Margin)	**356 905.00**	**1 066 417.00**
Average Farm Size (Ha)	0.96	1.46

Thereafter, independent sample *t* – test was applied to test the null hypothesis that mean gross margins of populations in good and poor accessible roads in Mpanda district are equal. This test examines existing difference between mean gross margins of the study populations: a population from area with good road and areas with relatively bad roads (Table 14). According to the test results there is enough evidence (t = 0.000) to reject the stated null hypothesis that mean gross margins of populations in good and poor accessible roads are equal. This is evidenced by the t-statistic ($p < 0.01$) entailing that the mean gross margins for the two groups was statistically different at 99% level of confidence. Since the Gross margin for farmers who are dwelling in good road areas was higher than that of their counterparts in poor road areas, it is plausible to say that farming in areas with accessible roads is more profitable than in area with difficultly accessible roads. This can be explained by the fact that dilapidated roads hinder market accessibility for both inputs and product delivery (Fabrizio *et al.*, 2001). Roads conditions are highly linked to the

availability of farm inputs in area around Mpanda District. Areas with accessible roads access low cost inputs in contrast to area with difficultly accessible roads. This has a direct influence on farming trend and profitability in general (World Bank, 2009; Raisudin and Hossain, 1990).

Table 14: Results for independent t-test to compare profitability of maize farming

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	99% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	19.411	0.000	4.759	122	0.000	1.7×10^6	2.8×10^5	1.9×10^5	4.6×10^5
Equal variances not assumed			4.759	67.41	0.000	1.7×10^6	2.7×10^5	1.9×10^5	4.6×10^5

4.7 Factors Influencing the Profitability of Maize Farming

4.7.1 Model parameter estimates

The regression analysis reveals that all the variables were significant with the exception of availability of extension service and type of labour used in maize farming (Table 15). Furthermore, it shows that farm size carries a positive sign and is significant ($p < 0.01$). This implies that a farmer farming a larger farm realizes an increase in maize yield. As stated earlier, type of labour used carries a negative sign and is not significant ($p > 0.1$) therefore, contrasting the study expectation; this may be due to modernisation of maize farm through technological innovations such as use of ox-plough, tractors and power

tillers. However, this variable remains a window of opportunity for future research. Capital invested is significant and carries a positive sign in line with the study expectation which implies that farmers with low capital outlay are realizing lower income. Road conditions is significant at 99% confidence level ($p < 0.01$) with a positive sign (0.082), market access significant at 5% significance level ($p < 0.05$) which implies that presence of market opportunity encourages maize farming as stated in expected variables signs. However this variable carries a negative sign contrary to the *priori* expectations and therefore is available for future research.

Credit access was found to negatively affect the profit realized from maize farming contrary to study expectation. This is because most farmers with access credit are not using them for targeted purposes, rather is used to solve family issues like education, health and shelter. However, the parameter estimate for this variable was not significant ($p > 0.1$) entailing that it is available for further investigation. Price per kg of maize was significant at 99% level of confidence ($p < 0.01$) and carries the expected positive signs implying that a good price normally translates into good income (Kilima *et al.*, 2008). Availability of extension service is non-significant ($p > 0.1$) and carries a negative sign in contrast to the expectation. This variable also provides an opportunity of research in the future.

Table 15: Summary of results of ordinary square regression analysis

	Dependent variable profitability (TSh/ha)			
Independent variables	**β Coefficients**	**Std. Error**	**t**	**Sig.**
Constant (α)	2.850	0.231	12.344	0.000***
Farm Size in Ha	0.273	0.027	10.234	0.000***
Type labour used	-0.014	0.041	-0.354	0.724
Road conditions	0.082	0.032	2.609	0.010***
Market access	-0.123	0.020	-6.097	0.000***
Credit access	-0.123	0.048	-2.544	0.012***
Price/ kg	0.002	0.000	4.669	0.000***
Availability of extension services	-0.013	0.021	-0.600	0.550
	Adjusted R^2 = 0.84, F=79.68, Standard Error of Estimates = 0.154			

Note: *** = Significant at 99% level of confidence; ** = Significant at 95% level of Confidence

4.7.2 Overall evaluation of the model

The adjusted R^2 value of 0.84 implies that 84% of the variation in the maize yield was explained by the independent variables in the model. However, it also implies that there are some variables which significantly affect maize farming profitability but are missed during the model estimation. Such variables may be investigated in further researches. The F-value of 79.68 was significant at 99% level ($p < 0.01$) also indicate an existence of overall the data fitted well to the model (Table 16).

