EVALUATION OF IRISH POTATO PRODUCTION AND MARKETING PERFORMANCE: A CASE STUDY OF MBEYA RURAL DISTRICT, MBEYA REGION, TANZANIA

BY

CATHERINE V. D. KABUNGO

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ABSTRACT

The study was conducted in Mbeya rural district. The main objective was to evaluate the Irish potatoes production and market performance in the district. Specifically the study aimed at determining economic profitability of Irish potatoes grown by small-scale farmers; identify existing Irish potato marketing channels and the roles played by key market participants and to examine the pricing structure of Irish potato at different levels of market chain with a view towards establishing margins. Primary data was collected using structured questionnaire and analyzed using SPSS computer programme. Purposive multistage sampling technique was employed to select districts, divisions, wards and villages. A sample size of 120 respondents was randomly selected of whom 90 were farmers and 30 were traders. Secondary data were obtained from institutions and organizations like Mbeya region agricultural offices, ARI Uyole, SNAL and internet. Study results show that farmers earn Tsh 253 403.90/= / acre, transporters, wholesalers and retailers received a profit of Tsh 2 051 344.90, Tsh 461 029.40 and Tsh 121 675.00 /week respectively. The study also identified four major marketing channels in the Irish potato marketing system. The CI of 87.2% was found, implying oligopolistic characteristic which is a tendency towards monopolistic marketing behaviour. Factors which hinder the expansion of Irish potato market were lack of capital, high market fees and unstable prices. The study put forward four major recommendations; (i) Local village stores should be constructed. (ii) Seed production system should be established (iii) Researchers should publicize and promote their new varieties (iv) Farmers should be organized into groups or associations.

DECLARATION

I, Catherine D. Kabungo, do hereby declare to the Senate of Sokoine University of Agriculture that the work presented here is my own original work and has not been submitted for a higher degree award in any other University.

_____   _____

Catherine V. D. Kabungo   Date

(MSc candidate)

The above declaration is confirmed

_____   _____

M. E. Mlambiti (Prof)   Date

_____   _____

A. A. A. Manyama   Date

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DEDICATION

To my beloved Mum Rosalia Massawe and my daddy, the late Victor Massawe, I pray that the Almightily God to rest his soul in peace. AMEN.

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LIST OF ABBREVIATIONS

ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
ARI	Agricultural Research Institute
CAN	Calcium Ammonium Nitrate
CI	Concentration Index
CIP	International Potato Centre
DAP	Diammonium Phosphate
GMA	Gross Margin Analysis
Masl	Meters Above Sea Level
MoAC	Ministry of Agriculture and Cooperatives
MSc.	Masters of Science
NGO	Non Governmental Organization
NPK	Nitrogen Phosphorus Potassium
POPSM	Presidents Office Public Services Management
SACCOS	Savings and Credit Cooperative Society
SH	Southern Highland
SHZ	Southern Highlands Zone
SNAL	Sokoine National Agricultural Library
Tsh	Tanzanian Shilling
TSP	Triple Super Phosphate
URT	United Republic of Tanzania
WPC	Western Potato Council

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Irish potato is one of mankind's most valuable food crops in the world with annual production volume of 347 metric million tones, produced in an estimated area of 18.9 million hectares (FAOSTAT, 2004). It ranks fourth in the world as food crop after maize, rice, and wheat (FAOSTAT, 2004). Among root crops Irish potato ranks first in terms of volume produced and consumed followed by cassava, sweet potato and yams, and provides roughly half of the world's annual output of all roots and tubers, making it the largest non cereal food and cash crop world wide (FAOSTAT, 2004). It contributes energy and substantial amounts of high quality protein and essential vitamins, minerals and trace elements to the diet (Horton, 1987). A single medium-sized Irish potato contains about half the daily adult requirement of vitamin C, very low in fat (about 5 percent of the fat content of wheat), more protein, and twice calcium than maize (Horton, 1987; Dean, 1994; McGlynn, 2007).

Moreover Irish potato crop provides more nutritious food per unit land in less time and often under more adverse condition than other food crops (FAO, 2006). It is one of the most efficient crops in converting natural resources, labour and capital into a high quality food with wide consumer acceptance (Horton, 1980; FAO, 2006). For low-income people in both urban and rural areas, "Irish potato is a buried treasure" It grows fast, it's adaptable, high yielding and responsive to low inputs (FAO, 2006).

Irish potato is important crop in developing countries (FAO, 2006). More than one-third of the global Irish potato output comes from developing countries including Asia (China,

India, Indonesia, Nepal, Pakistan countries) and Africa (Cameroon, South Africa, Kenya, Uganda, Egypt, Algeria, Morocco, and Tanzania) (CIP, 1983 ; Okoboi and Ferris, 2002). According to FAOSTAT (2007) consumption in developing countries increased from 9 kg per capita in 1961-63 to 14 kg per capita in 1995-97. Major producing countries in Africa are Egypt, Algeria, South Africa and Morocco, which produces 65% of the total world production (Okoboi, 2001).

In Tanzania, Irish potato is becoming an important cash and food crop (Kelly, 2006). Since its introduction, production trends have been increasing positively (FAOSTAT, 2007). Irish potato was introduced in Tanzania during 1920s by German mission in the Southern Highlands (SH) of Tanzania where local farmers began its cultivation in small scale gardens (Jakobsen and Mallya, 1976; Macha *et al*., 1982). Irish potatoes are generally grown in areas between 1 800 and 2 700 meters above sea level (masl), the highest producers in Tanzania being the Southern Highland Zone (SHZ), particularly Iringa and Mbeya regions (Macha *et al*., 1982).

According to Mayona (1991) 90% of Irish potato is produced by smallholder farmers in the SHZ where it is used as food and source of income and considered as potential as maize, rice and wheat in the region. Other areas which grow Irish potato in Tanzania are West Kilimanjaro, Arusha, Mara and Kagera regions, and west of Lake Nyanza near the Ugandan border (Macha *et al*., 1982). About 116 277 metric tones (equivalent to 58 % of total country production) of Irish potato is produced in SH regions, which cover about 16 609 hectares, while about 70 413 metric tones (equivalent to 35% of total country production) is produced in the Northern highland regions (Kilimanjaro and Arusha) covering an area of about 10 058 hectares (MoAC, 2001; URT, 2003). Minor production occurs in Mara, Tanga, Kigoma, Rukwa, and Ruvuma Regions (Macha *et al.*, 1982).

Generally, about 133 000 tones of Irish potato are produced annually in Mbeya Region (URT, 2003).

Horton (1987) narrated various information gaps surrounding the Irish potato production and marketing in developing countries. Among them include unreliability of the data whereby governments and statisticians usually give highest priority to collection and documentation of data on most important commodities like tea, sisal and coffee which are traded in international markets with less emphasis on food crops like Irish potatoes (Horton, 1987).

Several studies have been conducted on production and marketing of horticulture sub sector in Tanzania, some of which are marketing review for horticultural crops (Mbelwa, 1999; Nyange *et al.*, 2000; Ashimogo and Lazaro, 1989). However, these studies have concentrated on fruits and vegetables rather than Irish potatoes. Irish potato marketing system is not well organized as a result most farmers have become price takers. It is therefore expected that well defined market segments would assist farmers to make investment in a profitable venture that will earn them good income (Okoboi, 2001).

Irish potato production has had a rapid expansion over the last few years (CIP, 2007). Despite of a large expanding market in urban areas for Irish potato products, market functions such as assembling, grading, and transport do not match with production which is increasing while market services remain stagnant (Horton, 1987). In this context, smallholder Irish potato farmers need to know the available market opportunities, adapt and improve their produce so as to link with the market chain to meet the expanding demands of the ever increasing consumers (WPC, 2003).

1.2 Problem statement and justification

Agricultural marketing plays fundamental role in the development process. Marketing process integrates the farming community into the national economy through communication and exchange. Agricultural marketing has a great potential in creating employment opportunities, increasing production and distribution of income by involving majority of people, reducing unemployment and fostering national security (Matola, 2005).

Several studies have been conducted on the Irish potato production and marketing in Tanzania. Some of which are Mussei *et al*. (2000) who studied the adoption of improved potato production technologies in Njombe district, Mwakasendo, *et al*. (2007) who assessed market for fresh and frozen potato chips in the ASARECA region and potential for regional trade the case of in Tanzania, Mayona (1991) who assessed potato production potentials and constraints in the SHZ and Okoboi, (2001) who studied potato production and marketing in Tanzania and the market opportunities for Rwanda. However, these studies had scanty information on the production and marketing performance. Therefore little is known about the general performance of the Irish potato marketing chain in Tanzania and its contribution to total household income, leave alone the specific problems that face the industry. This study was therefore an attempt to fill that gap. Inadequate market information, especially on prices is a major obstacle to the performance of marketing and production system (Mlambiti, 1999). The level of state intervention in other food markets such as fruits, vegetables, roots and tuber was less wide spread (Ponte, 2002).

This study aimed at determining an economic profitability of Irish potato grown by small-scale farmers, identified existing Irish potato marketing channels and the roles

played by various market participants and determined the pricing structure at different levels of Irish potato market chain with the purpose of establishing marketing margins and producers share of a consumer shilling. Results of this study will help to provide market information to various stakeholders in Irish potato sub sector and possibly help to improve income and enhance poverty reduction of farmers' households.

1.3 Objectives

1.3.1 Main objective

The main objective of the study was to evaluate the Irish potatoes production and marketing performance in Mbeya rural district

1.3.2 Specific objectives

The specific objectives include:

1. To determine economic profitability of Irish potato grown by small-scale farmers.

2. To identify existing Irish potato marketing channels and the roles played by key market participants.

3. To examine the pricing structure of Irish potato at different levels of market chain

4. To establish margins at different levels of Irish potato marketing chain

1.3.3 Research questions

1. How profitable is Irish potato production enterprise to small scale producers?

2. What are the existing Irish potato marketing channels and the roles played by market participants over different market chain?

3. What is the existing pricing structure of Irish potato at different levels of market chain?

4. What are the marketing margins at different levels of Irish potato marketing chain?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Definitions and marketing concepts

Marketing is defined as the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods, services, organizations and events to create exchange that will satisfy individual and organizational objectives (Mlambiti, 1999). Marketing may also be defined as the process of creating form, time and space utility (Kohls and Uhls, 1990). Agricultural marketing refers to the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production to the ultimate consumer (Kohls and Uhls, 1990). Dixie (1989) defines agricultural marketing as series of services involved in moving a product from the point of production to the point of consumption.

Marketing concepts and techniques apply not only for profit organization but also non profit oriented businesses (Kohl and Uhls, 1990). However, marketing of agricultural products is a major problem for smallholder farmers in most of sub-Saharan Africa (Kusina N. T. and Kusina, J. 2001). Inadequate marketing information, especially on prices is a major obstacle to the performance of any market system and to the production system of the sector (Mlambiti, 1999).

2.2 Schools of marketing efficiency

2.2.1 The internal productive efficiency of marketing enterprises

This is the measure of economic efficiency at firm level and is a combination of technical and operational efficiency (Scarborough and Kydd, 1992). It is a good theoretical framework for measuring costs and analyzing the efficiency of individual firms. Under this school, the method of descriptive analysis of accounting data is commonly used

because data for that purpose are relatively more available. In this study, the structure-conduct- performance model is used to assess the marketing efficiency because it provides well developed framework for examining behavior of imperfectly competitive markets (Scarborough and Kydd, 1992). The model emphasizes the relationship between functionary similar firms and their market behaviour as a group.

2.2.2 Market structure

Market structure refers to the organizational characteristics of a market that influences the nature of competition and pricing mechanisms within the market (Scarborough and Kydd, 1992). Structural characteristics may be used as a basis to classify markets. Markets may be competitive (presence of a large enough number of firms that none can individually influence the price they receive by changing the volume of goods or services), monopolistic (in which there are many firms each producing slightly differentiated products) or oligopolistic (in which there are only a few firms each of which controls a large share of the market) (Pomeroy and Trinidad, 1995).

The common measures of efficiency of the component are the degree of concentration, market transparency, information barrier to market entry and product differentiation (Schmidt, 1999). Performance is expected to be satisfactory under the following conditions: If sufficient number of buyers and sellers exist to provide alternative outlet without one of them having the market power to dominate others. If market transparency with regard to product quality, variety, grades and prices is given and no serious barriers to market entry and exit (Scarborough and Kydd, 1992).

