ECONOMIC AND INSTITUTIONAL FACTORS AFFECTING SMALLHOLDER FARMERS' INCOME FROM ORANGE PRODUCTION IN MUHEZA DISTRICT, TANZANIA

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ABSTRACT

This study analyzed economic and institutional factors affecting income of smallholder farmers from orange production, who can be characterized as income poor, in Muheza district, in Tanzania. More specifically, the study analyzed orange institutional arrangements and their influence on prices and incomes of orange farmers; transaction costs and how they affect incomes of orange farmers; the effects of intrinsic characteristics of smallholder orange farmers and their organization settings on farmers' income; and orange market performance in the study area. Primary data were collected using open and close ended questions which were administered to 152 smallholder farmers and 62 traders. A check list was used to collect primary data from 25 key informants. The collected data were analyzed using both qualitative and quantitative approaches. Gross margin (GM) and multiple regression analysis methods were adopted for data analysis. The overall results showed that smallholder farmers are still facing high transaction costs in Muheza district. Contract arrangements and farmers' organizations were the main institutional arrangements which are being applied by orange farmers. The results showed that contracts are signed while farmers have no price information from urban markets. This subjects farmers into getting low farm gate prices and hence affecting their incomes from orange business. Similarly, farmers' organizations are not strong enough to influence profitable contracts to members. Econometric results indicate that tree bearing oranges ($P < 0.01$), orange quantity marketed ($P < 0.01$), orange price received ($P < 0.01$), and transport cost ($P < 0.01$) are the main intrinsic factors influencing incomes in orange farming. Gross margin results show that wholesalers had the highest profit figure of Tsh 43.86 per orange, followed by retailers (Tsh 40.23) and farmers (Tsh 18.32). Based on the key findings, the study recommends that the government should intervene specifically in the reduction of transaction costs and the risks of doing orange business by improving economic and institutional factors. There is need to ensure that a suitable business

environment is available in empowering smallholder farmers to do orange marketing in Tanzania. If all these recommendations are implemented, then improvement in the income from oranges would ultimately be realized.

DECLARATION

I, Robert Fanuel Makorere, do hereby declare to the Senate of Sokoine University of Agriculture, that this thesis is my own original work, and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

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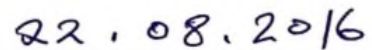
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The above declaration is confirmed,

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Lastly, I wish to assure all those who have rendered me assistance in one way or another that they are not responsible for any flaws that may appear in this thesis. I remain solely responsible for any errors, omissions or shortcomings therein.

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LIST OF ABBREVIATIONS AND ACRONYMS

AGREST	Agricultural Economics Society of Tanzania
ASDS	Agricultural Sector Development Strategy
BOFACO	Bonde Orange Farmers Co-operative
DHSO	District Horticultural Specialist Officer
NGO	Non-Government Organization
DALDOs	District Agricultural and Livestock Development Officers
DED	District Executive Director
ECI	East Africa Consultant Institute
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GM	Gross Margin
HODECT	Horticultural Development Council of Tanzania
KIFAA	Kilongo Farmers Association
KWAFAA	Kwa-fungo Farmers Associations
LGAs	Local Government Authorities
LDC	Less Developed Countries
LTD	Limited
MKUKUTA	*Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania*
MAFC	Ministry of Agriculture, Food Security and Co-operatives
MOFACOs	Muheza Farmers' Organizations
MUVI	*Muunganiko wa Ujasiriamali Vijijini*
NSGRP	National Strategy for Growth and Reduction of Poverty
NM	Net Margin
PhD	Degree of Philosophy

PRSP	Poverty Reduction Strategy Paper
PMO	Prime Minister's Office
PMO-RALG	Prime Minister's Office-Regional Administrative Local Government
REPOA	Research on Poverty Alleviation
RAS	Regional Administrative Secretariat
RDS	Rural Development Strategy
SPSS	Statistical Package for Social Science
SUA	Sokoine University of Agriculture
TABOGO	Tanga Best Orange Growers Organization
TAHA	Tanzania Horticultural Association
TSH	Tanzanian shillings
TCEs	Transaction Cost Economics
TICC	Tanzania Industries, Chamber of Commerce
URT	United Republic of Tanzania
USA	United State of America
UK	United Kingdom
VEO	Village Executive Officers
VAEO	Village Agricultural Extension Officers
WAEO	Ward Agricultural Extension Officers
WOB	World Bank

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Since independence in 1961, Tanzania has largely been depending on agriculture as the main economic activity. The sector has all along not only been providing employment but it has also been a source of livelihood to majority of households in Tanzania Mainland (URT, 2014). For example in the year 2012, agricultural sector contributed 22% of the country's GDP; it employed more than three-quarters (over 70%) of the workforce. It provided more than 95% of food requirements and 65% of industrial raw materials in the country; and it contributed 30% of export earnings (URT, 2010).

In view of the foregoing reasons therefore, the role of the sector towards poverty reduction cannot be overemphasized. Despite the economic importance of agriculture, the sector is still dominated by small-scale farmers (URT, 2014); and majority of these cultivate horticultural crops at different scales (URT, 2004). The horticultural crop production is the main activity of about 50% of the smallholder households (URT, 2011). Horticultural sub sector therefore deserves greater attention in the discussion of growth and poverty in Tanzania mainland.

Horticultural sector has been growing at around 8% per year in the country (TAHA, 2010). This growth is due to an increase of new investments and expansion of the existing ones as well as improved trade opportunities abroad (TAHA, 2012). For example, the contribution of investments in horticultural business to the total agricultural investments has increased at an average of 17% since 2007. However, this increase of investment in

horticultural business and the general growth pattern of agriculture have had little impact, if any, in poverty reduction, particularly in rural areas (Maro, 2011).

Horticultural crops grown in the country include fruits (oranges, strawberries, avocadoes, water melon, jackfruits, mangoes, Tangerines, pawpaw, pineapples, and pears, among others); vegetables (beans, onion, tomatoes, and carrots, and the like); and cut flowers. Official records show that vegetables especially beans are the leading contributors to the growth of horticulture industry in terms of foreign exchange earnings in the country (TAHA, 2012). For example, in year 2009 Tanzania exported beans worth USD 32 million to India alone. On the other hand, among fruits oranges, strawberries, avocados, and water melons (in that order) have also had a significant contribution to the growth of horticultural sector in Tanzania (TAHA, 2012).

Globally, oranges are produced in the tropical climate (URT, 2008), with Brazil being the largest orange producer in the world, and South Africa being the largest orange producer in Africa. In East Africa Tanzania has overtaken Kenya to become the largest orange producer after the latter faced greening disease, a problem that affects growers in Kenya's higher elevation (URT, 2008). Most of the oranges are sold in fresh form and are absorbed by the local market and some are exported to Kenya (MMA, 2008).

In Tanzania, oranges are cultivated in many parts of the country including Tanga, the Coast, and Morogoro regions. On average, the national orange production is 1.2 million tons per annum (URT, 2012). Tanga region is the largest producer of oranges in the country with an average production of 504 thousand tons per annum (URT, 2012), thus contributing 42% of the total oranges produced in the country. In addition, Tanga is a

relatively more efficient producer (with productivity of 22.41 t/ha), a the Coast region (18.31 t/ha), and Morogoro (10.9 t/ha) (MMA, 2008).

In Tanga region, Muheza district is the largest producer of oranges. The district has 7 205 hectares of land planted with 1 469 820 orange trees. These orange trees are estimated to produce around 101 thousand tons[1] of oranges which earn farmers significant incomes (URT, 2014). The incomes earned by farmers from orange sub sector amounted to Tsh 750 millions in year 2009/10, which was an increase from Tsh 650 million earned in the year 2005/06 (URT, 2009/10).

Despite the significant contribution of the orange sub-sector to the income of smallholder farmers, losses at farm level have been reducing farmers' incomes significantly (Lazaro, 2008; URT, 2009). For example, according to studies conducted in the country, it is estimated that the annual losses of oranges at farm level range from 30 to 40% (DAIPESA, 2003). These losses have eroded quite a huge portion of household's income; considering the fact that more than 54% of the total household income in the district comes from orange farming activities (URT, 2010).

As a strategy to reduce the magnitude of losses and more specifically to minimize market uncertainties and risks of doing business, farmers have been approaching traders to buy orange before harvesting time. This mechanism is also applied by farmers as a strategy of reducing transaction costs and risks both of production and of searching for orange markets. However, despite the application of such a strategy post harvest losses have continued to remain high among smallholder orange farmers (URT, 2009).

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[1] The district therefore produces 75% of the total oranges produced in the region (URT, 2014).

Even if there may be policy interventions to increase productivity and to reduce the magnitude of pre-harvest losses[2], such interventions are not ends by themselves. The market side of the equation must also be right. The market side or the post harvest system of oranges is characterized by market uncertainties and risks of doing orange business caused by lack of/or poor orange processing facilities, poor transport networks, and lack of adequate market information flows (URT, 2009; URT, 2010).

There are two aspects of economic costs, production costs and transaction costs (Dorward *et al.*, 2009). Transaction cost is the difference between the costs of production (up to the farm gate) and the costs from the farm gate to consumer and risks of consumer supply. These include costs of losses[3], transport, communication, monitoring, negotiations, monitoring contracts, price differences. In view of the above, Temu (2009) also argued that transaction costs may arise from poor institutional arrangements or lack of necessary institutional support for least-cost information sharing, monitoring, and negotiation.

The transaction costs play a significant role in enhancing farmers' supply of the farm's produce. This is because, if the transaction costs are minimal, the farmer will be in a position to supply more oranges and their supply curve will shift to the right and thus enjoying more revenues from oranges, *ceteris puribus* (Dorward *et al.*, 2009).

Uncertainty is linked to imperfect information, bonded rationality, and opportunism. Bonded rationality (limit ability to make use of all information available) and opportunism (which lead to unpredictable behavior of buyer) both contribute to market uncertainty and

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[2] Pre-harvest losses caused by pests and diseases, inadequate handling facilities, and lack of improved agronomic practices.

[3] "Losses and the risks of losses resulting from breach of contract are also ex-post transaction costs". These, and some of the monitoring costs, increase with volumes traded, introducing variable cost element to ex-post transaction costs (Lyne, 2009:147).

risk of transaction failure and hence losses to farmers. As noted by Kirsten *et al.,* (2008), uncertainty often makes farmers more difficult to control opportunism. For example, crop buyers can give farmers poor prices, for their produce under the pretext that urban market prices are very low, when this is not the case.

Based on the views as outlined above, it is the argument of this study that under the existing economic environment facing the orange sector, minimization of the post-harvest system constraints will lead to improved farm incomes and in turn be a basis for renewed improvement in productivity. It is the aim of this study therefore to analyze economic and institutional factors affecting orange farmers' incomes with special emphasis to market constraints.

1.2 Problem Statement and Justification of the Study

As noted above, orange production faces a multiplicity of constraints. It can be noted further that despite huge losses that the crop suffers before it reaches the market, demand of oranges in the local market seems adequately satisfied[4] (Mbiha *et al.,* 2004). According to URT (2009), Tanzania is self-sufficient in orange production for domestic consumption. This is reflected by the low prices that farmers receive or consumers pay. For example in Muheza district, at farm level the price of an orange ranged from TZS 10 – 20 per fruit[5] for orange season of 2009. It would have been expected that the losses mentioned above would have lead to high prices in the market and hence increase income of orange farmers.

Since this is not the case, it is necessary to understand and explain why farmers from Muheza district continue facing low prices and hence low incomes from oranges. In this

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[4] As if the market of oranges in Tanzania is saturated.
[5] During field survey, the price per orange at the wholesale level was TZS 65 and Tsh 100 per fruit at retail.

regard, it is therefore hypothesized in this study that demand for oranges is limited because (i) oranges are largely consumed raw (fresh). There is minimal processing[6], and (ii) available institutional arrangements[7] further suppress orange prices received by farmers. According to Temu (2009), institutional arrangements may increase risks of doing business with farmers who are less able to manage them and hence affecting their income.

Fresh orange production mainly feeds the local market with only limited exports to neighboring Kenya. Fresh orange exports to other overseas countries would face stringent regulatory[8] measures in those countries including quality and standards (ECI, 2003). Domestic processing arrangements would expand demand but face a number of challenges including competition from imported products. The increase of local orange processing would further increase demand of oranges and hence increase orange farmers' income (URT, 2009). It is obvious then that even if constraints related to increased production (in terms of quantity and quality) are removed, envisaged benefits would not be realized if the mentioned market and institutional constraints remain the same. This study has applied transaction economic framework to explain the factors that influence low orange farm incomes in the study area.

One of the objectives of agricultural policy in Tanzania is to increase agricultural productivity in the country. A number of measures to support the policies are employed such as the control of pests and diseases, promotion of better agronomic practices especially making agricultural inputs accessible by smallholder farmers (URT, 2008).

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[6] According to URT (1993), lack of adequate processing capacity for horticultural crops, including oranges, is a major problem facing producers in Tanzania.

[7] Marketing arrangements deal with the institutions of governance including producer's organizations and contractual arrangement (North, 1990).

[8] For example, restriction from importation of oranges from countries facing problem of *Bactocera-dorsalis* flies.

There is a myriad of these policy measures and they vary by crop. A policy issue which has received unequal attention is promotion of a conducive institutional environment including availability of and access to agricultural markets. This is evidenced by lack of strong institutions to foster crop exchange (Dorward *et al.*, 2009). It is widely agreed that institutional factors are prime determinants of economic progress (Dorward *et al.*, 2009). In the case of perennial tree crops, productivity increasing and market access policy intervention are more visible in the case of cashew-nuts, tea, and coffee[9]. On the other hand, oranges and other citrus fruits, coconuts and mangoes have not received comparable policy support. These crops make a significant contribution to farm incomes in areas where they are grown (URT, 2001; URT, 2009). Therefore, this study is expected to make a significant contribution by informing policy how to improve the welfare and specifically farm incomes of less targeted crops whose marketing arrangements are still relatively rudimentary. This study therefore addresses the institutional aspects that constrain increase in orange farm incomes.

1.3 Objectives of the Study

This study is guided by the following research objectives.

1.3.1 General objective

The general objective of this study is to assess economic and institutional factors influencing smallholder farmers' income from orange production in Muheza District, Tanzania. This general objective is seen to be relevant in this particular study due to the

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[9]This is because they receive special attention due to the fact that they have been institutionalized by having crop board, for example-Tanzania Coffee Board, Tanzania Cashew Board, Tanzania Tea Board (URT, 2001), while oranges and other citrus fruits have no crop board which would monitor efficiency or performance of the sector.

fact that smallholder orange farmers are considered to be price takers, prices being largely influenced by a number of these institutional factors.

1.3.2 Specific objectives

i.   To identify orange institutional arrangements and their influence on prices and orange farmers' incomes in the study area,

ii. To assess transaction costs that influence orange farmers' incomes in the study area,

iii. To assess the effect of intrinsic characteristics of smallholder orange farmers and their organization settings on farmers' income in the study area,

iv. To assess market performance of oranges in the study area.

1.4 Research Hypotheses

This study is also guided by the following research hypotheses:

H_1: Transaction costs influence income of orange farmers in the area of study,

H_2: There is a significant relationship between intrinsic characteristics of smallholder orange farmers and farmers' income in the study area.

1.5 Research Questions

i.   How do institutional arrangements adopted influence incomes of orange farmers in the study area?

ii. What is the magnitude of profit margins earned by orange actors in the study area?