Table 16: Overall evaluation of the model

Anova table	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Regression	15.551	9	1.728	79.68	0.000***
Residual	2.781	115	0.024		
Total	18.332	124			
R	**R Square**	**Adjusted R- Square**		**Std Error of Estimate**	
0.921	0.848	0.836		0.15551	

Note: *** = Significant at 99% level of confidence

The regression model was tested for the multicollinearity problem; the problem that describes the presence of linear or near linear relationship among explanatory variables in the econometric model (Gujarat, 2004). The test was done to check if independent variables in the model have this problem so as to take corrective measure (Table 17). Testing of the model on multicollinearity was done by using tolerance and Variance Inflation Factor (VIF) test which builds in regression of each independent variable. The higher the inter correlation of the independent variables, the more the tolerance approaches zero, On VIF, when VIF is high there is high multicollinearity and instability of the coefficients. Therefore, VIF $\geq$ 4 is an arbitrary but common cut – off criterion for deciding when a given independent variable displays "too much" multicollinearity: Values above 4 suggest a multicollinearity Problem (Gujarat, 2004). From Table 17 the result shows that tolerance values do not approach zero and VIF values are below four (4) for independent variables. Therefore, the alternative hypothesis could not be rejected, that is there is no multicollinearity problem in the model.

Table 17: Test of multicollinearity

Predictors	**Collinearity statistics**	
	Tolerance	**VIF**
Constant		
Farm size	0.520	1.922
Labour	0.975	1.025
Capital investment	0.719	1.391
Road conditions	0.922	1.084
Market access	0.960	1.042
Credit access	0.931	1.074
Price of maize	0.793	1.261
Availability of ext. Service	0.968	1.033

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

This study has argued that infrastructure is probably the most binding constraint on what is a highly dispersed rural community and predominantly agrarian dependent economy, but the main objective of this study remained how infrastructure affect agricultural profitability and poverty eradication in general. As it turns out, our results also provided insight knowledge on the effect of the level of infrastructure on both output and input components and provided evidence that on the questions of what type of factors apart from infrastructure that affect agricultural production and trade in the Mpanda District.

Firstly, the study concludes that road infrastructure significantly impacts the availability, use and selling prices of major agricultural inputs. Thus, poor roads affect both the demand and supply of the major inputs like fertilizers, machinery and pesticides. On the demand side, poor roads increase the buying price of these inputs which discourage farmers from using the industrial fertilizers and pesticides; a factor behind the high use of alternative farm inputs which do not substantially improve farm productivity.

Secondly, this study concludes that transport as a proxy for market access significantly affect both the supply and demand for crop production. The results conclusively indicated that there is a positive correlation between market access and agricultural production primarily reflects the impacts of access to output markets for agricultural produce as well as input markets. Traders prefer to purchase maize and other products from areas with relatively better roads and shun areas with poor road in order to minimize transportation cost. This results concludes similarly to Dorosh *et al.* (2009) that apart from an increased

inputs cost, poor roads is associated with low adoption of farming technologies due to difficulties in accessibility of an area by extension service providers.

Thirdly, the study farm size, labour type employed by a farmer, road conditions, and market access credits access, price of farm products and access to extension significantly affect the farm profit realized by a farmer. Therefore, farm profit can be improved if the above factors are considered in any plan that is to be designed.

5.2 Recommendations

Firstly, the study recommends that central government through its regional road agency (TANROADS), local government as well as other development partners like World Bank to invest heavily on improving regional and trunk roads. This will provide Mpanda District farmers with access to reliable markets available in major cities that include Dar es Salaam, Mwanza and Dodoma. As noted by Dorosh and Schmidt (2008) that rural population is dispersed away from regional and trunk which means that improvement of feeder roads by the local government is paramount for increased farm profitability.

This study recommends that government should put more effort in developing policies that can increase extension services availability by training more extension workers who can help promote the adoption of modern farming technology; this will result into more vibrant input markets will also increase the returns to market access. The study recommends that central government should continue to vigorously pursue the creation of agricultural corridor because of their likely impact of the Tanzania infrastructure investments and market access across the country. Additionally strategies like improvement of feeder road through road toll fund should be given more emphasis in order to improve market access for Mpanda farmers.

In conclusion, it is recommended that policy actions can focus on factors which significantly affect income. Also, agriculture and other development intervention programs such as the AMSDP, *KILIMO KWANZA* should concentrate on the developing of storage facilities and provision of enough soft loans to farmers which were identified as major problems militating against farm profitability in Mpanda District. This will reduce the tendency of farmers to sell their produce immediately after harvesting even when the prevailing prices are not favourable to them. Provision of soft loans will help farmers to cover all the variable cost associated with farming business and as well reducing their cash demand. Meanwhile, storage facilities ensure that produces are stored in raw or semi-processed forms which may command higher prices in later off peak season.