2.2.3 Market conduct

This is one of the determinants of performance of the marketing system. Market conduct refers to the pattern of behaviour that firms follow in adopting or adjusting to the markets in which they sell or buy (Pomeroy and Trinidad, 1995). There are two closely interrelated aspects of market conduct; one is the manner in which devices and mechanisms by which different sellers coordinate their intrinsically rivals decisions and actions. The second aspect concerns the characteristics of pricing policy that sellers in the industry adopt (Pomeroy and Trinidad, 1995). Market conduct can be assessed in terms of individual or collective aims or goals that different sellers pursue as they determine selling prices, their sales promotion outlays and the design and qualities of their products (Scott, 1995). Analysis of market conduct entails an examination of i) buying and selling behavour of various markets participants ii) forms which completion amongst them takes (pricing terms of payment and credit) iii) level of activity and iv) actions to avoid collusion (Scarborough and Kydd, 1992).

2.2.4 Market performance

This refers to the impact of the structure and conduct as measured in terms of variables such as prices, costs and volumes of outputs (Pomeroy and Trinidad, 1995). By analyzing level of marketing margins and their cost components, it is possible to evaluate the impact of the structure and conduct characteristics on market performance (Anderson *et al.*, 2004). It is generally knowledgeable that a distribution system displaying acceptable performance is the one that allows technological progress, has the ability to adopt, innovate and utilize resources efficiently and to transmit prices that reflect costs (OECD, 1982). Common indicators of performance are trends in retail price level of stability of farm prices and income spread of marketing margins, marginal propensity to consumer and farmers' share of the customers' shillings spent on agricultural product, middlemen

profit, party farm prices (Kohls and Uhl, 1990). Analysis under this concept normally includes evaluation of operational technical and pricing efficiency (Ellis, 1992).

2.2.5 Relationship between structure-conduct-performance models

According to Schmidt (1999) the market structure determines market conduct, the behaviour of economic agents within the environment and thereby sets the level of market performance. The structure conduct performance framework suggests that relationships exist between structural characteristics of a market and the behavior of market participants and that their behavior in turn influences the performance of the market (Scarborough and Kydd 1992; Scott 1995).

2.3 Marketing channel theory

The marketing channel is the trade or distribution channel and is defined as a set of interdependent organizations involved in the process of making a product or service available for consumption or user (Stern *et al.,* 1996). The channel follows a vertical structure where products flow from producer to the ultimate consumer and in which actors meet each other at markets. Producers, wholesalers and retailers as well as other channel actors exist in channel arrangements to perform marketing functions (business activities) that contribute to the product flow. Actors that stand between producers and final users are known as intermediaries (Eskola, 2005).

The analysis of marketing channels is intended to provide a systematic knowledge of the flow of goods and services from their original producer to their final destination (consumers) (Mendoza, 1995). This knowledge is acquired by studying the participants in the process i.e. those who perform physical marketing functions in order to obtain economic benefits (Mendoza, 1995). In carrying out these functions, marketing agents achieve both personal and social goals. They earn a personal financial reward by

performing an activity desired by the society. Also they add value to production and in so doing they satisfy consumers needs (Kotler, 1997).

Nyange (1993) identified Irish potato marketing channel to consist of producers, truckers, wholesalers, retailer hawkers and consumers. On the other hand, Ferris *et al.* (2002) reported marketing channel of Irish potato in Uganda to consist of farmers (producers), village traders, urban brokers, wholesalers, urban retailers and consumers and processors.

2.4 Market margins, price spread and share of consumers' shillings

Investigating marketing margins is of great importance because of the impact of intermediary market participants upon the prices paid by consumers and that received by the producers (Smith, 1992; Wohlgenant, 2001). Research studies on margins and price spreads in Tanzania are lacking especially as far as the Irish potato production sector is concerned. This section reviews findings of such studies. Nyange (1993) revealed that largest margins were found among hawkers and the smallest margins were observed at retail and wholesale Irish potato market levels, but no reasons were given. The author found that producer's share of consumer's shilling ranged from 36 to 42 cents but he didn't focus on monitoring costs of a few selected market participants over a period of time.

Ferris *et al*. (2002) found that transporters (truckers) get more than 35% net margin, wholesalers earn a net margin of 9.5% and retailers get an average net margin of 12.3% per 100 kg bag of Irish potatoes. However, Tomek and Robinson (1991) cautions that increase in the share of consumer shilling is not an indicator that farmers are better off, nor is a decline in the share of consumer shillings is an indicator that farmers are worse off and marketing firms are performing poorly. Prices spread provide only a starting

point in an attempt to evaluate the performance of the food industry. Therefore Tomek and Robinson (1991) argue that the measure of efficiency and profit earned must be examined to determine whether or not margins are excessive. In this study, the market margin analysis will be employed to make comparison of prices at different levels of market chain.

2.5 Irish potato production in Tanzania

Tanzania enjoys a wide diversity of agro - climatic conditions suitable for a wide range of both tropical and subtropical horticultural product (Nyange *et al.,* 1997). Production of Irish potato in Tanzania is fairly well distributed in areas with tropical and sub tropical climatic conditions (Nyange, 1993). The crop is socio economically important to both travelers and traders. Resource poor farmers prefer growing Irish potato because of its short maturity period and can be grown throughout the year. Maize crop in high altitudes take about ten to twelve months to reach maturity, the period which might have been used by two cycles for Irish potato production (Haugwitz and Thowart, 1972).

According to FAOSTAT (2007) Irish potato production in the country showed a positive production trends whereby between 1990 and 2005 production increased from 210 000 to 260 000 tones, with a rate of increase of 0.03% per year (Fig. 1). In the past decade annual Irish potato production in the country varied between 195 960 and 260 000 tones, whereas in year 2003 and 2004/05 Tanzania recorded the lowest and highest production respectively due to uncertain and erratic rainfall (FAOSTAT, 2007). Price fluctuation made Irish potato market be uncertain hence discouraged farmers to grow Irish potato in large amount. In the year 2003 there was increase in price hence farmers increased production in the following year.
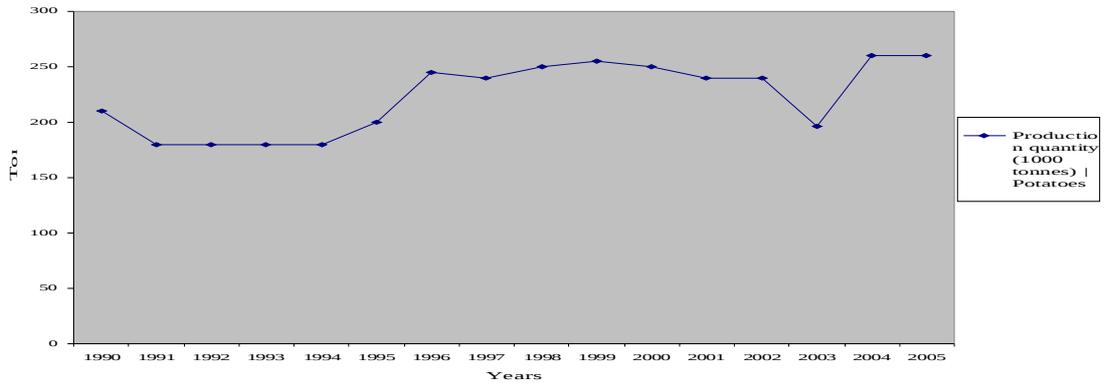
Figure 1: Irish potato production trend in Tanzania 1990 -2005

Source: FAOSTAT, 2007

The same scenario was indicated in potato yield whereby, for the past two decades yield was consistently increasing (Fig 2). The yield for the past two decades varied between 3 618.7 and 10 960.0 kg/ha (FAOSTAT, 2007). However, potato yield was very variable between and among years (Fig 2). General trend indicate a positive increase of 142 kg per year with a linear increase of the area cultivated as shown in (Figure 3).
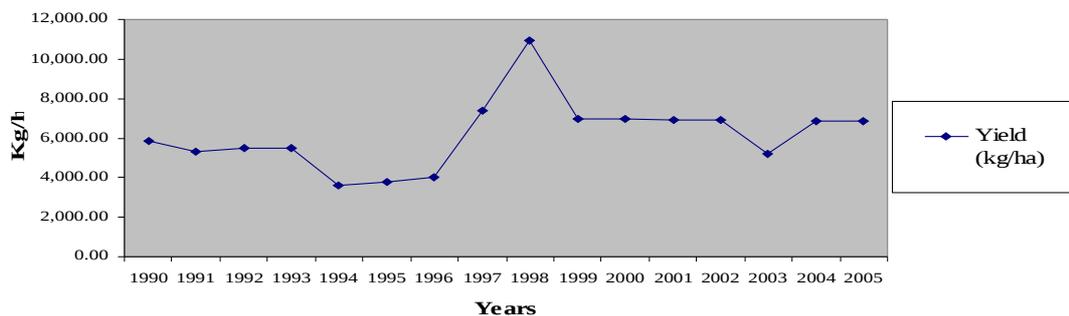
Figure 2: Irish potato yield trend in Tanzania 1990-2005
Source: FAOSTAT, 2OO7
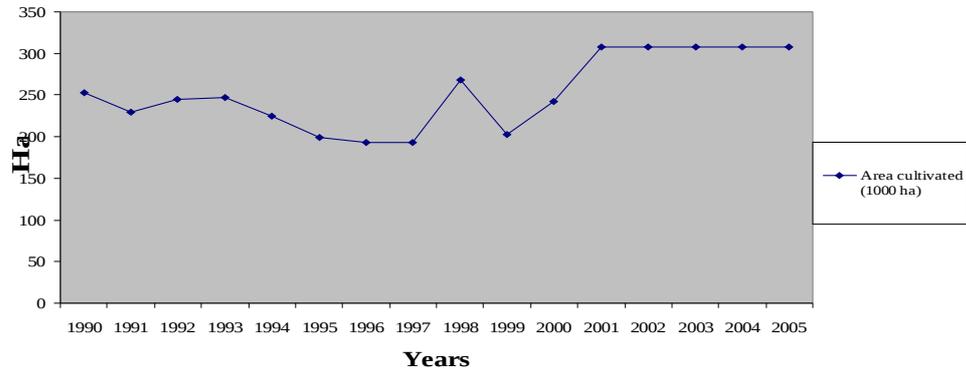
Figure 3: Area (1000 ha) under Irish potato cultivation in Tanzania, 1990 -2005
Source: FAOSTAT, 2OO7

2.6 Irish potato marketing in Tanzania

According to URT (2002) the marketing system is influenced by various factors. Poor infrastructure increases the cost of shipping from areas of surplus production to distant markets, where prices are higher. The marketing of produce with respect to both time and place has a profound effect on farmer's income, as these have a direct bearing on transaction costs (North, 2000). Marketing of Irish potatoes is constrained by high product perishability and limited on farm storage facilities. Improving Irish potato marketing is a very important but rather neglected aspect of the Irish potato industry. Mussei *et al. (*2000) reported that, the main problems facing farmers in Njombe district are low prices, unstable prices, and unreliable markets due to unreliable market information. So far, emphasis has been placed on increasing Irish potato production, with the goal of increasing household income, improving the nutritional status of consumers, consequently accelerating rural development (Setiadi, 1995).

There are those who hold the view that marketing is an adaptive set of activities to be given secondary consideration in Irish potato industry development, with primary attention directed towards increasing Irish potato production (Adiyoga, *et al*., 2001).

However, markets do not develop automatically, and the lack of a well-functioning market can increase risks and costs for farmers and other market participants (Adiyoga, *et al.,* 2001). There may be a need for positive action by public agencies to provide some of the basic services and create an environment conducive to efficient marketing of Irish potato. There is also a question of whether spontaneous development of marketing firms, in the absence of facilitating policies and programs, will provide efficient and equitable linkages between producers and consumers (Hayami and Kawagoe, 1993).

2.7 Impact of infrastructure on market access

Market infrastructures can be classified as hard (such as roads) and soft (such as access to credit, extension services, marketing information, security, risk bearing and agricultural inputs (IFAD, 2001). A well functioning infrastructure is critically important to efficient agricultural marketing (IFAD, 2001; Escola, 2005).The presence of good infrastructure is expected to increase the efficiency of both marketing and production as they reduce transaction costs and ensure more competitive pricing conditions in marketing than would occur in their absence (Minten and Kyle, 1995). Thus, regardless of their nature both types, hard and soft, have a significant impact on market access by farmers.

CHAPTER THREE

3.0 METHODOLOGY OF THE STUDY

3.1 Overview

This chapter presents the methodology used in this study. It covers the conceptual framework governing the study, description of the study area, study design, data collection and sources, study population and sampling procedure, sample size, tools of data analysis and study limitations.