1.6 Scope and Limitations of the Study

The following were the main scope and limitations of the study: *First*, the study limited itself to examining the economic and institutional factors affecting smallholder farmers'

income from cultivation of oranges in Muheza district using transaction cost economic framework. *Second,* the study was cross-sectional; its findings are therefore relevant at a particular point in time and may not necessary be relevant over extended time periods, since the income variable is a dynamic phenomenon. *Third,* based on the nature of the questions designed to answer specific objective two, that is, to assess transaction costs that influence the incomes of smallholder orange farmers-the study aimed at understanding the nature of institutions, marketing infrastructures, and technical drivers of institutional change overtime and how they affect the incomes of smallholder orange farmers. In this regard, this study was limited to qualitative data analysis approach to analyze specific objective two. This decision was based on Chirwa and Kydd (2008) as cited by Kirsten *et el.,* 2009) that "the qualitative data analysis approach is more suitable for studying the nature of institutional, marketing infrastructures and the technical drivers of institutional change over time". If the study aimed at understanding the existing economic conditions and management of the farm business, it could not be limited to quantitative data analysis approach. According to Chirwa and Kydd (2008) as cited by Kirsten *at el.,* 2009:215), quantitative data analysis approach is more suitable for studying and understanding the existing economic conditions and management of farms; however, it is inadequate for understanding the institutional changes. *Fourth,* this study was limited to twelve villages from six wards located in Muheza district, in Tanga region due to the fact that the wards are highly productive in orange crop farming, but also a smaller area enabled the study to make an in-depth analysis of issues, as it provided the researcher with enough time to investigate phenomena under study in their finest details.

1.7 Organization of the Thesis

This thesis is organized under five chapters. Chapter one presents introduction, problem statement and justifications, objectives of the study, and organization of the thesis.

Chapter two presents the literature review. Research methodology is described in chapter three followed by chapter four which presents the findings and discussion of the results. The conclusion and recommendations are given in chapter five. The last part shows references and appendices.

CHAPTER TWO

2.0   LITERATURE REVIEW

2.1 Theoretical Underpinning of Agricultural Marketing

According to Agricultural Marketing Policy of 2008, investments in rural infrastructures, particularly rural roads, water supply, transportation, processing facilities, communications, electrification, and crop markets are critical in stimulating increased agricultural production, marketing, and income opportunities. However, rural infrastructures in the country including in Muheza district as a study area is still inadequate to effectively and efficiently support agricultural marketing (URT, 2008). According to transaction costs economics theoretical model, poor rural roads often hinder farmers' access to lucrative markets, increase time and cost of transport and often result in deterioration of produce quality (DeeVon and Lynn, 2002). Also, inadequacy of communication facilities constrains access and dissemination of knowledge and marketing information (Lyen, 2003). Tanzanian smallholder farmers in the remote areas are mostly poor because of high transport costs resulting from bad road network and inefficient communication (URT, 2008).

Previous studies show that most of smallholder farmers in less developing countries including Tanzania have either been practicing subsistence farming or operating largely in local markets because of poor roads and information access (Mbiha, *et al.*, 2004; URT, 2010; Lyne, 2002). Poor roads and information access often increase the costs of exchanging products. An increase of transportation costs due to poor rural roads and marketing information, makes incentives in farming remain weak, leading to low investment in crop production, and thereby making the level of crop productivity remain low, which culminates into a decline of farmers' income. Thus, literature shows that

transportation costs are the key justification for the selection of marketing approach in agricultural markets (Joskow, 1988). High transportation costs have been restricting poor farmers to participate in lucrative markets as a result they sale crops at farm gate at low prices.

Accordingly, there is one unanswered question as to how poor farmers can improve their income. According to Cramers and Jenes (1982) there are two instruments which seems critical in breaking smallholder farmers' deadlock (a) one is marketing infrastructure such as information infrastructure and rural roads that connect smallholders to markets; and (b) the role of accompanying institutions that can reduce marketing risks and transaction costs in the process of exchange between farmers and traders.

Literature shows that farmers who are very close to tarmac roads often get good prices from traders (URT, 2009; Lyne, 2002). It is further reported by ECI (2003) that farmers who are very close to the main roads or central markets get more buyers and higher prices as opposed to farmers located in rural remote areas. It can therefore be argued that, the closer farmers to good roads or markets, the more the buyers reach farmers and the higher price will be obtained due to market completion among buyers, *ceteris puribus*.

On the other hand, the institutional development framework suggests that appropriate policies of investment in infrastructure need to go together with well-functioning marketing institutions, to take advantage of market opportunities and sustain increased agricultural output and raise rural incomes (Maila, 2010; Mukwenda, 2005 1998; Rodgers *et al.,* 1989). Thus, Tanzania has made commendable efforts to address problems of transportation costs by connecting all Tanzanian regions with tarmac roads network in so

as to increase farm business and raise rural incomes to smallholder farmers (Karam, 2011).

2.2 Institutional Context of Agriculture Marketing

The literature relating institutions to market exchange. Literature shows that liberalization of agriculture marketing may change the sources of transaction costs in the market exchange (Rudolph, 2010). According to Temu (2009) prior to market liberalization, extensive government intervention characterized agriculture industry through state-controlled marketing cooperatives and marketing boards. The government set prices and provided guidelines on exchange arrangements. In this regard, farmers and cooperatives had no alternatives market channels or arrangements for exchange (Kydd, 2009). However, these market conditions have changed since agriculture marketing liberalized in the country early 1980s.

As an outcome of agriculture marketing liberalization, farmers and traders now have to consider the costs of exchange under market arrangements which would minimize exchange costs (Crow and Murshid, 2011). However, market arrangements may increase transaction costs and risks of doing business for all market participants who are less able to manage them. According to Cook and Illiopoulos, (2010), transaction costs may arise due to poor market coordination or lack of necessary institutional support for least-cost information sharing, monitoring, and negotiation.

Marketing arrangements are procedures of reducing exchange uncertainty conditions of opportunistic behaviour in business which causes high marketing costs and lowers agent's income (Kirsten *et al.,* 2008). The marketing arrangements, micro-level of analysis known as the level of institutional arrangements, deals with the institutions of governance, which

North (1990) consider as a subclass of the institutional environment. Williamson (1993) refers to them as the "models of managing transactions" include models of contracting and producers organizations.

Literature suggests that when market exchange costs are high, transaction costs would be efficiently minimized through institutional arrangements (Williamson, 1979). Furthermore, the transaction costs theory suggests that when transaction costs are high it is not profitable to participate in particular markets (Davis and North, 1971; Williamson, 1985; Dorward, 2001). As Menard and Klein (2004) observe, the use of a variety of institutional arrangements (e.g. contract farming or farmers' organizations arrangements) may generate efficiency income by reducing transaction costs. In case transaction costs of market exchange are high, theoretical model of governance suggests that adoption of institutional arrangements as institutional arrangements[10] is the best method for governing transaction costs of market exchange.

Institutional arrangements include producers' organizations and contractual arrangements. Organization of farmers is associated with minimization of transaction costs and improving participation of poor farmers to lucrative markets exchange and for improving their income (Lyne, 2002). Theoretical model of governance considers institutional arrangement as one of the best marketing governance approaches for poor farmers to economize marketing costs as well as minimizing market uncertainty and risks, *ceteris paribus* (Hubbard, 1999).

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[10] Institutional arrangements is an agreement between economic units that govern the ways in which its members can cooperate or/and compete (Kirsten *et al.*, 2008).

High market exchange costs are associated with poor marketing governance. If farmers are operating together, chances of reducing exchange costs and increasing market power is great. Therefore, poor farmers can overcome problem of marketing failure through contract farming or using farmers' organization (Grosh, 1994; Hubbard, 1999; and Dorward, *et al.*, 2005). According to Glover and Kusterer (1990), contract farming is a one of the fundamental ways of allocating the distribution of risk between the investor and its farmers.

Contract farming is viewed as a partnership between investors and farmers which may bring about the means to develop markets and transfer technical skills in such a way this is profitable for both the investors and farmers (FAO, 2001). According to Eaton and Shepherd (2001), the intensity of the contractual arrangement varies according to the depth and complexity of the provision in each of the following three areas: One, *market provision*: the farmer and buyer agree to terms and conditions for future sale and purchase of a crop. Two, *resources provision*: In conjunction with the institutional arrangements the buyer agrees to *supply* selected agricultural inputs (e.g. chemicals like pesticides and fertilizers) including on occasions land preparation, trees pruning, and technical advice. Three, *management specifications*: the farmer agrees to follow recommended production methods, inputs regimes, cultivation and harvesting specifications. As stated earlier, contract farming has significant benefits for both the contract farmers and investors (Roy, 1963). Therefore, the significant roles of these two marketing institutions (contractual arrangement and producers' organization) are to reduce transaction costs, but also to increase income of farmers (Lyne, 2002).

Apart from emphasising on innovation on market access arrangements, as noted in the World Development Report (2008), institutional innovations are seen as key to achieving

not only agricultural sector growth, but also to involving poor smallholder farmers in this growth particularly on income growth. The theoretical model of marketing governance shows that getting the right market innovation (especially in contract farming or producers' organization) reduces problem of market failure and hence increase income of smallholder farmers.

2.3 Socio-economic Characteristics and Income of Farmers

Socio-economic conditions refer to the demographic, socio-cultural, and economic factors underpinning societies (Kirsten *et al.*, 2008). Socio-economic characteristics (or farm and farmer's characteristics) refer to household head education, age, gender, household size, farm labour, farm size, and household resources. Several characteristics of the farmer affect risk-taking behaviour and farm income.

The farm-household theoretical model assumes that, in principle, the household head is the decision maker with the potential role of influencing income of household farmers (Valvidia and Gilles, 2001 Rodgers *et al.*, 1989). Previous studies show that certain characteristics of household head which include education, age and farm size are potential factors for influencing the growth of household income and poverty reduction (Maila, 2000; Kamuzora and Mkanta, 1998; Rodgers *et al.*, 1989). In addition, large family size represents a large labour force for the household and this can therefore be expected to have a positive effect on farm income.

Furthermore, distributions of human, financial, and social assets (or capital) have been found to have major implications in improving income, wealth, and power of farmers. That is why in the view of theoretical model of household, highly unequal distribution of socio-economic variables among poor farmers in many African countries including

Tanzania have been having severe consequences to the income status and assets of rural farmers (Kirsten *et al.*, 2008). Based on Davis and North, (1971) and Ostrom, (1994), the outcome of a particular economic activity is affected by certain socio-economic factors including farm size, distribution of assets, household size, age, gender, and education of household head. Under this condition, the impacts of these intrinsic factors shape the marketing outcome (income) (Kirsten, *et al.*, 2009).

2.4 Theoretical Framework and Empirical Methods

2.4.1 Theoretical framework

Institutional innovations particularly in the adoption of farmers' organization and contract farming are aimed at overcoming market failures associated with information asymmetry (Lyne, 2002; WB, 2008). Conformity to institutional arrangements is considered as a general solution to the problem of information asymmetry between buyers and sellers. A buyer (trader) will generally be aware of the market prices of a given crop while the same market price information is hardly known to a seller (e.g. rural farmers). This reality has lately compelled market mechanisms to change accordingly to overcome the above shortcomings. One of the actions has been a move from spot market transactions to more closely coordinated forms of market governance such as contracts and group marketing, and joint ventures (Hobbs and Young, 2001).

Institutional economists such as Schmitz (1995) and (Nadvi, 1996), support the argument that a firm's joint action (e.g. collective voice of voiceless farmers) is essential for coping with new challenges in agricultural crop production. Similarly, Henson and Mitullah (2004) argue that external economies on their own are not enough for realizing progress and income growth. There is a need for joint action which focuses not only on individual enterprise or incidental external effort, but also on the deliberate inter-firm networks.

The social capital theory also supports network-relationships for enhancing feasibility and easier access to information, technical know-how, and financial support (Omta *et al.*, 2001). However, negotiations and reaching agreement especially on the level of price premium brings in high transactions costs (Buzby, 2003). In this case, a rational producer would choose a trade network that will minimize costs. Hobbs and Young (2001) argue that the networks or chain re-organization to closer buyer-seller relationship is associated with transaction costs reduction in addition to improved information flow.

2.4.1.1 Transaction costs and governance structure

Transaction costs economics forms the theoretical base of this study. Transaction costs economics, unlike traditional neoclassical economic theory, recognizes that commercial activity does not occur in a frictionless economic environment (Williamson, 2000). Instead, there are costs to incur for transaction to occur. According to Coase (1937), transaction costs can be divided into four main classifications: information, negotiations, monitoring, and enforcement costs.

Information costs arise *ex-ante* to an exchange and include the costs of price information searching and the costs of searching suitable trading partners. Negotiation costs are the costs of physically carrying out the transaction and may include commission costs, the costs of negotiating the terms of an exchange, and the costs of formally drawing up contracts. Monitoring or enforcement costs occur *ex post* to a transaction and are the costs of ensuring that the terms of transaction, e.g. quality, quantity, harvesting time, or payment arrangements, are adhered to by other party to the transaction (Coase, 1937; Williamson (2000). Therefore, information, negotiations, monitoring, and enforcement costs arise in any market exchange and can influence farmers to opt vertical coordination to reduce such costs if they are high.

Hobbs, (1996); Williamson, (1973; 1979) and Menard, (2001) identify four major characteristics that underpin variation in transaction costs leading to the emergence of various chains of governance structure. The characteristics include information asymmetry, asset specificity, uncertainty, and bounded rationality.

Williamson (1979) defines a governance structure as an institutional arrangement within which the truth of transaction is decided. The concept of governance structure comes from institutional economics as developed by, among many other authors, Coase (1937), Klein et al. (1978) and Williamson (1973; 1979; 2000). According to Hobbs and Young (2001), the key insight provided by TCE is that, *ceteris paribus*, contract farming may be used to accomplish several purposes including product quality control and transaction cost minimization. A producer may wish to control their supply chains more tightly so as to control the quality of his/her products.

Horizontal or vertical coordination forms are sometimes adopted as a source of reducing information cost[11]. A good example is a case of contracting as vertical coordination mechanism; it is costly to verify whether contractual obligations are being met especially under credence goods (Williamson, 1973; 2000). As Menard and Klein, (2004) observe, contracting through the use of a variety of marketing arrangements may generate efficiency income by reducing transaction costs.

Transaction costs analysis has been used to provide explanation for the existence and structure of firms and for the nature of vertical co-ordination within a supply chain (Menard and Klein, 2004; Hobbs, 1996; Williamson, 1979). Transaction costs economics

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[11] The seller-buyer may wish to be certain on how the products were produced, if it is organic or non-organic crops.

(TCE's) assume that when transactions are low , transaction will be carried out in spot markets, and when transaction costs are high, it is efficient to set up an organizational structure hierarchy for carrying out transactions (Williamson, 1979). When transaction costs increase or decrease, a different governance structure between spot market and hierarchy may be chosen to carry out the transactions. In between the two extremes, there are hybrid structures namely producers' cooperation, formal written contracts, joint ventures, strategic alliance and pointed vertical integration (Hobbs and Young, 2001) that may arise when needed.