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APPENDICES

Appendix 1: Road network Length in Kilometers

Road network Length (kms)	Unit	Length
Trunk roads	Km	10 601
Regional roads	Km	19 246
Subtotal managed by TANROADS	**Km**	**29 847**
District roads	Km	24 425
Feeder roads	Km	29 550
Urban/ Town roads	Km	2 650
Subtotal managed by LGA's	**Km**	**56 625**
Total	**Km**	**86 472**

Appendix 2: Questionnaire

TITLE: MARKET INFRASTRUCTURE AND ITS IMPACT ON AGRICULTURAL PROFITABILITY IN MPANDA DISTRICT, TANZANIA

Division.....

Ward.....

Village.....

Date of Interview.....

Name of Respondent.....

A. Basic Information

1. Questionnaire number.....
2. Respondents' age.....
3. Sex:

   1=Male 2= Female

4. Marital status

   1=Married 2=Single 3=Widow/ Widower 4=Divorced/ Separated

5. Level of Education:

   1=No schooling 2=Primary Education 3=Secondary Education 4= Tertiary Education

6. Number of children.....

7. Occupation

   1=Agriculture 2=Trade 3=Mining 4=Tourism 5=Worker

SECTION A: RURAL ROADS SITUATION

1. A) Do you experience road infrastructure a problem in the village?

   1=Yes 0= No

   B) If Yes, what are the problems.....

2. A) Does area inaccessibility by road affects agricultural products?

1=Yes 0=No

B) If Yes, explain how does it affect.....

.....

.....

.....

3. A) Do you face any other Constraints from the agricultural productivity?

1=Yes 2=No

B) If Yes, what are those constraints

.....

.....

.....

4. By which mean do you transfer your products to the market place?

1= By car 2= By bicycle 3= Carrying on head

5. A) Does road inaccessibility limit the delivery of agricultural inputs?

1=Yes 0=No

B) If Yes, what are those limited agricultural inputs

.....

.....

6. A) Is your farm located far away from your home?

1=Yes 0=No

B) If yes, how far is it? .....

7. What type of farming are you practicing?

   1=Traditional farming system 2=Modern Farming System

8. A) Does the roads infrastructure have any positive contribution to agricultural production?

   1=Yes 2=No

   B) If Yes, what are the contributions

   .....

   .....

9. A) Does the existing roads infrastructure satisfy farmer's products?

   1=Yes 2=No

   B) If No, why it doesn't satisfy farmers products

   .....

   .....

   .....

   A) Is rural roads infrastructure plays a big role to farmer's development?

   1=Yes 2=No

   B) If No, why it doesn't play a big role to farmer's development?

   .....

   .....

10. For how long have you been cultivating?

    1= 1 year 2= 2 years 3= 3 years 4= More than three years

11. When is the season for crops cultivation?

    1=Dry season 2=Rain seasonal 3=Throughout the year

12. A) What is the kind of crops do you grow?

1=Cash Crops 2=Food Crops 3= Cash and food crops

B) If is food crops which kind of food crop?

1=Maize 2=paddy (Rice) 3=Cassava 4=Others (Specify)

13. What is the size of your harvest per year?

1=Less than 1 sack 2=1sack 3=2 sack 4=3 sack 5= 4 sack

5= More than four sack

14. Where do you sell your products?

1=At market place 2=At home

15. Do you have any other source of income apart from agricultural?

1=Yes 2=No

16. What is the main source of your income?

1=Cash crops 2=Food crops 3=Both cash crops and food crops 4=Others (Specify)

17. What is the size of your farm?

1=<1 acre 2=1 acre 3=2 acres 4=3 acres 5=4 acres 6=5acres 7= > 5 acres

8=Others (specify)

18. Is the income enough to sustain your family in a year?

1=Absolute No 2=Not adequate 3=Fairly adequate 4=Adequate

5=Absolute adequate

SECTION B: ROADS ACCESSIBILITY AND ASSOCIATED COSTS

19. How is the cost of producing cash/ Food crops?

1= Very high 2=Constant 3=Very low

20. What are the Constraints that hinder you from producing more?

1=Price of farm implements very high 2=Transport Cost very high

3=Poor road Accessibility 4=Very high freight Charges

21. Why is road transport cost very high?

1= because the price of fuel is very high 2=Because of poor road construction

3= because the agricultural products are not easily obtained

22. A). Is there any impacts of increased road transport operations cost to the farmer?

1=Yes 2=No

B) If yes, what are the impacts derived from road transport operation costs

.....

.....

.....