3.2 Conceptual framework

Conceptual or analytical frameworks of market performance and the way in which the markets are structured are essential guidelines in identifying important variables for effective and efficient data collection. Scarborough and Kydd (1992) stress that such framework should help to indicate the most useful area(s) in which to focus, limited research resources and ensure that data collected is relevant to the objective of research. There are three factors that are important in determining the production and market channels of Irish potato (Fig.4).

The first factor is the ability of supplier to offer produce that will meet the demand of different end users. This in turn to a great extent is influenced by household endowment of factors of production mainly labour, land, and capital which jointly play a central role in agriculture production in Tanzania. Access to production technologies in terms of fertilizers, improved seeds and pesticides will also determine the level of production of various factors of production. Access to credit facility may also ease off rural households capital constraints. These factors all together affect the amount and rate of produce to be supplied which in turn affect the market efficiency.

The second factor is analysis of market efficiency by using market structure conduct and performance. Under market structure the organization of market was studied by identifying Irish potato market functionaries and their roles in providing product with place, form and time utility. The market channel and information transparency was examined to trace the movement of Irish potato from point of production to consumption. Concentration index and market barrier was also determined. Market conduct was studied by looking at the behavioural characteristics of market participants by examining Irish potato production pricing aspects as well as existence of organization among Irish potato market participants. Market performance which is the impact of structure and conduct was measured in terms of prices, cost and volume of outputs. This was measured by analyzing the level of margins and their cost components.

The third part is the consumer who buys the product in form that satisfies his/her demand. Prices set by market agents influences consumers demand. High demand of consumer results into higher prices of the product and therefore better margins of traders and producer.
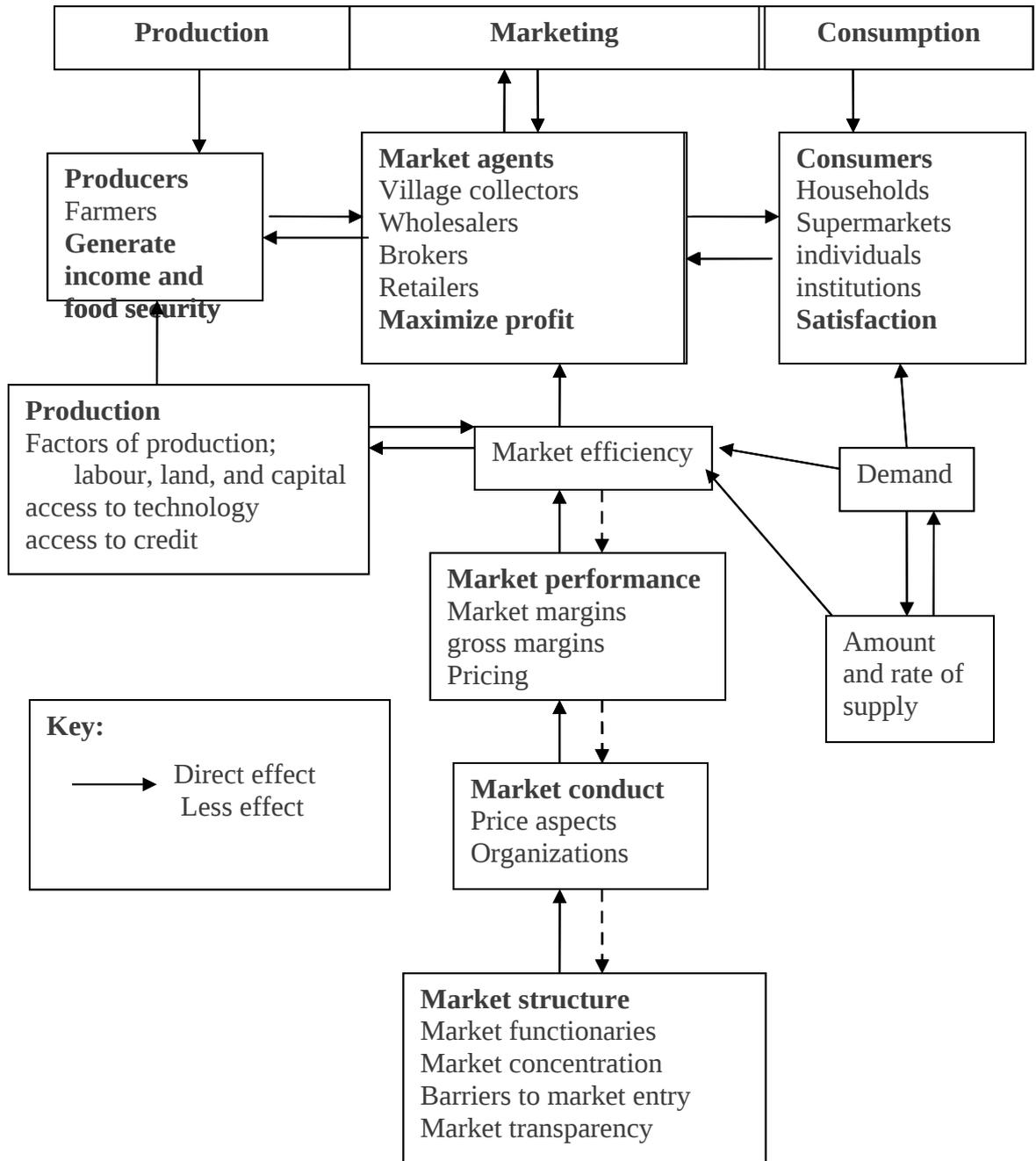
Figure 4: Conceptual framework

3.3 Description of the study area

The study was conducted in Mbeya rural district at Ulenje and Uyole wards. The district borders Chunya and Mbarali to the north, Iringa region to the east, Rungwe and Ileje to the south. Geographical location of the district is $8^{o}30'$ and $9^{o}30'S$ and $32^{o}45'$ and $33^{o}45'$ E. It has a total land area of 2 432 km^2 with the estimated population of around 254 897 people (URT, 2003). Administratively, the district has three divisions, 17 wards, and 162 villages. The district altitudes range from 1 000 - 2 500 masl with the mean annual rainfall of about 900 - 2 000 mm (URT, 2003).

This district was considered ideal for this study due to its high potential production and marketing of Irish potato. Ulenje ward was selected due to its potential production of Irish potato, while Uyole was selected due to its potential marketing, whereby most traders and farmers collect their Irish potato crop before transporting them to different markets inside and or outside the country in the nearby boarders of Zambia and Malawi. The economic activities of this district are mainly farming and livestock keeping. Food production is mainly maize, Irish potato, beans and sweet potatoes. Cash crops are dominated by Irish potato, maize coffee and pyrethrum (URT, 2003).

3.4 Research design

The study used a cross sectional survey in which data was collected at a single point at a time. This design has been chosen because of its economical benefits to researcher in terms of time and financial resource. Data for this study were collected from November 2007 to February 2008.

3.5 Data collection and sources

3.5.1 Primary data

The primary data from the sampled farmers and traders were collected through formal survey by using a structured questionnaire. The questionnaire was pre-tested before the main survey to check the relevance of questions and to determine whether it was comprehensive enough to collect the required information. The information collected included household general characteristics, household source of income, and crop production including quantity produced, costs of production, labour and use of farm inputs. Other information was quantity of produce handled in various markets, buying and selling prices, marketing costs.

3.5.2 Secondary data

Secondary data were collected from Mbeya rural district council offices and wards. Data from Mbeya rural district council were mainly on the social economic profile for the district and the Mbeya region at large. Information from the wards was on the number of the Irish potato farmers and traders their performance and the mode of the contract in the study area. More secondary data were obtained from relevant institutions and organizations like Mbeya region agricultural offices, Sokoine National Agriculture Library (SNAL) and internet.

3.6 Study population and sampling procedure

The target population of the study was Irish potato producers and traders. Purposive multistage sampling technique was employed to select districts, divisions, wards and villages. Respondents were randomly selected from three villages. Random sampling procedure was used to reduce biasness due large number of farmers available in study area.

3.7 Sample size

A total of 120 respondents were obtained and interviewed for this study being 90 farmers and 30 traders. Although sample size was limited to 120 it was sufficient enough to allow for statistical analysis. Usually the sample size depends on the size of the population to be sampled although general rule were hard to make without knowledge of specific population. Thirty cases seem to be minimal for studies in which statistical data analysis is to be done (Bailey, 1998. In this regard 30 farmers were selected from each village to make 90 farmers. At traders' level a total of 30 respondents were interviewed, among them being 8 wholesalers, 11 retailers and 11 transporters. The number was selected based on total number on traders available in the respective groups.

3.8 Tools for data analysis

The data obtained was summarized, coded, and analyzed by using Statistical Package for Social Sciences (SPSS) computer program version 12.0 Both descriptive and quantitative analysis were carried out.

3.8.1 Descriptive statistics

Statistics such as means, frequency distribution, percentage, average, and cross tabulation were used. Cross tabulation analysis was used to segregate respondents characteristics based on certain criteria such as price paid to each group and buying price along the market participants in order to determine whether or not the variable were statistically independent.

3.8.2 Quantitative analysis

3.8.2.1 Gross margin analysis

Gross margin (GMA) refers to the difference between total revenue and total variable costs (Msangi, 2000; Mlulla, 2003). Gross margin analysis (GMA) is one of the widely used analytical techniques for planning and analysis of projects by advisors, consultants, researchers and producers (Rogan, 2004). It is used as a measure of enterprise profitability and means of selecting farm plans. The size of gross margin depends on the services provided, market structure, perishability of the product as well as the distance between producers and consumers and may be influenced by market information especially for short-run margins.

The fundamental advantages of the GMA analysis as an economic tool include its easiness to understand and utilize the logical interrelations of economic and technological parameters and its ability to forecast rational variants for the operational structure of an enterprise or individual farmer (Selejio, 2002). In addition GMA is an easy way to understand profitability of an enterprise as it shows how effectively management can bring profits from sales and how an enterprise has to withstand downturn and fend off competition (McClure, 2004). The GMA models are very useful in cases where some data, for example profits of firms, are hard to collect. Just as important, calculations of depreciation have often been difficult to undertake due to the ambiguity nature of estimating the lifespan of fixed assets, appreciation and salvage values in many firms, thus necessitating the use of GMA models rather than the normal profit margin models.

Johnsen (2003) defined GM as the difference between value of an enterprises gross output and variable cost of that production; $GM = TR - AVC$

Where: GM = Gross margin (Tshs/kg),

TR = Total revenue (Tshs/kg)

AVC = Average variable cost (Tshs/kg)

However, gross margin analyses do not include fixed or overhead costs such as depreciation, machinery purchases, or permanent labour costs and comparison can be misleading (Hassall, 2003). Gross margin analysis is not an exact estimate and reliable point of reference of an enterprises pricing strategy and pricing profit but it does give a good indication of financial direction (Hassall, 2003). The GM analysis requires proper records such as input costs, quantities sold and prices received (Msangi, 2000).

In Tanzania, a number of studies have employed the GM model. For instance the study by Mlulla (2003) who assessed the operation of border trade in northern Tanzania and Philip (2001) who studied the economics of medium scale sugarcane producers in Morogoro. The model was also employed by Silomba (2000) who evaluated the performance of beans marketing in Kigoma region.

3.8.2.2 Market concentration

Market concentration is defined as the number, size and distribution of sellers and buyers in the market (Pomeroy and Trinidad, 1995). Market concentration is the measure of market power. It plays an important role in determination of market behaviour within an industry because it affects the interdependence action of firms. According to Kohls and Uhls (1990) the concentration ratio of over 50% is an indication of a strong concentrated (oligopolystic industry), 33%-50% a weak concentration and less than that, unconcentrated industry. In this study Irish potato market concentration was determined by looking at the proportion of total purchase accounted by few largest buyer to the total volume handled. Concentration ratio is given by the following formula:-

$$C = \frac{XP}{IP} \, x100$$

Where;

C   = Concentration ratio index

XP   = Volume of potato purchased by big buyers in the reference areas (Kg)

IP   = Total volume of potato handled in the market (kg)

3.8.2.3 Market margin

Market margins are differences between prices at different market levels. The term market margin is commonly used to refer the difference between producer and consumer price of an equivalent quantity and quality of a commodity (Pomeroy and Trinidad, 1995; Smith 1992). However it may also be used to describe price differences between other points in the marketing chain, for example between producer and wholesale or wholesale and retail prices like the case of this study (Pomeroy and Trinidad, 1995). Market performance was assessed by computing market margin, gross margin and determining the interface price efficiency.