In this regard, transaction costs are one of the factors that influence market exchange in agriculture industry (Williamson, 2006). Past studies have been showing that high transaction costs essentially constrain the participation of smallholder farmers in the open market economy (Binswanger and Rosenzweig, 1986; Hoff, Braverman and Stiglitz, 1993). Thus, some scholars posited that transaction costs associated with market exchange accounts for the prevailing preference for larger firms or horizontal or vertical coordination among firms. Furthermore, this would be (Williamson, 1985) tradition of identifying transaction costs with view of attending to pre-transaction incentives and related post-transaction governance adaptations to facilitate and safeguard transactions and interfirm relations.

Therefore, this study also argues that high information, bargaining, monitoring, and enforcement costs constrain smallholder participation in the market economy. In this regards, this study acknowledges that marketing arrangements including grouping marketing and contractual arrangements would minimize transaction costs and hence promote market governance to smallholder farmers.

2.4.2 Review of empirical methods

This section reviews various past studies in order to obtain appropriate analytical methods for assessing marketing performance and determinants of income as shown below:

2.4.2.1 Marketing margin

Marketing margin is the most commonly used method to measure market performance. Market margins are calculated by finding the price variations at different market segments and then comparing them with the final price of the consumer level. In addition, marketing margin measures the share of the final selling price that is captured by a particular agent in the marketing chain (Mendoza, 1995). Therefore, marketing margin is the difference in the prices from one actor to another. Mathematically, marketing margin is equal to selling minus buying prices from farmers to the consumer (Abbott and Makeham, 1990). Basically, high marketing margins reflect less income to producers and more benefits to the other market functionaries.

2.4.2.2 Profit Margin

Gross profit Margin (GPM) is used to establish the economic profitability. It is given as the difference between gross income accrued and the variable costs[12] incurred. However, to define gross margin, variable costs and fixed costs have to be distinguished (Makeham *et al.*, 1986). The GPM enables one to directly compare the relative profitability of similar enterprises and consequently provides a starting point in deciding or altering the farms' overall enterprise mix (Ferris, 2000; Mutayoba, 2005). Moreover, it is important to compare GPM of different market participants to know whether or not buyers and sellers

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[12] Variable costs are those costs, which increase or decrease as output changes (Cramer *et al.*, 2001). Common examples of variable costs in crop production include seeds, fertilizers, and pesticides. The most important fixed costs in agricultural production are owned land, farm buildings, machinery and implements.

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are able to pursue their economic activities sustainably (Mutabazi, 2007; Phillip, 2007; Johnsen, 2003).

Net profit margin (NPM) is performed to determine the efficiency of the product marketing system. Given that NMA equals the difference between the gross margin and the total marketing *cost* per unit of commodity item (Kohls and Uhl, 1985), the low net marketing margins might reflect a high marketing cost, which comes as a result of high transportation and handling costs as well as packing and other cost items.

2.4.2.3 Sherpherd formula for marketing efficiency analysis

Many studies measured marketing efficiency through Sherpherd formula (Sherpherd, 1993). In a study by Malaisamy (2012), on economic analysis of supply chain management and marketing efficiency of onions in Tamil Nadu, India, Sherpherd formula technique was used to estimate wholesaler marketing efficiency. Similarly, a study by Mogaji *et al.* (2013) used Shepherd's efficiency formula to analyze the marketing efficiency of evaporative-preservation cooling system for fresh tomatoes as an update of the performance evaluation of the evaporative cooling system developed at the Federal University of Technology Akure in Nigeria. Therefore, this current study will applied the Sherpherd formula to assess orange marketing efficiency as antecedents of orange income measurement in this study as explained in the next chapter.

2.4.2.4 Analytical method for determinants of income

Household income has been used as one of the indicators of poverty (Nyange *et al.,* 2008). Income is defined as "the output of activities as it measures both cash and in-kind contributions" (Schwarze, 2004). In this sub-section past, studies have been reviewed to examine various determinants of farmers' income. Mdoe and Mutabazi (2003) evaluated

the performance of milk marketing system in the Southern Highlands of Tanzania by estimating a multivariate linear regression model to identify critical determinants of profitability of milk businesses. The findings showed that the critical determinants of the profit margin were: nominal capital investment, business experience, group marketing, product diversification, and distance from the buying to the selling point. The distance to urban centre variable negatively and insignificantly influenced income margin in the case of milk. The distance to the urban market centre was not significant but it has an impact. These variables altogether accounted for about 58.9 % of the total variation of profits from milk in the Southern Highlands of Tanzania.

Olawepo (2010) focused on the earning activities of farmers in Afon district, a rural area in Kwara State, Nigeria with a view to assessing factors determining rural farmers' income. The findings showed that through the use of stepwise multiple regressions, four factors were found to be the main determinants of farmers' income out of the twelve examined factors. These were farm output/yield per ton, cost of farm input and implements, accessibility to credit facilities, and transport cost. In all twelve cases examined, the four variables together accounted for about 84.09 % of the total variance in income of farmers within a given year in Kwara State, Nigeria.

Ugwumba's *et al.* (2010), study reviewed the types of integrated farming system (IFS), profitability of IFS and its impact on farm cash income in Awka agricultural zone of Anambra State, Nigeria. The data obtained were analyzed by multiple regression method. The study recorded highest net farm income of Naira 1 156 730.00 or USD 7 462.77 by crop-livestock-fish partial integration which is closest to the full integration of crop-livestock-fish-processing-biogas. Multiple regression results showed that farm cash income was positively influenced by farmer's age, level of education, years of experience

and the type of farm integration. Farm cash income was, however, negatively influenced by household size, the cost of farm inputs, gender of the farmer, and farm gate prices. Therefore, these variables accounted for about 81% of the total variation in farm cash income in Anambra State, Nigeria.

In another study, Ugwumba (2011) examined catfish farming system and its impact on the net farm income in Anambra State, Nigeria. Both non-parametric and parametric statistical tools were employed for data analysis. A mean net farm income of Naira 734 850 proved catfish farming to be a profitable enterprise in the study area. A total of 10 predictors were used in a multiple regression model and the results indicated that the net farm income was insignificantly influenced by level of education, household size, feeding method, experience and water supply method. However, farmer's age, cost of feed, farm area, pond type and stock size exerted significant influence on the net farm income. Therefore, five variables (farmer's age, cost of feed, farm area, pond type and stock size) accounted for about 89% of the total variation in the net farm income earned by catfish farmers in Anambra State, Nigeria.

On another study, Obike *et al.* (2011) investigated the determinants of incomes among poor farm households of the National Directorate of Employment in Abia State, Nigeria. The data were analyzed using multiple regression analysis. The regression results showed that farmers' income was positively influenced by wealth index, labour employment, cash credit received, and the value of farm inputs at 1% and 5% risk levels. Meanwhile, the variable age of the household head was found to be negatively affected farmers' income at 5% level.

Furthermore, Sadeghi *et al.* (2001) used regression analysis method and found that the area of crop land, fruit land and livestock holding significantly affect farmers' income. Similarly, Mohammad (2007) found income of a farmer is influenced by education, farm size, livestock holding, family size, and crop (s) grown, but not by farmers' age.

Aikaeli (2010) assessed the impact of selected socio-economic and geographic factors on the income of rural households and communities. Linear models for these factors were estimated by applying a generalized least squares technique. The results show that improvements in four variables had a significant positive impact on the incomes of rural households: the level of education of household head, the size of household labour force, acreage land use and ownership of a non-farm rural enterprise. At the community level, greater use of telecommunication, which enables increased access to market information, and improvements in road infrastructure have noticeable positive effects on rural incomes. With respect to climatic factors, which are largely beyond community control, sufficient rainfall raised rural income, while the incidence of drought and flood impaired income generation. Therefore, the criteria used to identify independent variables for inclusion in regression model in these studies are based on their ability to predict income margins of farmers.

Based on the empirical review done above under this section, several past studies have used regression model to assess which intrinsic factors of smallholder farmers significantly influence farm income. With this regard, this particular study also applied regression model to assess which intrinsic factors of smallholder orange farmers significantly influence income of smallholder farmers in Muheza district as explained more in the following chapter.

2.5 Research Gap

Based on the theoretical and empirical literature reviewed above, poor institutional arrangements were found to be the source of high transaction costs, which in turn, affect rural farmers' participation in the lucrative markets. In other words, poor marketing infrastructures, that is, lack of adequate road networks, lack of processing facilities, poor communication flow were found to have had some negative influence on income of poor farmers. However, according to Agricultural Marketing Policy of 2008, investment in rural infrastructures, particularly rural roads, water supply, transportation networks, processing facilities, communication, electrification, and crops markets are critical in stimulating agricultural production, and in increasing marketing and income opportunities. Despite of the above knowledge on institutional factors that affect the incomes of farmers in less developing countries including Tanzania, still the incomes of smallholder farmers in these countries stay largely low. This empirical study to assess economic and institutional factors that affect the incomes of smallholder orange farmers is expected to provide more insights on economic and institutional factors that affect the incomes of smallholder farmers in Tanzania and thus contribute to a better understanding of why incomes of smallholder farmers remain low.

2.6 Conceptual Framework of the Study

The conceptual framework as depicted in Fig. 1 illustrates the interconnections of factors influencing incomes of orange farmers in the study area. This conceptual framework postulates that income of smallholder orange farmers is influenced by institutional arrangements, intrinsic characteristics of orange farmers, and market performance. This conceptual framework is based on transaction cost theory. The theory recognizes that market transaction does not occur without incurring marketing costs (Hobbs and Young, 2001). There have been costs arising from using market mechanisms.

According to transaction costs economics (TCEs) theory, often high transaction costs[13] essentially constrain rural farmers from participating in numerating markets (Binswanger and Rosenzweig, 1986; Hoff, Bravernman and Stigliz, 1993), even if these markets do exist (Hobbs and Young, 2001). As Doward *et al.* (2005) argue, low income of farmers is characterized by high transaction costs and risks of doing business. Furthermore, the previous past studies done by Poulton, (2008); Kydd (2008); Lyne, (2003) establish that lower transaction costs not only promote participation of smallholder farmers in lucrative markets but they also increase farm incomes. Therefore it can be argued that at high transaction costs influence risks of doing business also to be high for market participants who are less able to manage them to existing markets as is also argued by Hobbs (1997) that sales are influenced by transaction costs. Based on this view, transaction costs are the primary determinants of farmers' incomes (Lyne, 2002).

These costs[14] are *ex-ante* (e.g. information and negotiation) costs and *ex-post* (e.g. monitoring and enforcement) costs. As argued in the previous study done by Temu (2008) that transaction costs may arise from poor market coordination or lack of necessary institutional support for least-cost information sharing, monitoring, and negotiation. However, transaction costs may have increased because of reduced flow of information on product quality and prices, increased uncertainty stemming from regulations governing exchange, and poor marketing services from other sectors of the economy.

The conceptual framework assumes that high information, negotiation, monitoring, and enforcement costs influence institutional arrangements (Hobbs, 1997).Group marketing as

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[13] Transaction costs are the costs involved in exchange of product (e.g. marketing costs), costs of intangible (e.g. costs for searching exchange partners, gathering marketing information, travelling and waiting time), contract monitoring and enforcement (North,1990). Institutions are the formal laws and informal conventions that influence transaction costs and shape the benefits offered by trade (Lye, 2002).

[14] Information costs (searching or seeking and evaluating buyer or obtaining price information); negotiation costs (cost arise in determining the terms of the transaction); monitoring and enforcement costs (costs of ensuring that the pre-agreed terms of the transaction are adhered to) (Hobbs and Young, 2001).

part of smallholder farmers' organization and contractual farming are among the best marketing coordination approaches which could be applied by poor farmers to reduce marketing costs and risks of doing business and improve orange incomes. Group marketing can reduce costs of doing orange business by getting to the right governance structure.

As noted in the modes of managing transaction[15], appropriate selection of institutional arrangements often reduces marketing costs (for example, information search, transport, and risks of losses) and the problem of market access (Kirsten *et al.*, 2008). However, institutional arrangements may raise marketing risks to farmers or shift risks to farmers who are less able to manage them.

Similar, modes of managing transaction suggests that if poor farmers will do marketing together, chances of lowering transaction costs and of winning market power will increase considerably. In this regard, farmers can improve market access through contract arrangements or group marketing approaches (Grosh, 1994; Hubbard, 1999; and Dorward, *et al.*, 2005).

Intrinsic socio-economic characteristics refer to education of the household head, age of the household head, gender of the household head, household size, farm size, household resources, farmer's experiences, farm size, tree bearing oranges, market information access, and transportation costs. Indeed, socio-economic conditions are assessed because the household head is the principal decision maker with the potential role of influencing the income of the farmers (Valvidia and Gilles, 2001; Rodgers *et al.*, 1989). The intrinsic

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[15] According to Williamson (1993) Institutional arrangements refer more to the *modes of managing transactions*, and including market, quasi market, hierarchical models of contract, groping marketing, joint venture, strategic alliance, and franchise.

socio-economic characteristics of farmers may influence transaction costs (Bailey and Hunnicutt, 2002) as well as affecting farmers' income. Previous studies done by Manila, (2000); Kamuzora and Mkanta, (1998); Rodgers *et al.* (1989) showed that household income, household size and age have been found to be the potential factors influencing household economic undertakings and therefore determining the household poverty status. In this view, highly unequal distributions of these intrinsic socio-economic characteristics among smallholder farmers are a reflection of deeper disparities in the income holdings among orange farmers in the study area.