SECTION C: MAIZE PRODUCTION AND PROFITABILITY

23. When did you start cultivating maize?.....

24. Who persuaded you to cultivate maize?

1=Neighbor 2=Extension officer 3=Relative 4=Politician 5=Others (specify)

25. How big is your maize farm?.....(Hectares)

26. How many maize plots do you have?.....(Plots)

27. If you have more than one plot how are they located?

1=Close to each other 2=Not close to each other

28. What is the size of each of your plot/ plots (Hectors)

Plot	**1**	**2**	**3**	**4**	**5**
Size					
Total					

29. Would you like to expand it?

1=Yes 2=No

30. If no why?.....

31. If yes, at what size?.....(Hectors) why at that size.....

32. Apart from maize which crop do you grow?

No.	**Crop grown**	**Area under each crop**
1		
2		
3		
4		
5		
6		
7		

33. Could you please estimate how much money you get from each of the above crops (Fill in the table below)

No	Crop grown	Outputs	Price per unit	Revenue
1				
2				
3				
4				
5				
6				
7				

34. Referring to the above mentioned crops please help to fill in the following table below

Inputs	Crop	Crop	Crop	Crop	Crop	Crop	Crop
Fertilizer							
Amount (Kg)							
Coast(TAS/Kg)							
Seeds							
Amount (Specified unit)							
Cost TAS/ unit specified							
Pesticides							
Amount							
Cost per unit							
Animal Manure							
Amount							
Cost per unit							
Hired labor							
Amount							
Cost per labor							
Use of Tractors							
Amount							
Cost per hector							
Use of power tillers							
Amount							
Cost per hector							
Use of oxy farms							
Amount							
Cost per hector							
Other inputs							
Amount							
Cost							
Others							

Cost

Farm size			
Production (Kg)			
Producers Price (TAS)			
Revenue			
	Own	Hired	Payment
Labor (Man day)		Per hour/ per day/ per month	
Planting			
Weeding			
Harvesting			
Packing			
Transporting			
Storage			
Security			
Costs (TAS)			
Fertilizer			
Weeding			
Herbicides			
Pesticides			
Harvesting			
Parking			
Transporting			
Storage			
Marketing			
Others			
TOTAL			

35. What are the major problems facing you in maize production?

(i).....

(ii).....

(iii).....

(iv).....

36. What feature plans do you have concerning maize production?

1=To expand production 2=To reduce production

3=To continue producing at the same level 4=Others (specify)

37. What should be done to improve maize production?

.....

.....

38. Are market structures a problem to your production?

1=Yes 2=No

39. If yes, what are the problems?

.....

.....

40. Is market facilities are problems to your productions?

1=Yes 2=No

41. If yes, what are the problems

.....

.....

SECTION D: MARKETING

42. What factors did you consider when you decide to sell your maize?

1=The price offered 2=The personal ties with the trader

3=Household cash need 4=Need to repay back the loan

5=Others (Specify)

43. Who are major buyers of your maize production?

1=Industrial processors 2=Middle men

3=Maize traders 4= Cooperative union

5=Others (Specify)

44. Did you find difficult to sell your maize

1=Yes 0= No

45. If Yes why?

1=The market is very far from home 2=Few customers 3=Low demand4=Low farm gate price5=Lack of transport facilities 6=Lack of marketfacilities7=Lack of market structures8=Poor roads infrastructures

46. At what price did you sell your maize last season?.....TAS/Kg

47. Are you satisfied with that price?

1=Yes 2=No

48. If No why?.....

49. How is the price of your produce determined?

1=Size of the maize corn 2=Shape of the maize corn 3=Grade of the maize

4=Season 5= Others (Specify)

50. What are the price trends of maize for the last two seasons

1=Increasing 2=Decreasing 3=More or less the same

51. Output and revenue from maize production

Farm size (ha)	
Total output (kg/ha, bag/ha)	
Production price for maize production in Tsh/bag Dry season Rainy season	
Revenue Tshs/ha	

52. Do you know who will buy your produce before the crop is harvested

1=Yes 2=No

53. Where do you normally contact buyers?

1=At home 2=At the field 3=At the market 4=Others (Specify)

54. Which period there is high demand of maize?

1=At the beginning of the period 2=In the middle of the period

3=At the end of the period

55. If yes, which period do you normally have enough produce to meet demand?

.....

SECTION E. INSTITUTIONAL SUPPORT

56. Is any group/ association by farmers concerning maize production and marketing in this area?

1=Yes 2=No

57. If Yes, are you a member?

1=Yes 2=No If no go to question 68

58. What are benefits of being a member?

1.....

2.....

3.....

4.....

59. What is preventing you from joining a group/ association?

1.....

2.....

3.....

4.....

60. Is there any government or non-government that is currently assisting maize production and market facilities in this area?

1=Yes 2= No

61. If yes, specify the institution, type of assistance and condition under which assistance was provided

Institution	Assistance	Condition