The importance of estimating market margins springs from the fact that, intermediary market participants are very often reported to receive low shares of the total market values. Ashimogo and Lazaro (1989) in their study of the marketing channels for horticultural products in Morogoro district and Dar es Salaam city showed that marketing margins were the highest for truckers who delivered the product to the city for wholesale. Transport costs contributed about 37% to 40% of the total costs along this channel. The profit margin ranged between 25% and 27% of the producer prices.

Similarly, Nyange (1993) in his study of the economics of vegetables in Arumeru district (Arusha region) showed that the highest margins were accrued by retailers – with

hawkers receiving higher margins than other retailers. To a large extent this was expected since hawkers provide more services for delivering products closer to consumers. Nyange (1993) reported further that the truckers' margins were larger than margins at wholesale level with transport costs constituting about 30% to 35% of the total costs from producer to wholesale markets. In this study market margin was calculated by comparing difference between Irish potato selling and buying prices at different market level (farm gate, wholesale, transporter and retailers);

$$MM = P_i - P_i - 1$$

Where; MM   = Market margin between market level 1and market level i-1 in Tshs/kg

    P_i = Price at market level i in Tsh/kg,

    $P_i - 1$ = Price at market level i-1 in Tshs/kg

3.8.2.4 Degree of interface pricing

The degree of interface pricing efficiency was analyzed by using correlation analysis to test to what extent markets were statistically associated with buying and selling prices. The employed model was; $MM = f(P_i - \mu)$

Where; MM   =   Market margin,

    P_i =   Buying price at specified market and

    μ   =   Error term.

3.8.3 Limitations to the study methodology

The majority of respondents in the study area do not keep records a fact that posed a big problem during data collection. Therefore, collection of the required information depended mainly on memory recall. On the other hand, some respondents particularly traders were reluctant to give data on income generated from their trading activities. However most of them were convinced to cooperate after being persuaded by market authority that the information so given was meant for research purpose and that their privacy would be respected.

Inescapability, to capture respondents at their place of work made it difficult to get their full attention/ cooperation especially traders due to their habit of moving here and there to find transport goods. However, this was taken as a challenge by researcher to familiarize with such research works. Convention of units was also a problem since some traders used local units like bags filled extra ordinarily called "lumbesa," debes and or heaps which are not standardized. Estimations had therefore been made to convert local units to conventional ones such as kilograms.

CHAPTER FOUR

4.0 RESULT AND DISCUSSIONS

4.1 Overview

This chapter presents the results and discussion of the findings. The chapter is divided into two sections; section one presents Irish potato production aspects, household characteristic, use of inputs in Irish potato production, land ownership, sources of income, credit facilities and technical assistance in farming. The second section discusses the trading aspects including traders' characteristics, empirical results from gross margin analysis; market margin, producer's share and degree of interface pricing analysis with the aim of answering the stipulated research questions.

4.2 *Social economic characteristics* of farmers

4.2.1 Respondents general characteristics

Table 1 presents socio economic characteristics of respondents. Social economic characteristics have effects on the farmers' production decisions and resource allocation. They determine human potential to produce and capacity to change production practices and technology in this ever-changing social and economic environment (Ngailo, 1993).

4.2.1.1 Age

Survey results in Table1 indicated that 86.7% of the family members were aged between 1-18 years while 91.1% were 19-35 years old, 53.3% were 36-60 years and 4.4% were above 60 years old. The age of household head ranged from 19 years to a maximum of 80 years with the mean age of 39.8 years old. These findings imply that majority of farmers fall between the age group of 19-35 years who are energetic enough, capable to undertake Irish potato production activities. Age influences Irish potato production very much since activities associated with Irish potato production are very tough hence requires young and

energetic people. Regnard (2006) urges that in total the accumulation of wealthy is highly dependent on age of an individual, whereby a direct relationship is experienced. The interviewed Irish potato farmers in the study areas fall in economically productive class, below and above which are dependants.

4.2.1.2 Marital status

Furthermore, Table 1 show that 90% of farmers were married and male headed, 6.7% widowed and 3.3% were single. Married respondents are expected to have children who determine the size of household family members anticipated to provide supplementary household labour for Irish potato production. However, when the household has more children than adults it means that the household has too many dependants and hence low economically productive class.

4.2.1.3 Education

Mwikila (1992) reported that education is a factor of growth and productivity. The findings indicated that 82.2% of interviewed farmers had primary education, 8.9% had secondary education, 1.1% degree holders and 7.8% had no formal education Table1. These findings showed a typical characteristic of literacy common for smallholder farmers in the rural Tanzania villages. The implication of this is that, the majority of household heads in the study area have basic education enough for them to seek or receive better agricultural production and marketing technologies available from different sources such as extension agent, publications and mass media.

Table 1: Mbeya Rural District: Summary of sampled household socio-economic characteristics

Variable to be measured	Frequency	Percentage
Age (years)		
1-18	78	86.7
19-35	82	91.1
36-60	48	53.3
>60	4	4.4
Gender of household head		
Male	83	92.2
Female	7	7.8
Total	**90**	**100**
Education		
None	7	7.8
Primary education	74	82.2
Secondary	8	8.9
Degree	1	1.1
Total	**90**	**100.0**
Marital status		
Married	81	90.0
Single	3	3.3
Widowed	6	6.7
Total	**90**	**100.0**

4.2.2 Land ownership

Land is a major resource in agricultural production. With the reference to farm size the study findings indicate that size of fields owned by respondents ranged from 0.5- 45.0 acres of land with the mean farm size of 4.29 acres (Table 2). In the year 2005/06 the average area under different crop production was 3.13 acres which is about 72.96% of average total area owned. About 42% of that land (1.78 acre) is used for Irish potato production which implies that farmers in this area depend much on Irish potato as their cash crop. Steps taken to solve problem of land shortage for some farmers is renting from other farmers whereby the mean area rented was 2.21 acres.

Table 2: Mbeya Rural District: Land ownership and uses

Variables measured (Acres)	Min.	Max.	Mean	Std. Deviation
Land owned	.50	45.00	4.29	5.11287
Land used for crop production	.50	38.00	3.74	4.24196
Land that rented	.00	11.25	2.21	2.45561
Crop area in the year 2005/06	.00	15.00	3.13	2.18725
Area under Irish potato production	.25	10.00	1.78	1.46504

4.2.3 Major sources of income

Table 3 shows major sources of income for household members in the study area. About 54.4% of respondents depend on Irish potato for their income, 44.4% from livestock and 22.2% from wages. Other activities which contributed to the Farmers' income in the study area were carpentry and timbering (4.4%), petty business (3.3%), masonry (2.2%) and pension (1.1%). These findings suggest that contribution of Irish potato farming in household income is higher than other sources.

Table 3: Mbeya Rural District: Income earning activities

Activities	Frequency (N=90)	Percent
Irish potato farming	87	54.4
Livestock	40	25.0
Carpentry	4	2.5
Wages	20	11.9
Masonry	2	1.3
Petty business	3	1.9
Timber making	4	2.5
Pension	1	0.6
Total	**160**	**100.0**

4.2.4 Source of labour

Table 4 indicates the main source of labour as perceived by respondents in the study area. The result indicates that 74.4% of respondents used both family and hired labour in Irish potato production. The result further indicates that 50-80 percent of family labour is used

for Irish potato production which implies that Irish potato is potential crop hence given much attention by family members in the study area. The mean daily wage for farm labour was Tshs 1,782.54 with minimum of Tshs 800 and maximum of Tshs 3 000 as perceived by (70%) of the respondents.

Table 4: Mbeya Rural District: Source of labour for Irish potato production

Source	Frequency	Percent
Family (alone)	15	16.7
Hired	8	8.9
Family and hired	67	74.4
Total	**90**	**100.0**

4.3 Production aspects

4.3.1 Fertilizer use

Farmers in the study area used different strategies to replenish soil fertility. These strategies include application of organic and inorganic fertilizers. The use of fertilizers is directly related to the importance of the crop. In the study area most farmers used industrial or organic fertilizers to improve soil fertility as indicated in Table 5. About 92.2% of respondents used fertilizers in Irish potato production while 7.8% do not use fertilizers because it does not pay in terms of benefits.

The common inorganic fertilizers used by different farmers were; Diammonium phosphate (DAP) 25.1%, Calcium Ammonium Nitrate (CAN) 26.6%, Triple Super Phosphate (TSP) 22.7%, UREA 11.1%, NPK 7.7% and manure 6.8%. In potato production farmers prefer basal fertilizer application rather than top dressing methods of fertilizers application. Few farmers reported using NPK folia application.

Table 5: Mbeya Rural District: Use of inputs in Irish potato production

Response	Frequency	percent
Use of fertilizers		
Yes	83	92.2
No	7	7.8
Total	**90**	**100.0**
Type of fertilizer used (n=84)		
Urea	23	11.1
CAN	55	26.6
DAP	52	25.1
TSP	47	22.7
NPK	16	7.7
Manure	14	6.8
Total	**207**	**100.0**
Type of seed used		
Improved	19	21.2
Local	69	76.7
Improve and local	2	2.2
Total	**90**	**100.0**
Use fungicide		
Yes	84	93.3
No	6	6.7
Total	**90**	**100.0**

4.3.2 Use of fungicides

The major crop diseases of economic importance in the area are potato blight and bacteria wilt. However, farmers control potato blight by using fungicide but do not have specific means of controlling bacteria wilt apart from uprooting the diseased plants. Table 5 shows the perception of farmer on the use of fungicide. About 93% of the respondents used fungicide in potato production while 7% did not use fungicide. In order to reduce the degree of destruction of the disease farmers plant their crop during dry season when the disease is not serious i.e. the period with infrequent rainfall. Potato blight if not controlled can cause 100% crop loss in the rain season (FAO, 2006).

4.3.3 Type of seed used

The choice of variety of seed to grow is determined by its availability, farmer's knowledge about the source and preference in terms of production goal. Results on type of seeds farmers plant are presented in Table 5. About 76.7% of respondents reported to grow local variety known as *arka*, 21.2% used improved Irish potato varieties, whereas 2.2% used both improved and local varieties. The reasons mentioned were unavailability and lack of knowledge about the source of improved seeds.

4.3.4 Irish potato production and income statistics

Table 6 shows average production and income earned by Irish potato farmers in Mbeya rural district. The average farm size planted with Irish potato was 1.77 acres which gives the average production of about 97.21 bags equivalent to 4.92 bags/acre. Farmers sell their potatoes directly to traders who come from the urban markets. The price varies considerably from year to year, season to season and even from place to place depending on the accessibility to transport. The average prices for the period 2005/06 fluctuated between 6 000 and 40 000 Tshs per 100 kg bag. The big variation of price is attributed by variation in the time of selling, and market situation (demand and supply forces).

In order to access income realizable from growing Irish potatoes it is necessary first to estimate the average yield and production costs. The mean yield of Irish potato is about 46.24 bags per acre. In general, potato yields vary depending on crop variety, amount of precipitation and access to irrigation, solar radiation, fertility and soil conditions. Appendix 3 gives the average costs of cultivating 1 acre of Irish potatoes, the yield and returns as given by farmers interviewed. The result shows that with a total investment average cost of Tshs 480 219.6/acre the likely yield given favorable weather conditions

ranges from 12-120 bags with the mean of 46.24 bags per acre. Results further show that the farmer earns Tshs 253 403.90/= per acre.

Table 6: Mbeya Rural District: Irish potato production and income statistics

Variable measured	Min	Max	Mean
Area planted with Irish potato (acres)	.25	10.00	1.77
Production per acre (Bags)	12.00	120.00	46.24
Total production (Bags)	5.00	600.00	97.21
Quantity sold (bags)	4.00	600.00	90.92
Price per bag (Tsh)	6 000.00	40 000.00	15 865.56
Total earnings (Tsh)	18 000.00	15 750 000.00	1 581 071.11
Total earning per acre (Tsh)			**253 403.90**

4.2.5 Price setting in Irish potato market

Results in Table 7 show that about 60% of the respondents said that price was determined by market forces mainly through negotiation between farmers and traders, 36% said that farmers set the price and 4% said it is the wholesalers. The real situation is that, traders offer prices according to the market situation, and mostly depending on the prevailing prices in urban centers especially at Dar es Salaam markets.

Table 7: Mbeya Rural District: Who sets price?