Another factor discussed in the framework below is marketing performance, which is a measure of pricing and operating efficiency. Improved marketing performance is a common goal a farmer can achieve in maximizing net margins (Kohls and Uhl, 1985). It is observed that the performance of the market is a reflection of the impact of structure and conduct on the price of the product, costs of the products, the volume of the product, and quality of the product (Cramers and Jenses, 1982). Therefore, orange farm income can be managed through increasing the quantities of oranges marketed, improving the price spreads, and reducing marketing costs. As noted by Kirsten, *et al.* (2008), marketing performance can be measured in terms of optimality, prices, quantities, and incentives. The marketing performance measurement aims at getting the marginal conditions right (Williamson, 1999). In this view, farmers should minimize marketing costs to increase net margin. Figure 1 presents the Conceptual Framework that shows the existing relationship between various factors affecting income of smallholder orange farmers in Muheza District:
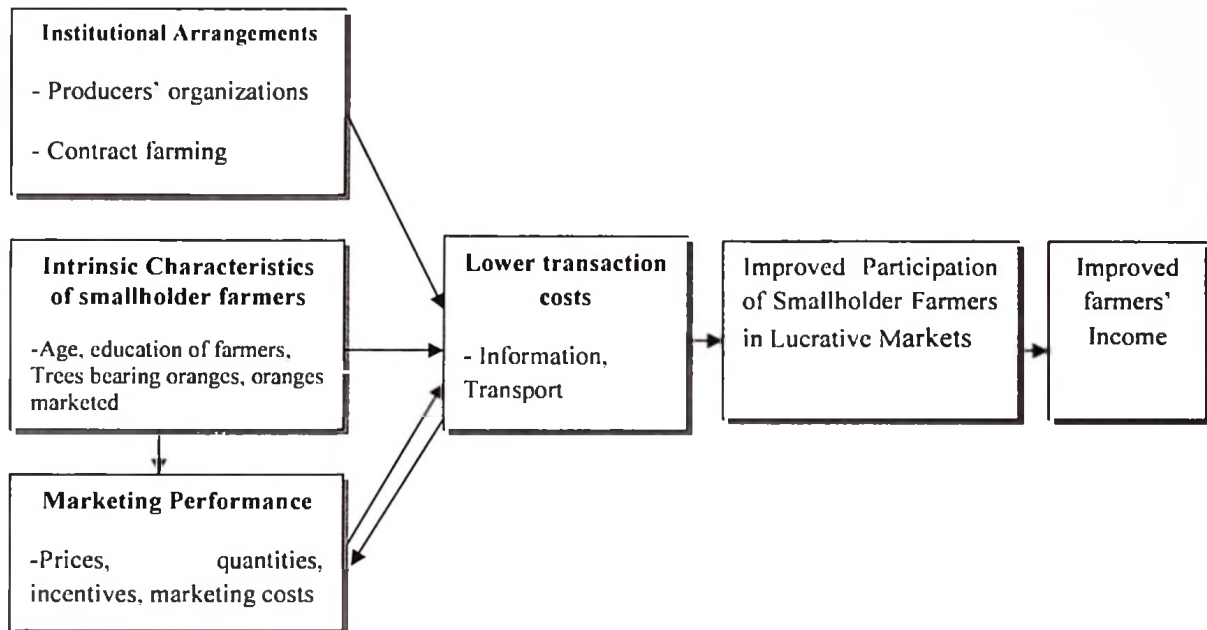
Figure 1: Conceptual Framework

According to the conceptual framework (Fig. 1) the income earned by orange farmers is partly affected by information costs. According to Doward *et al.* (2005), low income seems to be influenced by low prices obtained by smallholder farmers due to poor information flow in rural remote areas. Hence, costs of searching information increases among the farmers. The information costs arise as ex-ante costs. For example, before the farmer makes a decision about how to market oranges and who to sell to, he/she must determine the price that they expect to receive. As a result of this, farmers incur price information and searching costs. The costs of obtaining price information depend on the extent to which there is readily available information on the market prices. The second information cost that can arise is price uncertainty (Hobbs, 1997; Lyne, 2009). Although farmers can determine general price trends prior to crops sale, they cannot know the actual price that crops will fetch before the exchange takes place. This creates some uncertainty to a farmer. Price uncertainty is heightened if the farmer is unsure of the amount of crops likely to be demanded at harvest time. If the demand is too low, there is a risk that prices will not be competitive and hence lowering incomes of crop farming. Consequently, this

inhibiting both market development and access to the existing profitable markets and leaving the farmer economically poor.

The conceptual framework (Fig. 1) assumes that orange income of rural farmers is partly affected by the negotiation costs of transporting oranges to the central markets. Previous studies (e.g. Kydd, 2009; Lyne, 2001) reveal that higher costs of transporting the products to the central markets are reflected in lower farm revenue which is obtained by rural farmers. In this view, transport cost is a reflection of marketing costs[16]. However, they can also be a reflection of transaction costs if they are specific to that marketing channel (Hobbs, 1997). According to Ainembabazi *et al.* (2009), in addition to intangible costs, transportation costs are also often included as part of the transaction costs, since transport costs borne by the producers are a transaction–specific-investment which is not necessary related to production.

In developing countries including Tanzania, agricultural crops should be transported to the central markets for the farmer to realize higher prices and hence fetch higher incomes. However, negotiation cost also consists of the opportunity cost of the farmer's time and effort in organizing transportation to the market plus the monetary value of the transportation cost (Kydd, 2009). Generally, it can be argued that if marketing institutions (e.g. improved rural-town feeder road networks and rural communication) are improved properly, they are likely to minimize marketing risks and increase participation of rural smallholder orange farmers in numerating markets.

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[16] That is why, the costs of transporting oranges to the marketplace are often considered in traditional analysis of marketing costs (Hobbs, 1997).

The conceptual framework (Fig.1) assumes that farm income is partly affected by monitoring costs. In view of the transaction cost economics, adequate contract monitoring is a reflection of lower marketing risks and farm losses. Since farm losses is a reflection of transaction costs (Kirsten *et al.*, 2005). According to Kirsten, *et al.* (2008), farmers may incur monitoring costs in ensuring that farm losses are reduced by shortening the time of picking and collecting oranges from the farms. Farmers would incur high monitoring costs if there are uncertain behaviours shown by un-innocent traders. If monitoring is administered properly, it assumes the problem of oranges stolen by traders during orange counting process will be minimized and consequently the amount of oranges traded will significantly change and hence changing farmers' income.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Description of the Study Area

The study was carried out in Muheza district in Tanga region. The district was purposively selected because it is the largest producer of oranges in Tanzania (Makange, 2009; Mwanakatwe, 2006; Erick, 2008). The villages which produce oranges in large quantities in Muheza district include Mtindiro, Kwa-bada, Mkuzi, Mindu, Bwembela, Mamboleo, Misozwe, Kwa-Mingoji, Kwa-fungo, Kicheba, Kwa-Lubuye, Ngomeni, Magira, Mkumba, Kisiwani, Kilulu, Lusanga, Pande Darajani, Songa, Muhamba, and Potwe.

This study was conducted in 12 villages, which were Mtindiro, Kwa-bada, Mkuzi, Mindu, Bwembela, Mamboleo, Misozwe, Kwa-Mingoji, Kicheba, Muhamba, and Songa villages. These 12 villages were selected out of 21 villages because they produce oranges in large quantities in Muheza district.

3.1.1 Location

Muheza is one of the eight districts of Tanga Region; it has a total area of 1 974 square kilometers and a population of 204 461 people (URT, 2012). Administratively, the district is divided into 4 divisions, 33 Wards and 135 Villages. Muheza district is located in the north-eastern part of Tanzania, bordering Tanga City in the North East, Mkinga in the North, Pangani in the South and Korogwe district in the West (Map 1).

3.1.2 Climate

The climate ranges from hot to humid in the coastal plains to temperate in the mountains. December to March is usually the hottest months with temperatures ranging up to 30°C.

During May through October, temperatures range from 24°C to 28°C. Nights become much cooler in the Usambara Mountains with variable local conditions in both highlands and foothills dictated by their altitude and exposure to the sun and the prevailing winds from the Indian Ocean. Air masses from the Indian Ocean are the main source of rainfall. The coast generally receives between 1 100 mm and 1 400 mm of rain fall a year, with two rain seasons, the long rains from February to May; and short rains from October to December.
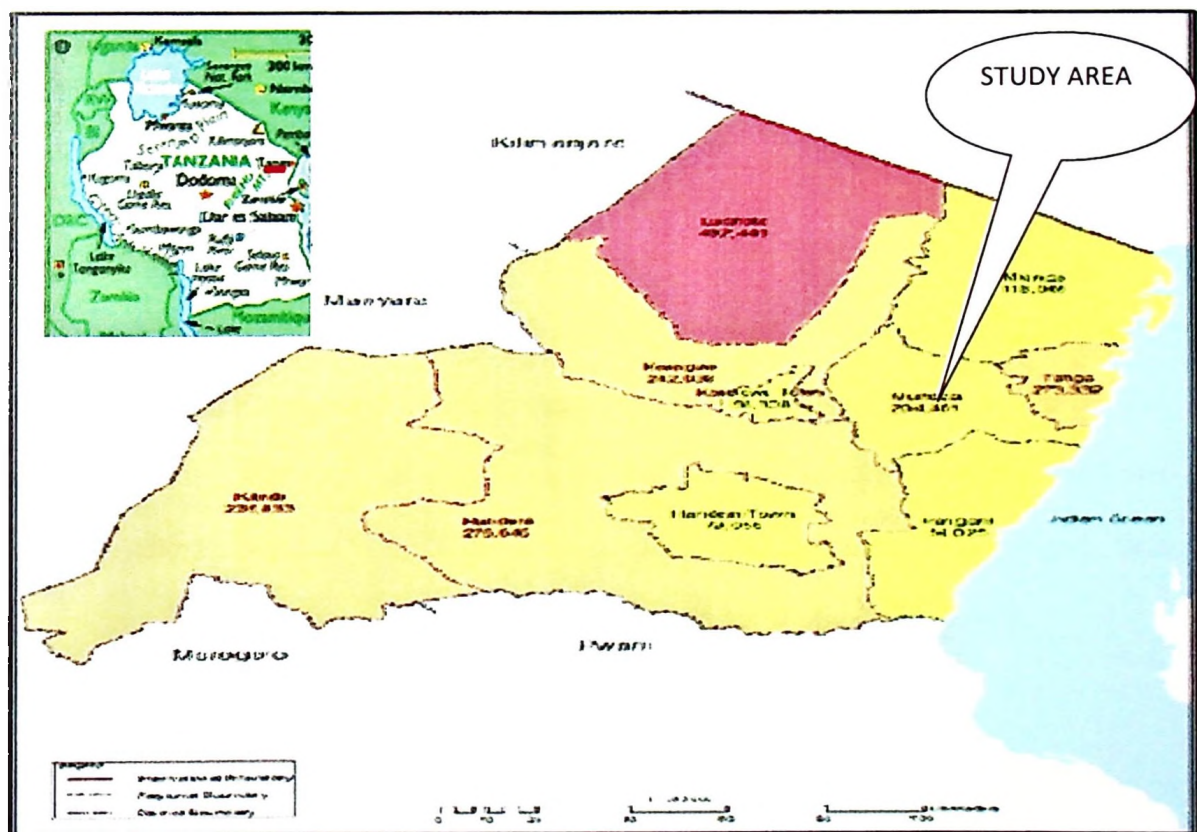
Figure 2: Map Showing Muheza District in Tanga Region, the Study Area
Source: URT-Tanzania Census Profile Report (2012)

Figure 2 above shows map of Muheza district in Tanga region. Muheza district has marked spatial differences in rainfall amount and temporal patterns, geology, landform and soil types. The district can be divided into five district agro-economic zones with different land use potentials and cropping possibilities as Table 1 as shows.

Table 1: Agro-economic Zones of Muheza District

Characteristics	Rainfall	Dominant crops
Costal belt: 0-15m above sea level – Covers Pangani, Tanga and part of Muheza district.	800-1 400 mm - Well to moderately drained.	Oranges, Sisal, Coconuts, Cashew nuts, Maize, Cassava, Rice and Sea Weeds.
Wet plains: 300 - 600 m above sea level – Covers most of Muheza and Korogwe district.	800 – 1 000 mm – Well to medium drained.	Sisal, Coconuts, Cashew nuts, Cotton, Maize, rice, beans, Cassava and Oranges.
Dry Plains: 200 – 600 m above sea level – Covers Handeni and part of Korogwe, Muheza and Pangani.	500 - 800 mm – Well and moderately to poorly drained.	Timber, Honey, Sisal, Cotton, Tobacco, Maize, Cassava and beans.
Mountain belt: 1 000 - 2000m above sea level – Covers Usambara mountains, Amani mountains and Nguu mountains.	800 – 2 000 mm – Well drained.	Tea, Coffee, Cardamom, maize, potatoes, bananas, beans, oranges.

Source: URT: Tanga Region Socio-economic Profile Report (2008)

Table 1 shows two rainfall seasons with sufficient length allowing the growth of a variety of crops including oranges. The orange-based farming systems of Muheza district have been subdivided into three different agro economic zones namely costal belt, and wet plains (Table 1). Muheza is the highest orange producing district in Tanga region, thus making majority of the household farmers earn incomes for living (URT, 2009).

3.1.3 Ethnicity and demography

The district has three major tribes, namely the Sambaa, Digo, and the Bondei. There are also other minority ethnic groups comprising less than 35% of the total population. According to the URT (2012), the district has a total population of 204 461, out of which 103 618 are females and 100 843 are males all of which constituting a total number of 41 778 agricultural households.

3.1.4 Economic activities

The main economic activity in Muheza is agriculture involving the production of both cash and food crops. The cash crops grown include sisal, coconut, black pepper, tea and oranges; and the major food crops include banana, cassava, and maize. There are also few households that keep livestock (e.g. cattle, goats, and local chicken) to complement crop farming. According to the National Sample Census of Agriculture 2008/9 (URT, 2012), agriculture provides the most important source of income (46%) followed by livestock keeping. Other activities are not important sources of income include government employment as less than 1% of the population are civil servants working for the Muheza District Council.

The district also produces a wide variety of horticultural crops. The major fruits grown in Muheza district are: oranges, mangoes, jackfruits, and tangerines. Other crops grown in Muheza district are: maize, paddy, cassava, coconuts, and bananas. Orange is the major horticultural crop produced in Muheza district, and the leading crop that provides income to a big population in Muheza district (Mbiha *at el.*, 2004).

3.1.5 Orange production status in Muheza District

3.1.5.1 Orange farm sizes

In Muheza district, orange farm sizes are divided into three main categories namely small, medium, and large. Similarly, Mbiha and Maerere (2002) classified orange farm sizes into three groups: small (0 – 2ha), medium (2ha – 6ha), and large (6ha and above). In this study, the following farm size distribution was adopted- small (0 -2ha), medium (2.1 – 6ha), and large (6.1 ha and above). The farm size distribution used in this study is as shown in Table 2:

Table 2: Farm size classification in the study area

Categorization	Farm Size	Number of farms	Percentage
Small-scale farm	0 – 2 ha	111	73
Medium – scale farm	2.1 ha – 6 ha	35	23
Large – scale farm	6.1 ha and above	6	4

Based on the findings in Table 2, most (111 or 73%) out of 152 orange farmers visited in this study, had small farms, followed by 35 (23%) farmers who had medium, and lastly 6 (4%) farmers who had large farms.

3.1.5.2 Orange production

Based on Table 3, from 2006 to 2010, orange production increased from 67 250 to 79 830 tons, which is an increment of 12 580 tons. Table 3 shows the level of orange production from 2006 to 2010.

Table 3: Orange Production Status from 2006 - 2010 (in Tons) in Muheza District

Year	2006	2007	2008	2009	2010
Orange	67 250	68 500	69 500	70 500	79 830

Source: URT (2009/2010)

The increase in orange production was mainly because of good weather which was due to enough rainfall and an increase of trees producing oranges in the farms (Personnel communication, 2010).

3.1.5.3 Types of oranges produced in Muheza District

There are seven orange varieties grown in Muheza District namely Early Valencia (Masasa), Late Valencia, Delta Valencia, Nairobi, Washington, Jaffa, and Pamba. Based on the findings of this study, Early Valencia (45.8%), Late Valencia (31%) and Nairobi (10%) varieties are the most popular in Muheza District as noted in Table 4. An important

characteristic of some popular varieties is that oranges do not have to be picked immediately when they ripen, since they can last for some time on the trees. Table 4 shows the summary of varieties with their respective local names, harvesting seasons, general characteristics, and ranking by farmers. Farmers were asked to rank orange varieties based on the buyers' preferences.

Table 4: Major Orange Varieties Grown in the Study Area and their Characteristics

Varieties (*)	Local Name (*)	Harvesting Season (**)	General Characteristics (*)	Rank (**)
Early Valencia	Msasa	May to September	Early maturing, High yield, Medium size, Thin and smooth skin, Very sweet and, more juice.	1st
Late Valencia	Valencia	January to March	Late maturing, High yield, Sweet and juicy when ripe, Robust to transport, Good price, Tolerant to various environment, Long storage time on tree and, Most popular variety.	2nd
Delta Valencia	Kitenesi	May to August	Early maturity, Seedless, Smooth skin, More juice and sweeter, High yield	7th
Mediterranean	Nairobi	May to July	Sweet, Medium Size, Highly flowering, Fruits drop down, Low Yield, long storage on tree, Popular in the Kenyan mark and, produced also in Matombo (Morogoro region) when the supply of orange is low.	3rd
Washington	Kitovu	July, March and, April	Poor juice content, not sweet, thick skin, Robust to transport, Seedless and, Late maturing.	5th
Jaffa	Shamoti	May to July	More juicy but not sweet, big size fruit, not robust to transport, high yield	4th
Pineapple	Pamba	October to January	Very sweet, Late ripening variety, Slow matured	6th

Source: *Modified from Mbiha and Maerere (2002); ** Author's inputs (Harvesting season and rank of scale)

Most farmers grow a mixture of Early Valencia (Msasa) and Late Valencia which are mostly preferred orange varieties by traders. These orange varieties are preferred because of their characteristics as shown in Table 4. However, Mbiha and Maerere (2002) found Nairobi as being the most preferred orange variety. By then, Valencia had not been introduced to local farmers of Muheza district.

Although oranges are produced throughout the year, the main harvesting season starts in May through October each year. The picking of oranges is done six months after the flowering period. Moreover, Muheza district experiences two rain seasons, that is, October to November, and March to April. Therefore, oranges are picked twice a year (URT, 2009/10).

3.2 Pre-Survey Study

The pre-survey was conducted prior to the main survey. The purpose of the pre-survey study was to refine the questionnaire so that respondents would have no problems in answering the questions and capturing the data. In this study, pre-survey enabled the researcher to assess the validity of the questions to be asked. Through the pre-survey, the study also established how long it would take for respondent to complete the questionnaire, whether the instruments were clear, whether any of the questions were unclear or ambiguous, whether there were any questions the respondents felt uneasy about answering, whether there were gaps in the coverage of the questions, whether the layout was clear and attractive, and if provision should be made for comments from the respondents.

During the pre-survey study, questionnaire was pre-tested on 25 smallholder orange farmers from Muheza district mainly from Lusanga and Ngomeni wards. Fink (1995)

recommended that sufficient sample size for pre-survey study should not be less than 20 respondents. A preliminarily analysis using the pre-survey data was undertaken to ensure that the data collected would enable collection of requisite data in the main survey.

The main findings from the pre-survey study resulted in certain questions being deleted and one being rephrased so that all the retained items could easily be understood by the respondents. The responses in the pre-survey study indicated that most items in the questionnaire worked well in terms of coding, layout and clarity as shown in Appendix 1.

3.3 Research Design

The research design of a study involves the organization of the research process, for example by establishing the framework of the data collection process, how the research constructs were measured as well as the methods of data analysis that was applied.

Wilson offers the following six research designs: case study, experimental, archival, comparative, cross-sectional and longitudinal research designs (Wilson, 2010). In this particular study, cross-sectional and case study research designs were used. A cross-sectional research design[17] involves a collection of data at one particular point in time, as there is a separate interaction with each respondent at the time of the interview. A case study research design[18] involves getting extra insights and understanding from a selected individual respondents or unit of study.

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[17] The study was cross-sectional because the findings are therefore relevant at particular point in time and may not necessarily be relevant over extended time periods, since the situation of orange farmers is a dynamic phenomenon.

[18] According to Mwaipopo (2006:24), a case study is an in-depth study of a selected case pertaining to the subject area.

The study managed to develop cases from individual respondents (smallholder orange farmers) based on interesting stories raised by these farmers during the interview. The responses that the farmers gave from the questions that were asked made it possible for the researcher to design four specific cases that provide an in-depth understanding of the subject area.

In accordance thereto, the following pertinent concepts are discussed below: the population that was investigated, sampling procedures that were applied to obtain a sample from the population, the data collection processes and lastly the measurement of the research constructs.

3.3.1 Targeted population of the study

A demarcation of the target population that is to be surveyed is not normally a straightforward process. This is because the population that is under investigation is determined by the research questions and by the background to the study and what it intends to achieve. According to Wilson (2010), the population under investigation should be able to establish the categories of cases that constitute the population of interest, which could be individuals, business firms, households and others. The population (s) of interest for the study can be defined as a group of research subjects that acts as a set of cases from which the sample for investigation is drawn.

In this study, the population(s) of interest for the study comprised three sets namely, heads of households of smallholder orange farmers, traders (retailers and wholesalers), and lastly key informants as explained in the next section.

3.3.2 Sampling procedures

Sampling involves the process of drawing up a set of elements from target population of individuals while aiming at getting some knowledge about the target population as a whole (Tabachnic and Fidell, 2007). In this particular study, the following selection procedures for drawing a sample from target population were used as explained in the sub-sections that follow:

3.3.2.1 The selection of sample size of smallholder orange farmers

Multistage sampling procedure, involving four stages, was used. Stage I involved the selection of district with high orange production per annum. Stage II involved the selection of 6 wards with high volume of orange production per annum. Stage III also involved purposive selection of 12 villages basing on high volume of orange production per annum. Stage IV involved the selection of orange farmers as shown in Table 5.

Table of random numbers was used to facilitate the selection of a representative sample in this particular case (Appendix 2). Practically, the researcher picked randomly a number from the Table of random numbers in a systematic order. After that, the researcher selected the corresponding number which appeared in the village list of orange farmers for inclusion in this study. Through this selection procedure, the researcher managed to select a sample size of 152 smallholders for inclusion in this study as shown in Table 5. However, the criterion the researcher used to arrive at this number is borrowed from Cooper and Schindler, (2008) that, at least 5% of the targeted population should be selected for inclusion in a study like this. The researcher had the entire list of smallholder orange farmers in the research area. The list was obtained from 12 village executive officers.

Table 5:   Selection of a Representative Sample of Smallholder Orange Farmers for this study

Wards	Villages	Population of Smallholder Orange farmers per village	+5% of the population	Sample Size (n=152)	Selection Index
Mtindiro	Mtindiro	1 051	53	31	0.58
	Kwa-bada	840	42	13	0.30
	Sub-total	1 891	95	44	0.46
Mkuzi	Mkuzi	234	12	15	1.25
	Mindu	195	10	8	0.80
	Sub-total	429	22	23	1.05
Bwembela	Bwembela	175	9	12	1.30
	Mambaleo	270	14	12	0.086
	Sub-total	445	23	24	1.04
Misozwe	Misozwe	195	10	7	0.70
	Kwa-Mingoji	146	9	19	2.11
	Sub-total	214	19	26	1.37
Kicheba	Kicheba	228	11	11	1.00
	Kwa-Lubuye	172	9	9	1.00
	Sub-total	572	20	20	1.00
Songa	Songa	124	6	7	1.10
	Mhamba	70	3	8	2.70
	Sub-total	194	9	15	1.67
Total smallholder orange farmers sampled for the study				152	

Based on Table 5, a total of 152 farmers were selected in this study[19]. However, the description given by Bailey (1994) shows that a sample or sub-sample of 30 respondents is a bare minimum for studies in which statistical data analysis is to be done regardless of population size; hence the study fulfilled Bailey's (1994) requirement. Moreover, the study selected fewer small sample sizes in some villages than what is required of at least 5% of the population because the respondents from these villages had similar characteristics in terms of selling prices and operating costs.

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[19] In those villages, technically, respondents were obtained from farmers' meeting called by Village Executive Officers (VEOs). The VEOs were informed at least a day prior to the visit and they were requested to call for smallholder household meeting on the day of the visit.

3.3.2.2 Selection of sample size of wholesalers for this study

Convenience sampling procedure[20] was used to get sample of wholesalers for this study. The sampling procedure used is that, orange wholesalers were visited at their town markets and the selection procedure was based on their willingness to participate in this study. The selection procedure was as follows; traders[21] were visited in Muheza town markets and were informed of the purpose of the study so as to get their consent of participating in this study before being selected. After getting their consent, traders were requested to participate in this study.

Through this selection procedure, the researcher managed to select a sample size of 31 wholesalers for inclusion in this study as shown in Table 6. However, the criterion the researcher used to arrive at this number is borrowed from Bailey (1994), that a sample or sub-sample of 30 respondents is bare minimum for studies in which statistical data analysis is to be done for a study like this regardless of population size, hence the study fulfilled Bailey's (1994) requirement.

Table 6: Selection of Sample size of Orange Wholesalers for inclusion in this Study

Contact area	Types of trade	Selling terminal	Sample size (n=31)
Muheza town	Wholesalers	Muheza town market	7
Muheza town	Wholesales	Dar es Salaam market	11
Muheza town	Wholesalers	Arusha market	5
Muheza town	Wholesalers	Nairobi market	8

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[20] According to Mwaipopo (2006:54), convenience sampling involves selecting subjects based on the ease of their accessibility. Rwegoshora (2006:120), the researcher studies all people who are most conveniently available or who accidentally come in his/her contact during a certain time in the main survey.

[21] Traders were divided into two types: (i) Traders who trade oranges in Muheza town market, and (ii) traders who transport oranges to distant markets namely Dar es Salaam, Morogoro, and Arusha regions as well as Nairobi, Kenya.

According to Table 6, the study selected 31 orange wholesalers for inclusion in this study. However, the researcher had to go around with the district horticultural specialist and chairperson of oranges traders to facilitate successful process of identifying and selecting representative of orange wholesalers for inclusion in the study[22].

3.3.2.3 Selection of sample size of retailers for this study

Convenience sampling procedure was used to get sample of retailers for this study. The selection of retailers was done in the regions of residence of the retailers during the field survey and was based on the convenience of the retailers to participate in the study. The selection procedure involved visiting the retailers at their places of business and being informed of the purpose of the study so as to get their consent of participating in this studying before being selected. After getting their consent, retailers were requested to participate in this study. Through this selection procedure, the researcher managed to select a sample size of 31 retailers for inclusion in this study as shown in Table 7.

The majority of the retailers were found alongside the roads (Muheza town market mainly in Masugulu and Majengo areas). However, a further step was taken to visit retailers at distant town markets such as Dar-Es-Salaam (Temeke Sterio at Temeke District, Buguruni at Ilala District and Tandale at Kinondoni District) and Arusha regions (Kilombero Market in particular Ngarenaro area) as indicated in Table 7.

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[22] This is to say that traders were approached at their work place, where the researcher or his assistant would explain the benefits of the study. Most of the traders were willing to spend the necessary 45 minutes in answering questions, check list was applied. The respondents -rate was very high.

Table 7: Selection of Sample of Orange Retailers for inclusion in this Study

Contact area	Type of Traders	Targeted Market	Sample Size (n=31)
Muheza town	Retailers	Passengers/pedestrian	14
Dar es Salaam markets	Retailers	Passengers/pedestrian	10
Arusha town market	Retailers	Passengers/pedestrian	7

Table 7 shows the retailers whom were selected in different regions namely Tanga (Muheza district), Dar-es-Salaam, and Arusha. The study arrived at a sample size of 31 retailers because most of the retailers had similar characteristics in term of selling prices and operating costs.

3.3.3 Data collection procedures

The data collection process comes after the sampling stage in the research process (Churchill and Lacobucci, 2002). In this particular study, primary data were collected as explained in the subsequent sub-sections below. Primary data were collected using a questionnaire; interview guide/ check list instruments as explained below:

3.3.3.1 The questionnaire

In this particular study, a survey research method involving questionnaire was used for data collection. The data collection process involved personal interviews to guarantee a high response rate from the farmers. The survey involves the use of a questionnaire which consists of open and close ended questions for administration to a sample. This yields primary data that is both qualitative and quantitative in nature; and on which both comparison and analysis can be executed using qualitative and quantitative analysis (Mouton, 1996; Lewis and Thornhill, 2007).

The questionnaire had both open and close ended questions (Appendix 3). The questions were designed in English and translated into Kiswahili so as to facilitate communication

during the interview. Technically, the researcher asked the consent of the sampled farmers to participate in the study. Afterwards the sampled farmers (respondents) were informed about the objectives of the study and were required to confirm their willingness and availability to participate in the study. Eligible farmers included in this particular study are those smallholder farmers who had harvested oranges at least in the last 12 months of cropping season.

On the other hand, questionnaire was also designed and used to interview traders i.e. retailers and wholesalers in this study (Appendix 4&5). The study used this instrument to collect data related with volume of orange purchased and sold, orange prices, and marketing costs incurred by orange traders in this orange business. The interviews were conducted by the researcher himself. Traders were visited and interviewed individually at their work places. Technically, the researcher asked the consent of the visited traders to participate in the study. Afterwards, the respondents (traders) were informed about the objectives of the study and were required to confirm their willingness and availability to participate in the study.

3.3.3.2 Check List

Check lists were used to interview key informants such as the leaders of orange farmer associations and Non-Governmental Organization (NGOs); District Agricultural Development and Livestock Officer (DALDO), District Horticultural Specialist Officers (DHSO) and Ward Agriculture Extension Officers (WAEO); Village Executive Officer (VEO) (Appendix 6). The interview sessions took a minimum of forty five minutes and maximum of one hour. Key informants were visited and interviewed individually at their work places. The interviews were conducted by the researcher himself.

3.3.3.3 Validity and reliability measurement

The study measured reliability and validity of data collected to test consistence and authenticity of the data collected to verify that the findings are safe for consumption. The study carried out pre-survey study before field survey to measure data collection instruments. During pre-survey study, the study tested the ability of the instrument to measure the constructs as validity measurement. Based on the outcome of the pre-survey study, some questions were restructured while others were dropped out. This procedure was done to the questions which were seen to be vague and not practical in the questionnaire and the check lists.

Nevertheless, reliability was not tested during pre-survey study, but was taken care of during data collection phase. As explained in the literature that validity[23] is a precondition of reliability (Gujirati, 2006; Pindyck and Rubinfeld, 2010; Creswell, 2011); Tatham *et al.*, 2007). Moreover, everything that is valid is reliable, but not everything that is reliable is valid (Creswell, 2011; Tatham *et al.*, 2007).

During the field survey, the study took some measures to control validity during data collection phase as stated earlier. *First,* the "training" was conducted to the research assistant before the start of the field survey. The training was intended to make the enumerator more familiar with the constructs used in the questions in the questionnaires. This helped the researcher to address the problem of validity in the study. *Second,* every day after field survey, the researcher and the research assistant "cross-checked" the filled questionnaires to see if the constructs were clearly understood and measured.

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[23] Validity is a precondition of reliability[23] (Mwaipopo, 2006), but reliability is not a precondition of validity. This arguments implies that reliability is a necessary condition of validity, but it is not sufficient to establish validity (Gujirati, 2006); Pindyck and Rubinfeld, 2010).

3.3.3.4 Ethical considerations

Most authors address the importance of ethical considerations (Locke *et al.*, 1982; Marshall and Rossman, 1989; Merriam, 1988; Spradley, 1980). First and foremost, the researcher has an obligation to consider the rights, needs, values, and desires of the respondent (s) (Gujirati, 2006; Spradley, 1980). Based on this view above, the following ethical considerations were observed in this study to protect both the researcher's and the respondents' rights:

i. Prior to the starting of data collection activities[24], the researcher applied for data collection permission from the Director of Muheza District Council. On the same day, the approval letter was signed and issued to the researcher. This gave the rights as a researcher to collect data formally from the respondents.

ii. After obtaining the approval letter, the researcher developed the *consent form* for the respondents to sign before being engaged in the research. This form acknowledges that the respondents' rights would be protected during data collection. Elements of this *consent form* included the following clause:

First, the researcher informed respondents that they have both *right* to participate voluntarily or withdraw at any time, so no one was to be coerced into participating in the study. *Second,* the researcher also explained the *purpose* of the study to the respondents before the start of the interview. This was done deliberately to enable the respondents to understand the nature of the research[25] and its likely impact on them. *Third,* the researcher explained to the respondents the *procedures* of the study so they can reasonably know what to expect in the research. *Four,* the study took seriously issues related to the privacy

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[24] The researcher went to Muheza Council Director to obtain field work permit. After approval, data collection started in August, 2010 to January, 2011. Six months were spent in the field work visiting every sampled village.