Responses	Frequency	Percent
Negotiate and agree with each other	15	60.0
Farmers	9	36.0
Wholesalers	1	4.0
Total	**25**	**100**

4.4 Agricultural support services

Agricultural support services discussed here include: credit, extension and association facilities

4.4.1 Credit facilities

Table 8 shows that 13.3% of respondents have access to credit facilities, leaving behind a substantial proportion of farmers without credit facilities. SACCOS, NGO, bank and informal groups are the most important financial sources mentioned by farmers whereby, 58.3% of respondents got credit from SACCOS, 25.1% from bank, and 8.3% from informal groups and NGOs respectively. Findings also revealed that, despite the obvious need of financial services by agricultural producers, credit facilities to farmers are very poor. These results conform to that of Goodland *et al. (*1999) who said that, access to financial services and in particular to funds for crop production is a limiting factor that slows down input use and output marketing. Furthermore, study results show that, 100% of those who accessed credit were paid cash of whom 83.33% used the money to finance Irish potato production activities while 16.67% used the money for diversion problems.

Table 8 : Mbeya Rural District: Access to credit

Response	Frequency	%
Access to credit		
Access	12	13.3
No access	78	86.7
Total	**90**	**100.0**
Source of credit (N=12)		
Informal group	1	8.3
Bank	3	25.1
SACCOS	7	58.3
NGO	1	8.3
Total	**12**	**100.00**

4.4.2 Access to extension services

Farmers' access to extension services is presented in Table 9. Results indicate that 51.1% of the respondents had access to extension services while 48.9% had no access. About 93.3% of respondents reported that they got the extension services from village extension

officers, 2.2% from progressive farmers and 4.4% from agrochemical traders. When farmers asked if they benefited from the service provided by extension officer, 50% of the respondents admitted that they benefited as they got more yield and good quality produce.

Table 9: Mbeya Rural District: Access to extension services

Extension services	N	%
Access	46	51.1
No access	44	48.9
Total	**90**	**100.0**
Service provider (N=45)		
Village extension officer	42	93.3
Aggressive farmers	1	2.2
Agrochemical traders	2	4.4
Total	**45**	**100.0**

4.4.3 Irish potato growers association

The results in Table 10 present activities of association of Irish potato growers. Only 5.6% of the respondents said that there is farmers association which provides services to Irish potato growers. About 94.4% of the respondents do not belong to the association. Of those who are members of the association, 40.0% benefited with the association by lending themselves money, 20.0% used the profit for other village activities, 20.0% divide profits among themselves and 20.0% have just started the business and didn't have any profit during the time of the study. Some respondents complained that, the association entry fee set by members 'acts as a restriction to join the association.

Table 10: Mbeya Rural District: Irish potato growers association

Variable measured	Frequency	Percent
Potato growers association		
Yes	5	5.6
No	85	94.4
Total	**90**	**100.0**
Benefits of the organization		
Lend themselves money	2	40.0
Produce money for village activities	1	20.0
Share profits	1	20.0
Not yet seen	1	20.0
Total	**5**	**100.0**

4.5 Constraints faced by Irish potato farmers

The respondents raised a number of problems as far as the access to market for Irish potato is concerned. Table 11 shows the summary of problems that were reported. About 68.9% of the respondents reported to face market problems while 31.1% reported no problems. Results further indicated that 30.4% of the respondents said that Irish potato market is not reliable, followed by 17.7% who reported low and uncertain prices respectively, 20.3% poor infrastructure, 8.9% fewer buyers and 5.1% improper measurement. The study therefore revealed that marketing of Irish potato crop in the study area was the main bottleneck as mentioned by farmers' especially unreliable market, uncertain price, poor infrastructure, fewer buyers, and improper measurement.

Table 11: Mbeya Rural District: Problems encountered by farmers in Irish potato marketing

	Frequency	Percent
Response		
Yes	62	68.9
No	28	31.1
Total	**90**	**100.0**
Problems (N=59)		
Unreliable market	24	30.4
Uncertain price	14	17.7
Improper measurement	4	5.1
Fewer buyers	7	8.9
Low prices of product	14	17.7
Poor infrastructure	16	20.3
Total	**79**	**100.0**

4.6 Marketing of Irish potato

4.6.1 Characteristics of sample traders

Table 12 presents characteristics of the sampled traders in the study area. The result shows that trading of Irish potato in the study area is operated by both male (40%) and female (60%). Female traders operate their business in local markets like Uyole and Igoma while others sell their produce along the road side. Some of female traders handle large amount of the Irish potato selling it to retailers and or to transporters. Male traders are mainly transporters handling large amount of the produce, transporting it to Dar es Salaam and other places within and outside the country. Variations in proportions of sample traders with respect to marital status in the study area were apparent. Nevertheless, it appears that trading of Irish potato is mostly performed by married traders (86.7%).

The overall age of sample traders ranges between 19 and 49 years with the mean age of 36.37 years. These findings imply that majority of traders are energetic and capable of operating their business properly. Table 12 also presents that 66.7% of Irish potato

traders completed primary school, followed by 26.7% who finished secondary school and 6.7% did not attend school. This implies that majority of Irish potato traders in the survey area have basic education enough for them to seek or receive better marketing techniques available from different sources such as extension agent, publications and mass media.

Table 12: Mbeya Rural District: Traders' household characteristics

Age respondents	Min.	Max.	Mean
Age	19.00	49.00	36.37

Other characteristics		
Gender	**Frequency**	**Percent**
Male	12	40.0
Female	18	60.0
Total	**30**	**100.0**
Education level		
None	2	6.7
Primary	20	66.7
Ordinary level	8	26.7
Total	**30**	**100.0**
Marital status		
Single	3	10.0
Married	26	86.7
Widowed	1	3.3
Total	**30**	**100.0**

4.6.2 Business activities done by Irish potato traders

Table 13 shows business activities carried out by potato traders. It can be seen that 36.7% of the respondents are transporters and retailers respectively, while 26.6% are wholesalers. Wholesalers buy the crop from farmers and sell at Uyole centre to transporters who in turn sell it to retailers in urban markets around Mbeya or transport it to other parts of the country including Dar es Salaam. About 83.3% of the respondents reported that Irish potato business is a full time activity while16.7% said it is a part time activity.

Table 13: Mbeya Rural District: Business activities

Business activities	Frequency	Percent
Nature of business		
Wholesale	8	26.6
Transporter	11	36.7
Retail	11	36.7
Total	**30**	**100.0**
Status of business		
Full time	25	83.3
Part time	5	16.7
Total	**30**	**100.0**

4.6.3 Source of capital for Irish potato trading

Table 14 shows sources of capital for Irish potato traders. The findings indicated that 56.7% of respondents depended on own savings, followed by 26.7% who depended on grants/remittances given by relatives and friends and lastly 16.7% who depended on credit.

Table 14: Mbeya Rural District: Source of capital for Irish potato trading

Source	Frequency	Percent
Loan	5	16.7
Own savings	17	56.7
Relatives /Friends	8	26.7
Total	**30**	**100.0**

4.6.4 Market information

The study found that different market participants have different sources of market information. Table 15 indicated that 58.0% of the producers got market information from traders, 26% from friends or relatives while 8% got market information from neighbours and radio respectively. Market information reached the respective market participants in different ways including; physical visit 44.4%, asking traders 11.1%, telephone

communication 38.9% from radio or television 3.7% and magazine 1.9%. This implies that there is uncoordinated and ineffective market information flow in the study area which may limit the realization of market transparency among Irish potato market participants. The type of information needed are prices of produce mentioned by 85.7%, price of input 5.6% and quality and standard of produce by 8.7%.

Table 15: Mbeya Rural District: Source of market information

Response (n=30)	Frequency	Percent
Source of information		
Traders	29	58.0
Friends and Relatives	13	26.0
Neighbours	4	8.0
Radio	4	8.0
Total	**50**	**100.0**
Type of information		
Price of produce	30	85.7
Price of input	2	5.7
Quality and standard of Produce	3	8.6
Total	**35**	**100.0**
How do you get market information?		
Physical visit	24	44.4
Ask traders when they come to buy	6	11.1
Listen to radio/TV	2	3.7
Read magazine	1	1.9
Telephone	21	38.9
Total	**54**	**100.0**

4.6.5 Marketing channels for Irish potatoes

Marketing channels facilitate the flow of goods from producers to consumers. A variety of well established although informal marketing channels exist in Mbeya rural for the distribution and sale of Irish potatoes in both the domestic and export markets. Table 16 shows Irish potato customers and places where farmers sell their Irish potato crop. About 82.4% of the respondents sold their Irish potato crop to traders direct in the field. Very few (4.9%) respondents transported their crop to different places outside Uyole like

Tunduma, DSM and home/ware house stores situated in the village and about 2.9% to Uyole. The major customers mentioned by the respondents were wholesalers (48.8%), truckers /Transporters (41.3%), individual consumers 9.1% and retailers (0.8%). This implies that many farmers sell their crop to traders who then transported their crop to different places inside and / or outside the country like Uyole, Dar es Salaam, Malawi Zambia and Democratic Republic of Congo (DRC).

Table 16: Mbeya Rural District: Available marketing channels (N=88)

Where	N	%	Customers	N	%
Field (Farm gate)	84	82.4	Individuals consumers	11	9.1
Tunduma	5	4.9	Wholesalers	59	48.8
Home/store	5	4.9	Truckers/transporters	50	41.3
DSM	5	4.9	Retailers	1	0.8
Uyole	3	2.9			
Total	**102**	**100.0**	**Total**	**121**	**100.0**

The result from this study reveals that there are four major channels where by Irish potato can move from farmers to consumers (Fig. 5). Ferris *et al*. (2002) got the same result on his study. In order to understand how Irish potato move through various channels, it is necessary to identify roles of various marketing participants. Marketing participants refers to all individuals or firm that are involved in the marketing process.
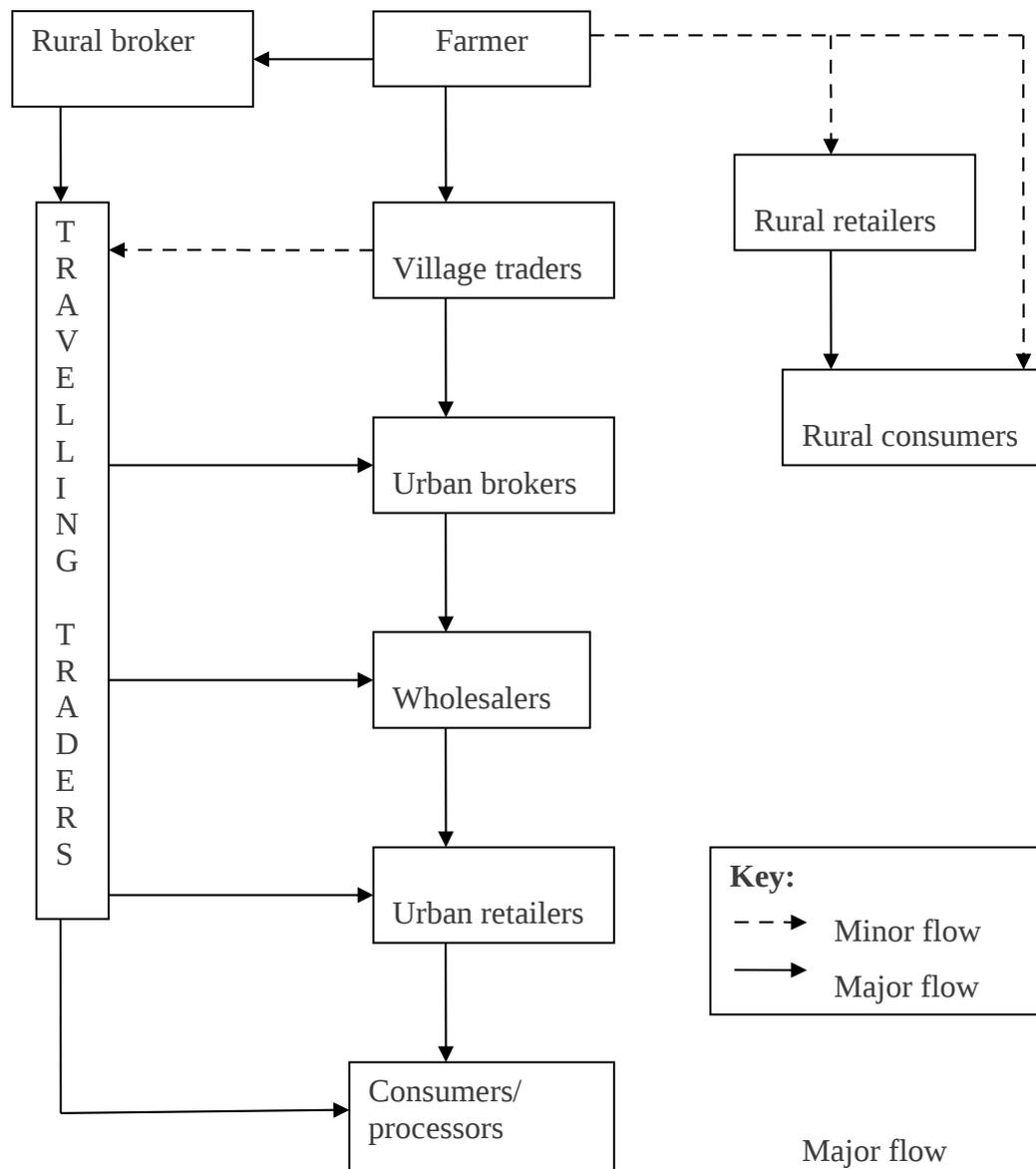
Figure 5: Mbeya Rural District: Irish potato marketing channel

4.6.5.1 Farmers

Farmers are the first link in the Irish potato market chain. Farmers are both producers and consumers. Farmers in the study area harvest their Irish potato crop only when they have a buyer. At the time of sale farmers either seek the village/brokers or the traders/brokers approach. After striking a price deal, the farmer and village trader/broker agree on harvest date and they give bags and advance cash for paying labourer (Mussei, personal communication, 2008). The study revealed that, in most cases farmers harvest Irish

potatoes while traders provide bags and do the packing. Very few individuals harvest their Irish potatoes, transport and wholesale them at urban markets. Most often, produce is sold at farm-gate and on a cash basis. The study revealed that, farmers also sell their Irish potatoes by the roadside or take them to the weekly village markets or sell them to the village retailer.