[25] The nature of this research is academic. The researcher also will submit final report to the Muheza District Council for their future consumption.

of the respondent in this study. The study would not disclose the name of the respondents in the questionnaire or PhD thesis unless the researcher got permission to do so.

3.3.4 Methods for data analysis

After the collected data were coded and cleaned, they were passed through a sequence of analyses to address the research specific objectives posited. These analyses were classified into two categories, namely qualitative and quantitative data analysis. The quantitative approach is more useful for understanding the existing economic conditions and management of smallholder orange farmers but is inadequate for understanding the institutional changes. In contrast, the qualitative approach is more suitable for studying the nature of institutions and the drivers of institutional change over time (Chirwa and kydd as cited by Kirsten *et al.* (2009:215). In this study, therefore the study applied both qualitative and quantitative research methods. To address objectives of the study, the following analytical approaches were employed.

3.3.4.1 Method for analyzing institutional arrangements on orange sub-system

Descriptive statistic analysis was used to analyze study objective one. The study used frequencies and percentages. The aspects analyzed descriptively included the farmers who were trading using modes of controlling transactions including contractual arrangements, group marketing, farmers' organizations (e.g. group marketing), joint venture, franchising, and strategic alliance. These frequencies and percentages were calculated to explain the modes of institutional controlling arrangements applied in the study area by farmers and their impact on farmers' income.

3.3.4.2 Method for analyzing the influence of transaction costs on orange income

Transaction costs may arise from poor marketing coordination or lack of necessary institutional support for least-cost information sharing, monitoring, negotiation, and enforcement (Temu, 2009) and hence (Binswanger and Rosenzweig, 1986; hoff, Braverman and Stiglitz, 1993) constraining the participation of smallholder farmers in the remunerative markets. In this view, according to Chirwa and kydd (2009), the qualitative approach is more suitable for studying the nature of institutions, market infrastructures, and the technical drivers of institutional change over time.

In the view of the above, this study therefore applied qualitative data analysis approach to analyze specific research objective two, which aimed at assessing transaction costs affecting orange farming income among smallholder farmers in the study area. This was done by recording verbal discussions with the respondents during focus group discussion and followed by breaking the recorded information into meaningful smallest units of information, subjects and tendencies.

3.3.4.3 Methods for analyzing marketing performance

The marketing performance analysis was done using marketing margin, gross profit margin, net profit margin as well as marketing efficiency and market power analysis as shown hereunder:

(i) Marketing margin

Marketing margin is the difference between prices at two market levels. Marketing margin equals the difference between what the consumer pays and the farm gate price per orange (Kohls and Uhl, 1985), on the assumption that wholesalers buy directly from the farmers. Marketing margins are calculated through computing the absolute margin or price spread,

which is essentially the same as the difference between the prices paid and received by each specific marketing player.

(ii) Gross margin

Gross margin analysis is chosen because it can be used to measure economic returns per unit of orange traded. Gross margin analysis is therefore a simple, but in many cases a sufficiently powerful tool for economic analysis (Abbot and Makeham, 2009 as cited by Mlambiti, 2008). It is given as the difference between gross income accrued and the variable costs incurred (Makeham *et al.*, 1986). The profit margin of a specific player in this study is the net earnings, which it earns after paying all operating costs. Therefore, the profit margins of actors in the orange market channel were calculated as follows:

$$NGM = TR - TVC \dots \dots (1)$$

Where:

NGM = Net gross margin in TSH/Orange

TR   = Total revenue in Tsh/Orange

TVC   = Total variable costs in TSH/Orange

This is, $TR = P_o x Q_o$ and $TVC = P_{in} x Y_{in}$

Therefore,

$$\prod = P_o x Q_o - P_{in} x Y_{in} \dots \dots (2)$$

$\prod$ = Profit margin in Tsh/Orange

P_o = Price of product in Tsh/Orange

Q_o = Quantity of oranges sold by farmer/Orange

P_{in} = Price per input in Tsh/Orange

Y_{in} = Item (input) incurred in Tsh/orange

The study computed every item per unit to facilitate comparison across the orange market channel from farmers to the retailers in the study area. Net profit margin (NPM) is

performed to determine the efficiency of the product marketing system. According to Kohls and Uhl (1985), the high net profit margin implies better economic performance, while low net profit margin denotes poor economic performance. The profit margin results were interpreted according to Kohls and Uhl's (1985) interpretation above.

Profit margin results of different market participants in market channel were compared. It is important to compare profit margin of different market participants to know whether or not buyers and sellers are able to pursue their economic activities sustainably (Mutabazi, 2007; Phillip, 2007; Johnsen, 2003).

(iii) Sherpherd formula for measuring marketing efficiency in the study area

The study by Emam, (2011); Malaisamy, (2012); and Magoji *et al.* (2013) measured marketing efficiency index of chain actors by using Sherpherd formula (Sherpherd, 1993). This study also applied Sherpherd formula to calculate a marketing (operational) efficiency index as follows:

$$\text{Marketing efficiency index} = \left(\frac{Selling\ Price}{Total marketing\ costs} - 1 \right) \quad \text{................................ (3)}$$

Based on the marketing efficiency formula above, marketing efficiency index of each actor in the orange marketing channel is measured by comparing the highest efficiency index to the lowest efficiency index. This is, the actor with the highest efficiency index has lower operational costs and experience better profit margin, while the actor with the lowest efficiency index has poor marketing efficiency in terms of profit margin generation (Sherpherd, 1993).

In this study, the interpretation of the results was based on the previous study done by Abbot and Makeham (1990). According to Abbot and Makeham (1990), the high marketing efficiency index implies better performance, while low efficiency denotes poor performance.

3.3.4.4 Econometric analysis of the effects of intrinsic characteristics of smallholder orange farmers on orange farm incomes

A regression analysis was applied in this study. Before carrying out regression analysis, assessment of relevant tests were firstly carried out to examine whether the data violated any of normality, linearity, and homoscedasticity assumptions. The tests were considered out include normality test, linearity test, and homoscedasticity test. The study also assessed collinearity of independent variables before conducting regression analyses.

This particular study applied multiple regression method to analyze the intrinsic factors that influence income from production of oranges among smallholder farmers in Muheza District. The selection of this method in this study was influenced by the fact that multiple regression proved successful in determining intrinsic factors influencing income in many other previous studies such as Lyne (2002); Mutabazi and Mdoe (2003); Schwarze, (2004); Wanyama *et al.* (2010); Aikaeli (2010); Ugwumba *et al.* (2010); Olawapo (2010); Obike *et al.* (2011); Ugwumba (2011); and Talukder (2014). The variables for inclusion in this study were also selected from the past experience of studies based on their relevance in improving income of farmers.

Therefore, regression model was used to determine intrinsic factors that influence household income among orange farmers in this study. The model was employed to

predict the power of predictors in explaining the dependent variable (income). The study assumed that the main source of income was sales of oranges.

Therefore, the specification of respective multivariate regression model is presented below:

$$OI = \beta_o + \beta_1 TBO + \beta_2 OFEXP + \beta_3 OFED + \beta_4 OPR + \beta_5 MIA + \beta_6 OFAG + \beta_7 QOM + \beta_8 TRANSCOST + \varepsilon, \ldots\ldots(4)$$

Whereby:

OI	=	Orange farmer's Income (Earnings from orange sold in Tanzanian shillings) as dependent variable
TBO	=	Tree bearing oranges
OFEXP	=	Experience of orange farmer in orange trade
OFED	=	Education of orange farmer
OPA	=	Orange price received by farmer
MIA	=	Market information access
OFAG	=	Age of orange farmer
QOM	=	Quantity of orange marketed by farmer
TRANCOST =		Transportation costs
εi	=	Stochastic error term $[\mu_i \approx N(0, \delta^2)]$
β_o	=	Intercept
$\beta_1 \ldots \beta_{10}$	=	Regression coefficients

Based on the aforementioned regression model above, the study generally assumed that income of smallholder orange farmers is influenced by certain intrinsic factors[26] which

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[26] This study refers to farm and farmer characteristics

include trees bearing oranges, experience of orange farmer, education level of orange farmer, orange price received, market information access, age of orange farmer, amount of oranges marketed, and transportation costs.

(i) Measurement of dependent variable

Dependent variable (DV) is smallholder farmers' income from production of oranges in the area of study. In this study, smallholder farmers' income from production of oranges is the sum of the net income from orange sub-sector. The net income of smallholder farmers is obtained by subtracting the total operating costs incurred during farm yield production and marketing process from the gross income (Taylor and Turner, 1998). Based on this view above, data for calculating net income in this study were collected from smallholder orange farmers at the village level. The procedure was achieved through farmers (respondents) to recall quantities of oranges marketed, prices received, and the operating costs incurred in the previous orange production season.

Before measuring net income, gross incomes of individual farmers were measured by taking orange supply and multiply the average market prices received for a given particular agricultural season[27]. Thereafter, net income was measured by subtracting the gross income from the sum of operating costs incurred during orange production and marketing stages including payments of labour charges for pruning orange trees, weeding, harvesting and collecting, loading and off-loading, and transportation.

In other words, orange income of farmers was measured by deducting the total variable costs from the gross income in this study. However, the study did not account for the total

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[27]Although theoretically gross income would be measured by taking all oranges produced, including oranges marketed plus those consumed at home, and multiply by marketing prices received for a given orange production season.

overhead costs like farm machinery or motor vehicles, as they were not seen to be used in orange production and marketing during the study.

(ii) Measurement of the Independent Variables

In this study, eight independent variables were measured. Table 8 presents the summary of independent variables which influence income among smallholder orange farmers in Muheza District:

Table 8: Summary of Independent Variables Influencing Smallholder Farmers' Income from Production of Oranges (n=152)

Variable Code	Variable Description	Nature of Variable	Unit of Measurement	Expected Sign
TBO	Tree bearing oranges	Continuous	Number of trees per acre	+ve
OFEXP	Experience of orange farmer	Continuous	Years of farmers in orange trade	+ve
OFEDU	Education of orange farmer	Continuous	Years of farmer I schooling	+ve
OPR	Orange price received	Continuous	Amount of price received per orange	+ve
MIA	Market information access	Binary	Dummy (0 if No and 1 if Yes)	+ve
OFAG	Age of orange farmer	Continuous	Years of orange farmer	+ve
QOM	Quantity of oranges marketed	Continuous	Amount of oranges marketed per acre	+ve
TRANCOST	Cost of transportation	Contiuous	Amount of transport cost per orange	+ve

Source: Researcher (2010)

CHAPTER FOUR

4.0   RESULTS AND DISCUSSION

4.1 Socio-economic Characteristic of Orange Farmers in the Study Area

The socio-economic characteristics include farmers' age, gender, education level, orange

farming experience, orange outputs (amount of oranges sold), and farm size. These

characteristics are correlated with orange farmer's income as indicated in Table 9. The

orange sales (revenues) are influenced by transaction costs (Hobbs, 1997), which are in

turn influenced by socio-economic characteristics of orange farmers.

Table 9:   Correlation between Social–economic Characteristics and Orange

Farmers' Income in Muheza District, Tanzania (n=152)

Farmers' Characteristics	Unit of Measures	Mean Value	Correlation
Farmers' Age	Age in years	48	-0.059
Farmers' Education	Years in schooling	7	-0.172*
Farmers' Experience	Years in orange farming	9	0.117
Farm size	Hectares producing oranges	1.6	0.569**
Orange Marketed	Quantity of oranges marketed	78 795	0.429**
Orange trees	Tree bearing oranges per hectare		0.535**
Orange price	Tanzanian shillings per orange	20	0.438**
Orange Income	Tanzanian shillings	1 830 338 (52.3%)	
Farmers' income[28]	Tanzanian shillings	2 781 168 (100%)	1

** and * = 1% and 5% significance levels respectively

The results in Table 9 shows that, out of seven (7) variables tested, five (5) variables such

as farm size, quantity of oranges sold, number of orange trees bearing oranges per hectare,

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[28]This income is a total of orange sales (52.3%), livestock sales (7.1%), other crops sales (11.7%), income
from employment (9.2%), income from business activities (6.7%), cash credit received (5.2%), and income
from retirement (7.8%).

and orange prices received by farmers (farm gate price) had positive and significant liner correlation with orange income mostly at 1%. Other variables particularly farmers' education had a negative and significant liner correlation with orange income at 5%. The implication is that these socio-economic characteristics should not be undermined by the policy makers because these (characteristics) seems to have liner correlation with household farmers' income.

On average, sales of oranges contribute about 1 830 338 (52.3%) of the total household income as cited in Table 9. The remaining 47.7% of household income contribution come from other sources of economic activities. This implies that orange is the major source of rural farmers' income in Muheza district. Therefore, any improvement in orange production as well as markets may lead to an increase orange income and improve household welfare, *ceteris puribus*.

4.2 Other Household Characteristics of Farmers

The following were other characteristics of the interviewed orange farming households in the study area:

4.2.1 Ownership of household equipment and implements

Ownership of household equipment and implements is also a good indicator of farmers' livelihood (Adesina and Baidu-Forson, 1995). In this study, farm equipment and implements owned by the interviewed farming households included hand hoes, bush-knives, axes, radio, furniture, water pumps, slashes, bicycles, motor cycles, motor vehicles, generators, solar systems, Television sets, fridges, mobile phones, and sewing machines. The most frequently owned household equipment (owned by at least 50% of the households surveyed) included hand hoes, pruning knives, axes, radio, and furniture such as tables, chairs and beds.

About 97.4% of all household surveyed had hand hoes and 59.2% owned radios. The findings reveal that farm implements such as water pump, grass slashes, and pruning knives were owned by less than 25% of the surveyed household farmers in Muheza District. These types of farm implements are very important as tools in managing orange fields. Low percentage of farmers owning these types of farm equipment implies that majority of rural farmers do not have adequate farm equipment to enable achieve best farm management practices of orange fields that would enable them improve orange production. Thus, a problem of weeding and pruning is common to majority of smallholder farmers.

About 43.4% of the farmers interviewed owned bicycles while about 2.6% owned mobile phones. This indicates that a bicycle is also an important means of transporting either planting materials or orange seedlings to the fields.

4.2.2 Types of houses

The type of the house is one of the criteria used in household classification in terms of economic well-being (Chongela and Mlambiti, 2009). In this study, therefore, the type of the house was used to assess the economic status of orange farmers. Houses of the surveyed orange farmers were classified into three type's namely permanent, semi-permanent, and temporary houses. Permanent houses had walls made of burnt brinks or concrete blocks, concrete floors and are roofed with iron sheets or tiles. While semi-permanent houses had walls made of un-burnt brinks or mud and roofed with iron sheets. Temporary housing consists of houses with walls made of mud or mud floor and roofed with grasses.

In light of the findings in Table 10, most (40.1%) of the households surveyed were temporary followed by (35.6%) permanent houses and lastly (24.3%) semi-permanent houses. Therefore, majority of smallholder farmers still live in temporary houses implying that the problem of income poverty in the rural areas is still rampant. Table 10 shows the types of houses owned by orange farmers surveyed:

Table 10: Types of Houses

House type	Percentage of respondents (n=152)
Permanent house	35.6
Semi-permanent house	24.3
Temporary house	40.1

4.2.3 Keeping livestock in the orange based farming systems

Keeping livestock is one of the livelihood activities (Chongela and Mlambiti, 2009; Talukder, 2014). Keeping livestock also was one of the livelihood activities which is carried out by orange farmers in Muheza District. Based on the findings in Table 11, the main livestock types kept include cattle, goats, sheep, pigs, chicken and ducks. The findings also reveal that about (85.5%) of all surveyed households were keeping chicken, 46.1% were keeping goats, sheep, pigs or a combination of these, and lastly about 19.7% were keeping cattle. The percentages of households keeping each type of livestock and the average number of animals per household varied significantly in terms of types across the wards surveyed. Chicken keepers had the highest average number of all livestock types per household (Table 11). Livestock was kept mainly for farmyard manure, meat, milk (especially for cattle and goats) and cash (Baijukya *et al.*, 2005).

Table 11: **Percentage of Livestock Keepers and Average number of Livestock per Household (n=152)**

Household surveyed	Percentage of household (n=152)	Average livestock per household survey
Chicken keepers	85.5	12
Goats, sheep and pigs keepers	46.1	6
Cattle keepers	19.7	2

Livestock keeping has a significant contribution to the improvement of livelihood of rural farmers. Through farmers interviews; it was revealed that farmers sell livestock to supplement incomes from orange sales to meet various household needs such as payment of school fees, meals, health services and the like.

4.3 Description of Actors in the Orange Value chain in the Study Area

There are three market channels in Muheza namely the local channel (1), domestic channel (2a and 2b), and the Kenyan (export) channel (3). The local channel (1) is the shortest market channel with four value chain activities: nurseries/inputs supply, farmers, street hawkers, and rural market/consumers. The second market channel is domestic market channel (2a); this channel has eleven value chain activities namely nurseries/inputs supply, production, brokering, harvesting, collecting, bulking, regional transporting, wholesaling, retailing, and consumers. The domestic market channel (2b)[29] comprises nurseries/inputs suppliers; farmers, traders/wholesalers, harvesters, collectors, transporters, and the urban market which comprises wholesaling/market brokers, retailers, and restaurants, hotels, supermarkets, and institutions. The third market channel (3), which is the Kenyan (export) channel starts with orange farmers, local brokers, Kenyan traders,

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[29] The main distinction between channels 2(a) and 2(b) is on the use of brokers. For example, channel 2(a) is observed during the peak season and is characterized by direct contact between traders and orange farmers. While channel 2(b) takes place during the low season where the amount of oranges produced are limited, the brokers' job becomes of great importance though the actors in the channel are basically the same.

exporters, and Kenyan markets (Kenyan wholesalers or brokers). Kenyan market brokers sell their products directly to Kenyan processor. On the other hand, brokers can sell directly to Kenyan retailers, then, Kenyan importers/consumers, also, Kenyan wholesalers can sell directly to Kenyan retailers, and finally to Kenyan consumers. Figure 3 illustrates the main different market channels and orange value chain activities in the study area.
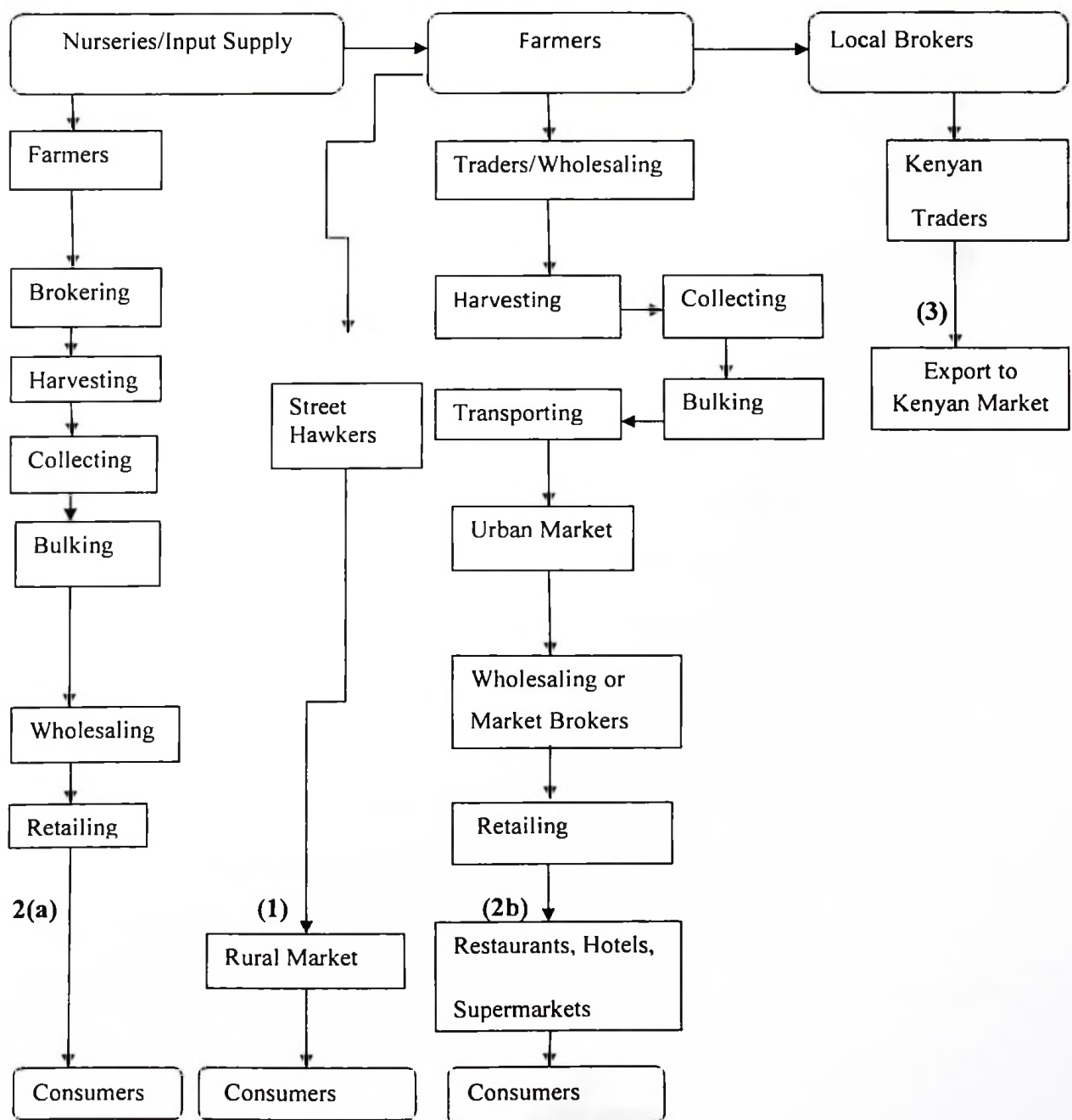
Figure 3: Market Channel of Orange Industry in Muheza District, Tanga

4.3.1 Orange Seedling Suppliers

Orange seedlings supply is conducted to replace old or diseased or dead orange trees, and or for expanding orchards. Orange value chain starts with the supply of improved seedlings. These seedlings are produced by farmers themselves or purchased from other farmers who have small home nurseries. A firm may reduce risks attached with inputs supply uncertainty through vertical coordination forms (Koppen, 2009). Similarly, most farmers obtained orange seedlings for planting from either their own back yard nurseries or purchased the seedlings from other farmers who have small home nurseries producing local orange seedlings.

Some farmers have mastered the budding technique for the vegetative propagation of citrus. Rough lemon, a vigorous and high yielding rootstock are always used as a rootstock. These rootstocks are either purposefully raised in small home nurseries or collected as spontaneous seedlings. The rootstock seedlings are often taken bare rooted and transplanted in the permanent field, where they are mostly grafted with different well-known cultivars after one year of growth. This unusual practice has developed as a measure against plant theft. Plants grafted in a nursery are considered to be prone to theft, while those grafted on the rootstocks which are already established in the field cannot be easily uprooted without compromising their survival. Lemon stem is very resistant to diseases, and tolerant to bad weather. These are the main reasons that influence farmers into adopting seedling grafting. Those who bud trees are also in a position to be sure of the cultivar they have selected. Farmers who buy seedlings from small home nurseries report of not being sure of whether or not the cultivar they had ordered would be supplied to them.

To reduce the risk of receiving the wrong cultivar, farmers, had decided to graft the plants themselves with the orange trees they prefer the most. Therefore, farmers decided collectively to open seedling nursery units to produce seedlings to meet their own local demand. A group, (Maduma Orange Seedlings Multiplier Organization) produces varieties of improved orange seedlings (grafted oranges) namely Early and Late Valencia, and Lemon seedling for grafting process and hence reduce problem of improved orange seedlings to its members. This is the only co-operative seedling nursery unit located at Maduma village, in Mtindiro ward, which is about twenty kilometres from Muheza town. It is owned by a small group of smallholder farmers from the abovementioned area.

4.3.2 Agro-input suppliers

Agro input dealers supply agro chemicals like pesticides, weed killers and fertilizers through agro shops, which are located in Muheza town. The main actors are the shop vendors located in Muheza. There is a high demand for the chemicals by farmers. Smallholder orange farmers encounter inadequate finance to purchase herbicides and spraying equipments to control orange diseases and pests.

As a result, the government via Muheza District Horticultural Department, as one of its main roles to farmers in Muheza District and as part of the Muheza District project to control orange flies in the district, supplies essential agricultural inputs such as herbicides and pesticides at a subsidized price.

For example, according to the district horticultural specialist, chemicals are used to prevent and/or cure orange tree diseases such as gummosis, a root disease which is caused by white flies.

4.3.3 Farmers

The major role played by farmers in the orange value chain is selling fruits to traders. The second role is sorting out oranges. The sorting takes place in two stages. The first stage takes place at farm level before the truckers/wholesalers pay the farmers for the quantity agreed upon between the two parties. Sorting by size is done by the pickers under the supervision of the traders, in the presence of farmers. The second stage takes places at the retail level where the sorting is also based on the size of the fruits. This enables the retailers and farmers to identify defected fruits before the farmer is paid by the trader (retailer/wholesaler).

In light of the aforementioned facts, if the quality cannot be detected prior to purchase, traders face additional uncertainty over product quality (Hobbs and Young, 2001). On the other hand, there have been price uncertainties in the orange sub-sector as prices depend on quality. In this view, the sorting enables both the farmers and the traders to set up selling/buying price.

4.3.4 Brokers

In this study, a broker is an individual who arranges transactions between a buyer and a seller, and gets a commission when the deal is executed (Spiro, *et al.,* 2003). The prime responsibility of a broker is to bring the sellers and the buyers together. Therefore, a broker is a third –person, a mediator or a facilitator between a buyer and a seller.

In Muheza District, the first role of the broker is to negotiate with the wholesaler about wholesale prices. The second role is to negotiate with the farmer on the farmers' price. The third role is to negotiate with the pickers (harvesters) on picking, collection, sorting and loading charges; the fourth role is to negotiate with the truckers on transport charges

(but this occurs when the broker receives order to supply a certain quantity of oranges to distant markets like Dar es Salaam, Arusha, Morogoro and Nairobi). Lyne (2009) argued that uncertainty often determines the contracting process. In this case, the distant wholesalers make some kind of contractual arrangement with the Muheza brokers to supply them with the produce. The communication between the broker and wholesalers is facilitated mainly by mobile phones.

During low orange production seasons (January-April and October-December), orange supply drops largely and exports to Kenya drop as well. During such periods the domestic market becomes the main market for village brokers[30]. Kenyan traders require bulky supply and do not have access to a local network of orange farmers. In some instances, the Kenyan traders merely arrive in orange producing areas and announce a price they are willing to offer. As the result, farmers opt to supply their oranges to Kenyan traders directly avoiding brokers, and receive relatively better market prices.

During low orange production season, orange volumes are low. Traders use the brokers as a mechanism of collecting oranges in bulky quantities before hiring transporters to haul the oranges. This is because staying in the collection centres with transporters until sufficient supplies are collected is too costly and time consuming.

4.3.5 Wholesalers

In the research area, there are three groups of orange traders along the market channel namely the indigenous/local traders, outside traders and external traders. Outside traders come from Dar es Salaam, Arusha, Kilimanjaro, Morogoro and, Tanga regions; while

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[30] Brokers normally charge a brokerage fee of 1 to 3 Tanzanian shillings per orange.

external traders coming from Kenya. Local traders come from Muheza town and make up the majority of the orange traders. These traders are also called orange agents. These local traders are normally operating in the villages or in Muheza town central market.

The market operations of the orange value chain in Muheza District for the wholesaler include buying, harvesting (picking), assembling, sorting, loading, transporting, off loading, packing, storage, and selling. One of the roles played by wholesalers is sorting oranges. As said previously, the sorting takes place at the farm level before the wholesaler pays the farmer for the quantity agreed upon between the two parties. If quality cannot be detected by buyers prior to purchase, such buyers often fall victims of uncertainty over product quality (Hobbs and Young, 2001).

Thus, sorting by size and wholesomeness is done by pickers under the supervision of the farmer in the presence of the wholesaler. This enables the wholesalers to identify the defected fruits before making payment to the farmer and hence minimize transaction risks. Therefore, overall grading by size and packaging at wholesale level plays a key role in adding value to the produce.

At Muheza town market, wholesalers sell oranges to retailers and hawkers, who sell oranges in perforated bags, each containing between twenty and thirty-five oranges. This means that the wholesalers sell some oranges directly to the final consumer, through hired agents.

Findings show that wholesalers buy oranges directly from the farmers at the farm gate price enabling the former to get oranges at relatively low prices and avoid paying brokerage fee. Indigenous traders commonly use this channel because they are familiar

with the orange production areas and of the farmers. This cannot easily work with outside traders who are less familiar with orange farmers. Such traders face stiff competition from local traders, and hence the former use the latter to fast track trade. As noted by Poulton (2009) that direct marketing channel is the best way of marketing coordination since it lowers transaction costs as well as enhance market access and strengthening the competitive position of the firm in the market chain.

A new outside trader would look for a local trader from Muheza town to collect oranges from farmers on their behalf. Some brokers are both traders and transporters. They obtain orange fruits directly from the orange farmers or active brokers at the village level. On completion of trade, the brokerage charge is normally paid per orange. During low production season, local traders from Muheza town ask brokers at the village level to find sufficient oranges for transportation and further go into villages to collect loads of oranges on advice of the village broker. In this case, Kenya traders and other regional traders drop out significantly.

4.3.6 Harvesters/pickers

Often, traders hire harvesters/pickers to pick and load oranges onto trucks. They play a role of harvesting, gathering, sorting, counting and loading[31]. Orange sorting is based mainly on the size of the orange and this is done at both at the harvesting and loading stages, often under the supervision of both farmers and wholesaler. Due to uncertainty over product quality, traders incur high sorting costs in determining a product's true quality (Bazel 1982). As noted in Aagency theory, uncertainty will be higher when it costs

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[31] These roles are included in the harvest fee, which ranges from Tsh 1 to 2 per orange.

more buyers (traders) to monitor directly the actions of the sellers (farmers) (Hobbs, 2007).