4.6.5.2 Village traders/assemblers

Village traders come from the production areas and know the farmers in their village and surrounding areas. They know what farmers have planted and when it is likely to be harvested. The observations made during study time revealed that village traders are in contact with transporters, wholesalers and retailers who they contact using mobile telephones after identifying farmers willing to sell and a price is agreed. Once an agreement is struck, the deal is concluded on a trust basis. Trade can also be initiated by the wholesaler who requires urgent supplies. When wholesaler requires Irish potatoes, he will call his contact (village trader) agree on a price and other marketing arrangements and in turn the village trader assembles the crop to as per amount required.

4.6.5.3 Brokers

Brokers are one of the prominent market participants in Irish potato trading. In the study area, brokers are the contact point for travelling traders and wholesale buyers and the key link of farmers to traders. Brokers get instant pay (commission) per Irish potato bag collected for their services. The amount of the commission ranges from 500-1 000/= per bag depending on the quantity required and the urgency with which the consignment is required (Khalifa, personal communication, 2008). Apart from rural brokers there are also brokers in most urban centers who link travelling traders to wholesalers and urban retailers. For example, in Dar es Salaam travelling traders or village traders, who have brought a lorry load of Irish potatoes, surrender it to the broker to handle the product on behalf.

Brokers are an organized and influential group in the market especially at Dar es Salaam markets. The study revealed that urban brokers negotiate a fixed price with the travelling traders and sell at a higher price to the wholesalers while the rural brokers may negotiate a different price (higher price) with the buyers and pay a different price (lower price) to the farmers. At worst, they sell at the travelling traders' reserve price otherwise a price above the reserve price guarantees them of a minimum commission. On the whole, the market has now accepted brokers (urban and rural) as a necessary iniquity. They are a key link in the marketing chain. They are the most informed about the market (demand and supply) conditions.

4.6.5.4 Wholesalers

Wholesalers are divided into two groups; collectors and distributors. The former collects produce from farmers in the region. They travel long distances to purchase commodities in spot markets from the producing areas in the village. To facilitate operation, collectors frequently employ purchasing agents who work in the production areas on their behalf. Purchasing agents reduce costs by identifying produce for sale, carrying out the negotiations, accumulating, assembling and carrying the produce to a nearby earth road for ease of collection. Major Irish potato wholesalers in the study area come from Uyole and Dar es Salaam markets.

More often, wholesalers in Dar es Salaam buy from traders. Rarely wholesalers venture out to buy directly from the farmers. Some wholesalers in the study area sale their product at Uyole market to transporters and sometimes to retailers who sell at Uyole and other urban markets around Mbeya. Once there is enough load to carry, collectors transport the crop to the main cities/towns generally using seven tons lorries. Collecting wholesalers operate in such a way that allows distributing wholesalers to focus entirely

on their urban customers and it is important in large urban centers such as Dar es Salaam where wholesale and retail markets operate.

4.6.5.5 Travelling traders

These are traders who either own trucks or hire them for buying Irish potatoes from farmers or village traders and then transport and sell to wholesalers and urban retailers in other district markets. In Dar es Salaam, travelling traders can sell their truckload of Irish potato at one market agent where they have a contact.

4.6.5.6 Retailers

Irish potato retailers are many and range from village to small towns roadside sellers. In the study area, retailers in markets buy 5-15 bags from the farmers and then sell it in various heap sizes or tins for amounts ranging from 100-500/=. A heap sells at 500/= and weighs an average of 3 Kg. Retailers sort and grade potatoes according to variety and size. A tin (debe) which has an average weight of 20 kgs, sells for approximately 2500/= at the time when the study was conducted.

4.6.5.7 Consumers /processors

In Irish potato farming communities and rural dwellers, potatoes are eaten as a major staple food, mainly in boiled or mashed forms by all age groups. At times they eat Irish potatoes mixed with beans, beef, or other vegetable stew. In the urban areas where most of Irish potato is sold, Irish potatoes are mainly consumed as chips, snacks (crisps) and occasionally in a boiled or mashed form. The major consumers of Irish potatoes in towns are young people of working class and students of higher institutions of learning. Many customers in hotels, bars and restaurants preferred chips compared to boiled, mashed or grilled potato (Mwakasendo *et al*., 2007).

4.*7 Efficiency analysis for Irish potato marketing system*

4.7.1 Market structure and prices

Marketing outlets for potatoes basically include local, regional and export markets. Data from traders through questionnaire showed that the number of traders who are doing Irish potato business range from 25-100 with the mean of 51 traders. These traders are responsible for bringing products to local consumers in potato-deficit districts and cities in Tanzania. Based on the existing number of potato traders and exporters in Mbeya rural, low barriers to entry, and the homogeneous nature of the locally grown potatoes; the market structure for potatoes in Mbeya rural district can be categorized as competitive. Marketing costs and profits do not appear to be excessive, and product losses during marketing appear to be low. Price fluctuation is a source of uncertainty that confronts Irish potato growers in the study area. As negotiations and trade take place between buyers and sellers, potato prices may change from week to week, from day to day, and even within the trading day. Prices in the field are also influenced by prices at Dar es Salaam markets. Prices are somewhat below the annual average during the main harvest season i.e. between January and April.

4.7.2 Market transparency

Market transparency affects the intensity of competition. If buyers or sellers do not have proper knowledge about market conditions, the intensity of competition is low despite the sufficient number of market participation to ensure competition. The most important aspect of market transparency is information transmission process in marketing system which implies information about prices, grades and standard weights of the product in question. In the study area the conditions for a high degree of market transparency are poor. There are no uniform measurements, weights or standard grades. Market traders use many and different measuring devices such as bags, tins and heaps such that direct price

comparisons are very difficult. For instance, some traders used bags which are over filled with a big heap at the top (lumbesa) which may go up to 150 kg per bag instead of normal weight of a bag which is 100 kg. Market retailers sell Irish potato in heap which you can not know what the exact weight is. Therefore, although the price within the market tends to be uniform, the amount sold for a given price differs greatly i.e. price variations are replaced by quantity variations.

4.7.3 Barriers to market entry

Barriers to market entry reduce the threat of potential competition and therefore impede marketing efficiency (Eskola, 2005). Barrier can result from know-how, capital requirements, and institutional restrictions and non- competitive reaction of established traders (Eskola, 2005). The major entry barrier include shortage of capital and or credit facilities, the licensing fees which are still exorbitant for many traders and lack of market information associated with poor infrastructure and transport facilities. All traders admitted that Irish potato business was open to any body provided that he/she has enough capital. Some traders said they are constrained by capital where by 72% said did not have access to credit. It was observed that the majority of traders do not have enough collateral to meet requirement imposed by credit lending institutions and the acquisition of credit from formal institution such as bank follows very long bureaucratic procedures. All these factors act as disincentives to traders for making any effort to seek credit from formal financial institutions.

Accordingly traders market fee (produce levy) of (300- 800)/= is charged per bag of Irish potato sold. Traders who procure Irish potato from rural areas pay a district council levy (ushuru wa mazao) of 15 000-20 000 Tsh per trip. Sometimes these fees are paid more than once before reaching its final destination. Moreover some traders who transported

Irish potato to Dar es Salaam complained about road blocks which require them to pay some extra money in case their bags seemed to be overfilled. These results show that, lack of enough capital, high market fees and unstable prices are the major barrier to market entry. It can be concluded that market entry is not a serious problem but rather a major barrier to business expansion.

4.7.4 Market concentration index

The concentration indices (CI) were obtained by dividing the volume traded by few largest traders by total volume traded by sample traders in 2005/06. In order to obtain the volume for the largest few Irish potato traders the respondents were divided into two groups. The first group comprised of respondents who handle volumes below the sample mean and the second group comprised of respondents who handle volumes above the sample mean. The volume for the first group was calculated and those above the mean were taken as a few largest traders in marketing system. Survey results in Table 17 show that concentration indices for Irish potato traders were; retailers 34.1%, wholesale 83.5%, transporter 42.9% and overall traders 87.2%. The index of 87.2% for Irish potato traders, suggests that Irish potato market was highly concentrated.

According to Kohls and Uhls (1990) the concentration index of over 50% is an indication of a strong concentrated (oligopolystic industry), 33%-50% a weak concentration and less than that, unconcentrated industry. In the study area, the concentration ratio of 34.1% and 42.9% for retailers and transporters respectively implies that Irish potato market is weakly concentrated. The CI of 83.5% for wholesalers indicates that the market is highly concentrated implying oligopolistic market behaviour a tendency towards monopolistic marketing behaviour. The higher concentration ratio of the traders which reflect barriers to entry manifests its effect on the conduct of price formation.

Based on the CI of retailers and transporters which was the prominent group among traders, it can be concluded that the number of traders in Irish potato marketing system in the study area is high enough to prevent monopolistic tendencies among traders. According to Ferris *et al.* (2002) the Irish potato market structure has the characteristics of a monopolistically competitive market (few sellers, many buyers, limited information).

Table 17: Mbeya Rural District: Market concentration index

Amount (100 kg bags)	Retailers	Wholesalers	Transporters	Traders
a) Total amount traded	88.00	635.00	1260.00	1983.00
b) Amount traded by big buyers	30.00	530.00	540.00	1580.00
c) Concentration ratio (b/a *x*100 (%)	34.10	83.5	42.90	87.20

4.7.5 Market conduct

Market conduct refers to the way market participants behave towards avoiding competition e.g. pricing and selling tactics, research and development activities and traders' cooperation or rivalry (Pomeroy and Trinidad, 1995). Irish potato traders in the study area operate individually without any appreciable cooperation. This result conforms with the findings of Scarborough and Kydd (1992) who explained that performance is expected to be satisfactory under the following conditions: If sufficient number of buyers and sellers exists to provide alternative outlet without one of them having the market power to dominate others and if market transparency with regard to product quality, variety, grades and prices is given and no serious barriers to market entry and exit.

4.8 Marketing margin analysis along Irish potato channel

4.8.1 At farm level

Table 18 presents marketing margin analysis at different levels along the Irish potato channel. The average profit margin per acre was estimated to be Tsh. 253 403.90. Returns per shilling invested are Tsh 0.53 while return per bag harvested is Tsh 5 480.20 and return per acre rented is Tsh 8.51. Market margin at farm level seems to be small compared to other market levels due to the nature of the enterprise. Irish potato is labour intensive crop which requires effective supervision at every stage of production. Any small mistake in the production may lead to total loss. This is evidenced by a large range of yield per acre of 12-120 bags obtained by farmers as shown in Table 6. The survey reveals that having a relatively high farmers' share of the marketing margin may not guarantee that potato growers will earn profits as it depends in the market price received. This implies that when the price is low, the risk of loss due to deterioration is higher for potato growers than for potato traders.

Table 18: Mbeya Rural District: Irish potato returns at different market levels

Return at different level	Value
Farm level	
Total output (100 kg bag/acre)	46.24
Average selling price(Tsh./100kg bag)	15 865.56
Gross revenue per acre	733 623.50
Average variable costs[a]	480 219.60
Gross margin (Tsh/acre)	253 403.9
Returns per bag harvested	5 480.20
Return per shilling of land rented (Tsh)	8.51
Return per shilling invested (Tsh)	0.53
Transporters level	
Quantity of Irish potato bought (100 kg bags)	234.50
Buying price per 100 kg bag (Tsh)	32 045.45
Variable costs (Tsh)	1 839 223.40
Average selling price per bag (Tsh)	48 636.36
Gross revenue (Tsh)	11 405 226.40
Gross margin (Tsh)	2 051 344.90
Returns per bag of Irish potato (Tsh)	8 747.70
Return per shilling invested (Tsh)	0.22
Wholesalers level	
Quantity of Irish potato bought (100 kg bags)	88.00
Buying price per 100 kg bag (Tsh)	17 454.55
Variable costs (Tsh)	485 370.16
Average selling price per bag (Tsh)	28 209.09
Gross revenue (Tsh)e	2 482 399.90
Gross margin (Tsh)	461 029.40
Returns per bag of Irish potato (Tsh)	5 239.00
Return per shilling invested (Tsh)	0.23
Retailers level	
Quantity of Irish potato bought (100 kg bags)	31.00
Buying price per 100 kg bag (Tsh)	12 312.50
Variable costs (Tsh)	79 825.00
Average selling price (Tsh per bag)	18 812.50
Gross revenue (Tsh)	583 187.50
Gross margin (Tsh)	121 675.00
Returns per bag of Irish potato (Tsh)	3 925.00
Return per shilling invested) (Tsh)	0.26

 Source: Appendices 3-6.

4.8.2 At transporters' level

The survey results show that on average transporters receive a total profit of Tsh 2 051 344.90 per week per person giving an average return per bag of Tsh 8747.70 if transported and sold in Dar es salaam. The return per shilling invested is found to be low (0.22 Tsh.) compared to the return per shilling acquired at farm level (0.53). Although the return per shilling of transporter seems to be lower than that of the farmers, it is important to note that transporters usually have higher turnover than farmer. For example a transporter may sell the average of 938 bags of Irish potato per month giving him a net income 8 205 342.6 Tsh per month while a farmer can get only 253 404.45 for three months.

4.8.3 At wholesalers' level

The results also show that on average wholesalers receive a total profit of Tsh 461 029.40 per person per week lower than that of transporters, giving an average return per bag of Tsh 5 239.00. A return per shilling invested is found to be Tsh 0.23 which is higher than that of transporters. This implies that the cost incurred at transportation stage is higher than that at wholesale stage. Efficiency at wholesalers' stage is lower than that of transporters because of relatively small amount handled. Return per shilling at farm level seems to be higher than that at wholesalers' level. This could be the reason why farmers keep on producing Irish potatoes.

4.8.4 At retailing level

At retailer's level, profit is found to be Tsh 121 675.00 per week giving Tsh 0.26 returns per shilling invested which is higher than that of wholesalers and Tsh 3 925.00 returns per bag of Irish potato sold. Although the return per shilling invested seem to be higher, turn over is very small because retailer sell the average of 124 bags giving a monthly net income of Tsh 486 700.00 while a wholesaler may earn the average of Tsh 1 844 128.00

per month. The efficiency of marketing at this point seemed to be very small compared to other levels of Irish potato market. This obeys the rule of economies and diseconomies of scale since at retail level amount handled is small compared to other levels and high rate of deterioration since the produce take long time before finished.

4.8.5 Market power distribution along Irish potato marketing channel

Transporters seem to have relatively more market power than other participants in Irish potato market channel. This is revealed by the efficiency measures of return per bag and return per shilling invested (Table 19). Returns per bag were highest at transporter (8 747.70 Tsh) compared to other actors. However return per shilling invested single out retailers to be more efficient than other chain actors. The reason for large return per bag at transporters level with relatively small return per shilling is accounted by the time at which they handle Irish potato.

 It was found that, transporters may take 3-5 days to collect and transport potatoes to Dar es Salaam while wholesalers who sell potatoes at Uyole may hardly take one day to collect and sale their product. Another reason for transporters efficiency is large volume of Irish potato handled compare to other actors hence economy and diseconomies of scale. Transporters handle an average of 234.5 bags of Irish potato while wholesalers handle 88 and retailers handle 31 bags per week. Morever marketing costs are highest at transporters than other marketing levels hence more profit margin. Marketing costs are highest at the transporters level, but transporters also earn the highest profit margin (Adiyago, *et al.*, 2001).

Table 19: Mbeya Rural District: Efficiency measures among marketing agents

Market level	Return per bag	Returns per shilling
Farm level	5 480.20	0.53
Transporting level	8 747.70	0.22
Wholesale level	5 239.00	0.23
Retailing level	3 925.00	0.26

4.9 Degree of interface pricing efficiency in Irish potato marketing

In this study the degree of interface pricing efficiency along traders marketing channel was determined using correlation analysis to test to what extent marketing margin statistically correlate with buying and selling prices. That is to examine to what extent Irish potato market participants pass on price changes to subsequent marketing channel level and locations. Table 20 shows that marketing margins are significantly highly correlated with selling prices and buying prices at 0.01 levels. There is a strong association (r <0.954 P= 0.01) observed between buying and selling prices. This indicates that the marketing system is efficient in this aspect. A positive correlation between market margin and buying prices implies that as buying prices increase market margin increases and vise versa.

It can be deduced that selling prices are relatively stable than buying prices. This is attributed by the fact that Dar es Salaam which is the end destination of Irish potato from Mbeya rural is a center of selling Irish potato not only from Mbeya rural but also from other areas such as Njombe and Northern part of Tanzania. Basing on the results of correlation analysis the Irish potato marketing system in Mbeya Rural can be viewed as being efficient. The closely related result was found by Ferris *et al.* (2002) who reported correlation coefficients of Irish potato market between Kampala and Masaka to be

(0.722) and between Masaka and Mbarara (0.624) hence reveal a modest degree of correlation.

Table 20: Mbeya Rural district: Correlations analysis

Correlation	Market margin	Buy price	Sell price
Market margin	1.000	0.727(**)	0.875(**)
Average buy price		1.000	0.954(**)
Average sell price			1.000

**Correlation is significant at the 0.01 level (2-tailed) (N=30)

4.10 Problems faced by Irish potato traders and their possible solutions

Table 21 shows that traders face a number of marketing problems that affect their performance hence contribution to the economy. About 33.3% of respondents said that the main problem they face in trading Irish potato was perishability of the product followed by unreliable market (19.4%), uncertain price 13.9%, transportation and low capital 11.1% respectively, government intervention on measurements 8.3%, and storage facilities 3.8%.

The possible solutions given by traders on how to solve these problems include: government to organize market (25%) and improving infrastructure by building stores with storage facilities as mentioned by 36% of respondents, removal of road blocks 16%. Other suggestions given are government to provide loan to traders (12%) so that they can get capital to run their business. Some traders took own effort to change the crop and sell as seed in case there was a sign of perishability and other efforts as mentioned by 8% and 4% respectively.

Table 21: Mbeya Rural District: Problems facing Irish potato traders and their possible solutions

Problem (n=23)	N	%	Possible solution (n=23)	N	%
Perishability of the product	12	33.3	Government improve infrastructure	1	2.8
Unreliable market	7	19.4	Government organize market	9	25.0
Transportation	4	11.1			
Uncertain price	5	13.9	Government remove road blocks	6	16.7
Low capital investment	4	11.1	Government provide loans to traders	4	11.1
Government intervention on measurements	3	8.3	Sell as seed instead of crop	3	8.3
			Personal effort	1	2.8
Storage facility	1	2.8			
Total	**36**	**100.0**		**36**	**100.0**

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Overview

The main objective of this study was to evaluate the Irish potatoes production and marketing performance in Mbeya rural district. Specifically the study aimed at determining economic profitability of Irish potato grown by small-scale farmers; identify existing Irish potato marketing channels and the role played by key market participants and to examine the pricing structure of Irish potato at different levels of market chain with a view towards establishing margins at different levels of market channels.

5.2 Conclusion

Based on CI of retailers and transporters it can be concluded that the number of traders in Irish potato marketing system in the study area is high enough to prevent any monopolistic tendencies among traders.

It is evident that Irish potato growers in Mbeya rural district have not captured the full potential benefits of production. Some problems have been noted from the study which indicated some inefficiency in the entire production – marketing system. These problems are perishability of the crop, unreliable markets, uncertain prices, transportation, road blocks, low capital investment and government intervention on measurements.

Despite the far ranging effects of certain natural factors on crop yield, the potato grower himself is responsible to a large extent for the final success or failure of his crop. The survey data show a wide range in final profit margins suggesting that many producers could achieve better financial results if they paid greater attention to the factors influencing Irish potato production that are within their control.

5. 3 Recommendations

Marketing of Irish potato crop in the study area was the main bottleneck as mentioned by farmers' especially unreliable market, uncertain price, poor infrastructure, fewer buyers, and improper measurement. This study therefore recommends that these problems should be addressed in order to improve performance of Irish potato market.

The profitability of Irish potato production depends largely on yield and product price. Results show a wide range of yield from 12-120 bags/acre, which suggests that many producers could achieve better financial results if they pay greater attention to the factors influencing Irish potato production that are within their control. One of these factors is the use of improved seed variety. This seems to be a problem since it was mentioned by 76.7% respondents that they use local variety. They do not grow improved varieties due to its unavailability and farmers' knowledge about the source. It is recommended that research should consider wide publicity of new varieties and promote them through participatory on farm research trials and demonstrations.

In potato enterprise, price fluctuates considerably depending on season. This is demonstrated by a wide range of profit margin. One way of reducing price fluctuations would be increased use of storage facilities. A local village stores could be constructed for storing potatoes for later sale.

In order for farmers to fully enjoy the benefits of a free market environment they must understand the market mechanism at play. This is only possible if farmers are organized into groups or association which will increase bargaining power. Through associations farmers can be able to mobilize saving and credit facilities which can provide funds for urgent need while speculating for higher prices when there is low supply of potatoes in the market.

The bulk of potatoes in the study area and Tanzania at a large are transported in trucks and stored in warehouse that are not refrigerated. Often times great losses are experienced especially when breakdowns occur or when the trucks get stuck in the muddy roads during the rain season. There is a need to conduct another study to analyze technical efficiency of potato transportation system in order to come up with the recommendation regarding Technology and infrastructures aimed at extending and improving the storage period of potato.

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APPENDICES

Appendix 1: **Farmers' questionnaire for the study; evaluation of Irish potato**

production and marketing performance. A case of   Mbeya rural district

Name of Enumerator _____Date _____

A. Background information

1. Name of household head_____

2. Name of respondent_____ 3. Age _____

4. Telephone number_____ 5. Division _____

6. Ward_____7. Village_____

B. Household characteristics

8. Age of household head (Years) _____

9. Gender of hhh_____1= Male_____ 2 = Female_____

10. Education level of household head (indicate by putting tick)

None	**primary**	**Ordinary secondary**	**Advanced secondary**	**Diploma**	Degree

11. Marital status of household head;

Single	**Married**	**widowed**	**Divorced**	**Separated**

12. Number of household members by age i) 1-18 years_____

    ii) 19-35 years_____ iii) 36-60 years _____iv) > 60 years _____

14. What are the main sources of income in your household? i. Agriculture_____

    ii. Livestock _____ iii. Carpentry _____ iv. Wages _____   v. Gifts_____

    vi. Masonry _____   vii Petty business _____ viii. Others specify_____

C. Irish potato production

15. How many hectares of land do you own? _____

16. How much of that land do you use in crop production? _____

17. How many ha used but not owned (rented)? _____

18. How many ha did you cultivate in the year 2005/06? _____

19. How many ha were under Irish potato production_____

20. What is the main source of labour used in Irish potato production?

    i) Family _____ ii) Hired _____ iii) Family and hired _____

21. What is the daily wage rate for general farm labor in this area?_____

22. For this wage, what is the typical number of hours worked per day? __Hours

23. What percentage of family labour time in agricultural activities is spent on Irish

    Potato production?

       i) 20%_____ii) 40%_____iii) 50% _____

       iv) 80% _____ v) 100%_____

24. What type of technology do you use in the farm?

     i. Hand hoe _____ ii. Animal traction _____iii. Tractor_____

25. What type of seed do you use? i. Improved_____ii. Local_____

26. Do you use fertilizer? 1= yes_____2. = No_____

27. If yes what type of fertilizer do you use? 1. Urea _____ 2. CAN _____

     3. DAP _____4. TSP _____5. Others specify _____

28. If not using fertilizers why? i) Not available _____ii) Expensive _____

    iii) Not required _____ iv) Not easily accessible_____

    v) Others (specify) _____

29. Do you use fungicide to control diseases? 1) = yes _____2. = No_____

30. If not why? 1) Not available_____ 2) expensive_____

     3) Not aware_____ 4) No serious diseases_____

5) Others (specify)_____

31. Indicate costs for different operations in Irish potato production

Operation	Costs/ unit
1. Hiring land	
2. Land cultivation	
3. Harrowing	
4. Planting	
5. Chemicals (fungicides, insecticides, herbicides)	
6. Fertilizers	
7. Weeding	
8. Spraying (labour)	
9. Seed (buying costs + haulage cost)	
10. Harvesting	

32. Do you have any access to credit facility? 1 = Yes_____2. No_____

33. If yes what was the source of that credit?

1= Informal group _____2= bank_____

3= informal money lenders_____4= friend/relative _____

5 = Input distributor_____ 6 = Governments_____

7= others specify_____

34. What form of credit? 1. = Money _____2. = inputs_____

35. How did you use the credit? 1 = Investing in business _____

2. = Investing in agriculture_____3 = children's school fees _____

4. = Home consumption_____ 5 = others specify) _____

Give information about Irish potato yield in the year 2005/06

Area planted	Production per/ha	Total production	Quantity sold	Price per unit	Total earnings

D. Irish potato marketing

37. When do you sell Irish potato? i. Before harvest _____ ii. After harvest_____

38. Is access to market a problem? 1. Yes_____2. No_____

39. If yes mention the problems encountered and possible solutions

Problem	Possible solution

40. Where do you sell your produces?

41. Who are the major costumers of your produce?

   i. Individual _____ ii. Wholesaler _____iii. Trucker _____

   iv. Others specify _____

42. How do you always get those customers?

43. Are you aware of current Irish potato prices in the market? i. Yes _____ii. No

44. How far is from home to market? i) 1-3 km _____ ii) 4-6 km_____

    iii) 7-10 km_____ iv) others specify_____

45. What is means of transport?

46. What is the cost of transporting one bag of Irish potato from the farm to the

    market?

47. Where do you get market information? i. traders _____ ii. neighbours____

    iii. Friends and relatives _____iv Radio_____v. Internet_____

    vi. Magazine _____ vii. Others_____

48. What types of information do you get?

   i. Price of the produce_____ ii. Price of inputs_____

   iii. Quality and standards of produce_____ iv others specify_____

49. Do you have problems in getting market information? 1. Yes___2. No _____

50. If yes, mention the problems and strategies to have information on time always

Problems	Strategies
1.	
2.	
3.	

E. Irish potato growers association

51. As Irish potato growers do you have any association? 1. Yes ___2. No _____

52. If yes what activities does the organization perform?

_____
_____
_____
_____

53. What are the benefits of that organization?

_____
_____
_____

54. Are there any restrictions in joining the organization? 1. Yes_____2. No_____

55. If yes what are the restrictions

_____
_____
_____
_____

F. Extension services

56. Do you have access to extension service? 1. Yes_____2. No _____

57. If yes where do you get extension services? i) Village extension officer_____

   ii) NGOs _____iii) Research_____

 iv) Others   specify_____

58 What kind of services do you get

   _____
   _____
   _____

59. Are there benefits from the services provided? 1. Yes _____2. No _____

60. If yes what are the benefits?

   _____
   _____
   _____

_____Thank you for cooperation_____

Appendix 2: Traders' questionnaire for evaluation of Irish potato production and marketing performance. A case of Mbeya Rural District

Name of Enumerator _____Date _____

A. Background information

1. Name of respondent_____2. Age _____3. Gender_____

4. Telephone number_____

5. Respondent level of education (indicate by putting tick)

None	Primary	Ordinary secondary	Advanced secondary	Diploma	Degree

6. Marital status;

Single	Married	Widowed	Divorced	Separated

B. Information about Irish potato business

7. Nature of the business i) Full time_____ ii) Part time_____

8. How long have you been involved in Irish potato trading? years_____

9. What type of trade do you perform i. Assembling _____ ii. Wholesale ___

iii. Retail trade _____iv. Others specify _____

10. Where do you get Irish potato for sale? i. From farmers _____

ii. From village assemblers _____iii. From wholesalers___iv others specify_____

11. What is means of transport do you use? i. By head _____ ii. By trucks _____

iii .By Carts _____ iv. Others specify_____

12. What is the average amount of Irish potato handled?_____

13. Please fill in the following table on Irish potato trading pattern per week

Quantity bought	Unit buying price TZS/ (bag)	Distance to Market (km)	Cost of transport (TZS)	Labour cost (TZS)	Storage costs (TZS)

14. Do you have any contractual arrangements with buyers/ sellers of Irish Potato?

 i. Yes_____ii. No _____

15. Who sets price for Irish potato i. Farmers _____ ii. Assembler_____

 iii. Wholesalers_____ iv. Retailer _____

16. What are criteria used in setting price? i. Costs incurred _____

 ii. Supply and demand situation_____ iii. Others specify_____

17. What kind of measurement do you use when selling your Irish Potato? _____

18. Do you grade your products prior to buying/ selling? 1. Yes_____ 2. No_____

19. If yes what is the grade definition

Grade name	Grade characteristics	Price

20. What factors do you consider when buying or selling Irish potato?

 i. Price on which you are going to sell _____ii. Quantity of crop_____ iii.

 Accessibility of market place _____iii. Others specify _____

C. Market information

21 Where do you get market information? i. Traders _____ ii. Neighbours _____

 iii. Friends and relatives _____ iv Radio _____v. Internet_____

 vi. Magazine _____ vii. Others specify_____

22. How do you get this information?

    i. Physical visit_____ ii. Ask traders when they come to buy_____

    iii. Listening to radio/watching TV_____ iv. Reading magazine_____

    v. Telephone (mobile/ fixed) _____ others specify_____

23. What types of information do you get?

    i. Price of the produce_____ ii. Price of inputs_____

    iii. Quality and standards of produce_____ iv others specify_____

24. How much cost do you incur in getting information?

    _____

    _____

    _____

    _____

25. What strategies do you set to have information on time always?

    _____

    _____

    _____

    _____

26. Are you aware about current Irish potato current prices at market?

    1=Yes_____ 2 = No_____

27. Is Irish potato business open to every body? 1= yes_____ 2= No_____

28. If no what are barriers to market entry? i. Capital_____ ii. Institutional _____

    iii. Experience _____ iv Knowledge _____

D. Other traders' information

29. How many Irish potato traders re operating in this market (including yourself)

_____

30. What is the volume of trade?

    i. Large_____ ii. Average_____iii. Minimum_____

31. What are your costumers? i. Retailers _____ ii. Wholesalers' _____

iii Village brokers _____ iv. Transporters _____

32. What kind of your customer do you prefer most? _____

33. Why do you prefer to sell to this buyer than others?_____

34. Have you notice any rivals among buyers/sellers? 1) yes_____2) No_____

E. Capital and cost analysis

35. What are the sources of capital for your business i. loan _____ ii Agriculture___?

   iii. Relatives _____ iv. Selling livestock _____ v. others specify_____

36. What kind of marketing cost do you incur?

Costs	Tsh
Transportation	
Market fee	
Labour charges	
Taxes	
Others specify	

7. Gross margin analysis

On season		Off season	
Buying price Tsh/kg	Selling price/ kg	Buying price Tsh/kg	Selling price/ kg

F Credit accessibility and organization

38. Do have access to credit facilities? i. Yes _____ ii. No _____

39. If yes what are the sources? i. bank _____ ii. Trader _____

   iii. Farmers _____iv. Relatives v. _____ v. others specify_____

40 Have you ever applied for a credit from any agency in recent years?

   i. Yes _____ ii. No _____

41. If yes fill the following table

Source	Amount	Interest rate	Terms of payment (Cash, in kind, both)

42. If not why? a. Not available _____b. High interest rates _____

   c. High risk _____ d. Others specify _____

43. As Irish potato traders do you have any organization? i. Yes_____ ii. No _____

44. If yes fill in the table bellow

Name of organization	Activity	Benefits	Entry conditions

G. Irish potato Marketing problems

45. Do you face any problem in Irish potato marketing i. Yes _____ ii. No _____

46. If yes mention the problems and give suggestions for solution

Problems	suggestions

_____Tank you for cooperation_____

Appendix 3: Mbeya Rural District: Irish potato returns at farm level

S/N	Parameters	Value
1	Area under cultivation (Acres)	1.00
2	Total output (100 kg bag)	46.24
3	Average selling price	15 865.56
4	Gross revenue per acre (2x3)	733 623.50
5	Hiring land (cost/acre)	29 789.83
6	Land cultivation	27 179.78
7	Harrowing	25 413.46
8	Planting	15 264.04
9	Chemicals	27 975.00
10	Fertilizers	72 823.81
11	Weeding	18 968.18
12	Spraying	9 860.49
13	Seed	159 291.67
14	Harvesting	93 653.33
15	Total costs	480 219.60
16	Gross margin (4-15) (Tsh/acre)	253 404.00
17	Return per shilling of land rented (16)/(5) (Tsh)	9.32
18	Return per shilling invested (16)/(15) (Tsh)	0.53
19	Return per bag harvested (16)/(2) (Tsh)	5 442.50

Appendix 4: Mbeya Rural District:Profit margin analysis for Irish potato transporters

S/N	Parameters	Value
1.	Quantity of Irish potato bought (100 kg bags)	234.50
2.	Buying price per 100 kg bag	32 045.45
3.	Purchasing cost (1)x(2) (Tsh)	7 514 658.00
4.	Transport	831 408.00
5.	Market fee	23 450.00
6.	Labour charges	245 158.00
7.	Taxes	17 587.50
8.	Storage	22 383.00
9.	Miscellaneous (bags, twines needless)	347 486.80
10.	Village commissioners	117 250.00
11.	Town commissioners	234 500.00
12.	Total cost incurred (3-11)	9 353 881.40
13.	Average selling price per bag	48 636.36
14.	Gross revenue(1)x(13)	11 405 226.40
15	Gross margin (14)-(12)	2 051 345.00
16	Returns per bag of Irish potato (15)/ (1) (Tsh)	8 747.70
17	Return per shilling invested (15)/(12) (Tsh)	0.22

Appendix 5: Mbeya Rural District: Profit margin at wholesalers' level

S/N	Parameters	Value
1.	Quantity of Irish potato bought (100 kg bags)	88.00
2.	Buying price per 100 kg bag	17 454.55
3.	Purchasing cost (1)x(2) (Tsh)	1 536 000.4
4.	Transport	152 803.20
5.	Market fee	8 800.00
6.	Labour charges	58 396.80
7.	Taxes	16 975.20
8.	Storage	8 399.60
9.	Miscellaneous (bags, twines needless)	107 999.8
10.	Village commission	44 000.00
11.	Town commission	88 000.00
12.	Total cost incurred (3-11)	2 021 374.6
13.	Average selling price per bag	28 209.10
14.	Gross revenue(1)x(13)	2 482 400.80
15	Gross margin (14)-(12)	461 026.20
16	Returns per bag of Irish potato (15)/ (1) (Tsh)	5 239.00
17	Return per shilling invested (15)/(12) (Tsh)	0.23

Appendix 6: Mbeya Rural District: Profit margin analysis at retailers level

S/N	Parameters	Value
1.	Quantity of Irish potato bought (100 kg bags)	31.00
2.	Buying price per 100 kg bag	12 312.50
3.	Purchasing cost (1)x(2) (Tsh)	381 687.5
4.	Transport	27 900.00
5.	Market fee	3 100.00
6.	Labour charges	13 950.00
7.	Storage	2 325.00
8.	Miscellaneous (bags, twines needless)	32 550.00
9.	Total cost incurred (3-11)	461 512.5
10.	Average selling price per bag	18 812.50
11.	Gross revenue(1)x(11)	583 187.50
12.	Gross margin (11)-(9)	121 675.00
13.	Returns per bag of Irish potato (12)/ (1) (Tsh)	3925.00
15	Return per shilling invested (12)/(9) (Tsh)	0.26