Plate 1: Farmer and Harvesters Sorting and Counting Oranges at the Farm Gate

In a few incidences, farmers harvest oranges before selling. This happens when large numbers of traders (often from Kenya) come to an area during peak seasons. Because oranges are easily perishable,[32] farmers follow this practice when they are assured of the market. In these instances, orange harvesting is carried our either by farmers themselves or harvesters who are paid to harvest oranges for them. Normally, farmers do not harvest oranges until buyers have been identified since they (farmers) are not capable of storing oranges for a long period while waiting for a buyer.

Although traders hire local pickers in some instances, some smallholder orange farmers and their family members have to play a role of a harvester, either during peak seasons or

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[32] Perishability adds to the complexity of a transaction because the quality of the product can deteriorate. Traders incur high sorting costs to minimize risk of losses if this (deterioration) occurs.

during scarcity. Smallholder orange farmers use family labour to harvest and pack oranges into baskets and traders' trucks. During peak seasons, labour is limited and it is a good time for traders to employ local harvesters. Local contract harvesters are often small farmers, family members of neighbours or local youths. However, during low production season, a larger proportion of small scale farmers and their families play the role of local contract harvesters as the volume of oranges harvested decreases substantially.

After the oranges have been harvested, traders would normally do the sorting and grading of oranges basing on size, colour, and freshness. The remaining oranges are either left to rot on the floor or disposed off by the farmer. Traders from Kenya are a salvation to Muheza farmers because these traders also buy small size oranges, which enhances farmers' income, otherwise such small sized oranges would have been left to rot.

Oranges are packed into baskets of two sizes, with the smaller round baskets containing 500 oranges per basket and the bigger baskets taking up to a 1 000 oranges. The baskets are usually purchased by traders at the beginning of the season at a cost of Tsh 500 to 800 per basket depending on the size. The baskets usually last for a season and traders usually purchase enough baskets per season. Sometimes, if there is a need for additional baskets, bigger size baskets can be hired; but due to the relative high cost of rental fees, baskets are rarely hired.

Truck sizes of 2 to 4 tons and 4 to 10 tons are most preferred by traders for transporting oranges. Fuso and Canter are the most popular motor vehicle makes. Oranges are sorted according to size before being loaded into trucks. The selection of oranges is also evident during harvesting. The oranges that are considered too small are not purchased and are left on the farm. No price differentiation is evident on cultivar, size or quality at either farm or

trader's level. The harvesting fee is Tsh 1 to 2 per orange and Tsh 30 000 to 60 000 is charged for loading one truck. Traders may come along with their own personnel to count the oranges and often two persons are responsible for counting on behalf of a trader.

4.3.7 Transporters

There are different means of transportation as discussed hereunder: first, oranges can either be carried on the head or by bicycles from the orchards to the nearest road. Often, the harvesters also transport the oranges to the roadside. In this case, the local transport cost is included in the harvesting/packing/counting fee, while in other instances it is negotiated separately. The relative cost is dependent on the distance involved.

The second means of transportation is trucks. Most transporters use small trucks (of 2 to 4 tons) to transport oranges within the district and larger trucks (4 to 10 tons) to transport oranges from Muheza to distant destinations such as Dar es Salaam, Arusha, Moshi, Mwanza, Morogoro, and Nairobi. Transporters collect oranges in bulk although some collections are also done by traders or brokers. The number of oranges loaded is not only dependent on the size of the truck, but also on the extent to which the transporters accept to be overloaded. Usually, traders pay transportation fees and local council levies per truck basis and therefore endeavour to fill the truck to full capacity whenever possible. However, small traders often share the load with other traders during transportation to town markets. As argued by Dorward *et al.*, (2009) that the role of collective action on the part of producers is to reduce transaction costs for enhancing market access and strengthening the competitive position of the producer group in the market chain.

As said earlier, truckers transport the produce to the Muheza town market and distant markets such as Dar es Salaam, Kilimanjaro, Morogoro, Arusha and Nairobi. Majority of

wholesalers who are based in Muheza are supplied with the produce by truckers. A few wholesalers however are supplied with the produce by pick-ups and cyclists. But, it should be noted that the produce supplied by truckers is normally not the property of the farmer but the consignment of the Muheza Middlemen. In other words, the amount supplied to Muheza wholesalers is a combination of the excess produce which is purchased by the trader after accomplishing the orders by distant wholesalers, and some quantities obtained by cheating the farmers when counting. A few farmers however, transport their produce to the Muheza main market (for sale to wholesalers and/or retailers) using their bicycles.

Packaging materials which are used are bamboo reed baskets, polythene bags and coconut trees leaves. The first two are used for transporting the fruits to wholesalers and retailers at the Muheza central market. The third type of materials are used to cover the inner walls of the lorries or trucks which transport the produce to distant markets as mentioned above. .

The fruits are collected in the designated areas in the villages where truckers and wholesalers come to buy. Lorries and pickups are the commonest means of transport used. While pickups and bicycles are the commonest means of transporting the fruits to the Muheza central markets; lorries/trucks are the commonest means used to transport the fruits to distant markets.The transportation fee varies according to distance to be covered and not weight. A number of traders in Muheza own between 1 to 10 trucks each. A few farmers own trucks as well while majority of the traders rent trucks for doing their business.

During peak harvesting seasons, a trader is able to fill a truck with oranges from one big farmer or two to three middle level farmers. A truck is fully loaded in less than a day. During low seasons, truckloads often carry oranges from many different farmers and it

could take a trader up to four days to load the truck to capacity. During low supply periods, traders could assist in collecting the oranges as it would save time and money for traders and transporters. On the other hand, many trucks at Muheza district were found to specialize in transporting oranges during peak seasons. However during low seasons, truck owners would diversify business and transport other products. During peak seasons, trucks would transport oranges on a daily basis, but they would remain idle for four or five days between loads during low seasons.

4.3.8 Retailers

Retailers either conduct their business in cities, towns or villages. Retailers would do business in either one permanent position or street vending by moving from place to place along the streets. In most cases, retailers obtain their stocks from traders or wholesalers who conduct their businesses from the vending stalls in the wholesale markets. Retailers purchase their oranges from wholesalers on a more unstructured basis. Majority of the retailers purchase their orange fruits from three common channels namely; wholesalers, traders, and farmers. While other retailers purchase oranges from wholesale markets; mobile vendors purchase oranges from either wholesale markets or other retailers. The prices are fixed per orange.

It is for this reason that sorting of the fruits based on size is the common marketing practice among the retailers. Sorting enables the retailer to identify the defected oranges and thus making appropriate payment to the supplier. This practice also enables the retailer to set up selling price. Retailers sell their fruits to consumers who include bus passengers, waiting passengers, drivers, pedestrians, and to other market traders. Some of the oranges are sold when peeled, ready for consumption. Overall, the grading by size and

packing in perforated plastic bags and or peeling at a retail level plays a key role in adding value to the produce, and hence the retailer receive high prices.

Plate 2: Retailers Selling Oranges at Muheza Bus Terminal

Oranges can also be sold to consumers either peeled or unpeeled. Unpeeled oranges are put in heaps of five oranges. Normally, retailers put oranges in small heaps based on size and type. Large sized oranges are sold at high prices than small sized oranges. Retailers often grade oranges to differentiate the prices.

4.3.9 Processors

During the study it was revealed that no orange processing factory was operating in the study area. In the past, however, there was the TANGOLD processing factory which was located in Korogwe district, in Tanga region. The factory stopped production in 1986, and today it is a dilapidated structure.

Furthermore, in the year 2006, a small group of smallholder farmers and some women community groups officially started a vegetables and fruits processing unit in Muheza. This centre is called MUWAMU; the centre, which was funded by UNIDO, was producing orange juice and jam. However, the production of products was substandard, and could therefore not meet the approved standards. The processing unit was further challenged, in that it failed to meet hygiene requirements and quality standards and thus it could therefore not acquire food safety certification and other permits from the Tanzania Bureau of Standards and the Food and Drugs Authority. The MUWAMU factory, as shown in the photo below stopped production and has since been abandoned.

Plate 3: Muheza Vegetables and Fruits Processing Unit (MUWAMU)

Large scale processors mentioned by respondents were UNNAT and Bakhressa Food Processing Co. LTD. The factories were buying oranges at Tsh 25 per kilogram as opposed to the open market price of Tsh 20 for one orange. No wonder, farmers were not ready to sell their oranges to these factories directly. They therefore prefer to sell oranges to Kenyan traders and local Tanzanian traders who offer relatively better prices. However,

Hobbs (2007) argued that facilitating rural agricultural investment like investment in agricultural plants may increases price of products and hence increasing farmers' income.

4.4 Institutional Arrangements and Their Influences on Prices and Orange Farmers' Income in Muheza District

In the free market, farmers have to consider the costs of exchange under alternative market arrangements as they cannot precisely predict the actions of traders (Temu, 2009). The Institutional arrangements (farmers' organizations and contract farming) which might reduce transaction costs and risks of doing business as opposed to individuals selling in spot markets. Therefore, the following section discusses the most commonly observed institutional arrangements in the area with regards to overall market linkages, followed by a discussion on farmers' organizations aspects and their involvement in contractual arrangements under orange supply agreement system.

4.4.1 Farmers and market linkages

Findings in Table 12 show that over 98% of the smallholder farmers sell their fruits to wholesalers through middlepersons (brokers). While 2% sell their produce to both wholesalers and retailers. Over 98% of farmers sell their oranges through middlemen especially when the farmer is in need of emergence cash especially where there are no other sources of cash apart from orange trading. Farmers sell their fruits under contract agreement to investors (traders) while oranges are still pre-mature. This is because smallholder farmer individually cannot afford high costs of transporting their oranges to the town markets as pointed out during focus group discussion. As a result, the market channel for oranges in Muheza District is characterized by two models namely, direct and indirect selling market channels.

Table 12:   Distribution of respondents by Type of Selling Channels

Model of selling	Percentage of the respondents (n=152)
Sold directly	2
Sold through middlemen	98

Table 12 shows that out of 152 interviewed farmers, 149 farmers sold oranges through middlemen. As stated earlier, farmers have been selling oranges through middlemen due to their financial inability to transport oranges directly to the markets. Secondly, farmers lack self confidence and believe that they cannot sale oranges in urban markets as a result of poor marketing knowledge.

Very often farmers rely on brokers, who have a wide market networks. There are two levels of middlemen (brokers): brokers are based in the villages and most of these are found in Muheza town. Accordingly farmers were found not to be making attractive profit because they cannot sell directly to the markets.

4.4.1.1 Selling through spot market

Spot markets[33] constitute "default" marketing options for many farmers. As Derek *et al.,(2008)*; and Derek *et al.,* 2007; Fafchamps (2004) ague, "spot markets play a paramount role in Sub-Sahara African Countries, arguably more so than in developed countries" This is because there are usually many middlemen and most transactions are very small. The common practice in a pure spot market is for the trader to contact the farmer (or vice versa), inspect her fruits, negotiate the price, seal the deal, pay and collect the products, and all of this is done within a few hours or less.

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[33] Spot market refers the place oranges are sold and being delivered immediately. Buyers are not interesting with product information. Product information including agricultural chemicals used in producing agricultural crops or information about the supply reliability is not relevant to buyer.

Findings from Table 13 show that 56.6% farmers sold their oranges through spot market arrangement. This is because of the existence of high monitoring and enforcement costs shown in orange contract farming and group marketing arrangements. As a result, farmers have not been enjoying the benefits of either being a member of an organization or using a contract farming arrangement.

According to the model of managing transactions, a firm should choose efficient marketing arrangement that minimizes costs of exchanging goods and services for profit maximization (Milgrom and Robert, 1992). Thus, about 56.6% of the interviewed farmers decide to sell oranges through spot market approach for reducing exchanging costs in orange markets as indicated in Table 13. In practice, farmers sell the produce to traders because they (traders) either offer higher prices or because the sale is done rather quickly.

Table 13:   Distribution of respondents through Spot Market Transaction

Organization in orange production and marketing	Percent of respondents (n=152)
Selling through spot market arrangement	56.6
Non-spot market arrangement	43.4

Despite selling oranges on spot markets, farmers still incur high transaction costs especially information costs. This is because farmers were found to be selling oranges without having adequate information on the existing prices in markets. Lacking price information could reduce confidence in bargaining for high prices and get high orange income to rural farmers.[34] In this regard, asymmetry information suppresses farmers to lucrative market participation (Derek *et al.*, 2010). Since traders are not ready to share

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[34] Since the nature of spot market arrangement is for farmer to search a buyer of oranges, bargain price, close the deal as agreed and deliver oranges to the buyer immediately.

market information with farmers. Some traders take advantage of informational asymmetry existing between themselves and farmers.

Indeed, traders can have this information but they may decide either not to share it with farmers or provide farmers with wrong information so that traders can have the powers and monopoly of information possession to maximize profit. Thus, traders operating in the rural areas declare lower prices than those operating in town markets. During the field survey, some farmers were found having mobile phones; but surprisingly, the mobile phones have not solved the problem of having information asymmetry. This is because farmers rely on traders for obtaining price information. Consequently, farmers still continue to incur high transaction costs and receive low prices and low income from orange sells and ultimately continue to remain in income poverty.

Therefore, institutional arrangements especially on marketing arrangements (e.g. contractual arrangement and farmers' cooperation) are very important not only in overcoming problem of market uncertainty and information asymmetry, but also in ensuring that poor smallholder farmers also participate to lucrative markets (Derek *et al.*, 2008) as explained in the next section.

4.4.1.2 Co-ordination through contractual arrangement system

The structure of market coordination of smallholder farmers like contract farming is conditioned by asset specificity and product characteristics, such as perishability of product (Chan, 2014). Similarly, contractual arrangement system in this study is also preferred because of financial constraints which often face smallholder orange farmers during off season. During harvest time, the study observed that many smallholder farmers fail to transport oranges to urban or central markets due to financial resource constraints.

In this view, contractual arrangement system is addressing problem of transaction costs and market constraints in cash crops both to farmers and traders (Key and Runsten, 1999; Kirsten and Sartorius, 2002). On other hand, contractual arrangement system is also preferred by Kenyan traders for ensuring orange supply reliability as well as avoiding competition Tanzanian traders.

In this study, contractual arrangement system is one of the market coordination mechanisms used by most of smallholder orange farmers to link with orange traders at low costs and to increase incomes[35]. High transaction costs create need for contractual farming to minimize transaction costs (Hobbs and Young, 2001). In this study, among the transaction costs smallholder orange farmers complained about as being exorbitant was transport costs and post harvest losses. According to Dorward *et al.*, (2008), if these transaction costs are very high, it reduces quantity of orange supply to consumers hence the higher the likelihood of transaction failure to occur. For example, 43.4% of interviewed orange farmers enter into contract farming[36] under *"orange supply agreement"* as shown in Table 14.

The weakness of this mechanism is that, contracts are signed during flowering or a premature stage and exchange price is fixed on signing contract. Furthermore, contracts are not supported by properly drafted legal documents. Such contracts often lack transparency. As Hobbs and Young, (2001) note that lack of transparency in the contracts is another potential concern, especially on how many quantities of oranges are required by traders; and this results to farmers being unfairly treated by traders[37].

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[35] Singh (2002) also notes that contract farming leads to increase in incomes in agricultural areas.

[36] Kirsten and Sartorious (2002) argue that contract farming can become an important institution for empowering poor smallholder farmers in developing countries and can improve their access to technology and high-value markets.

[37] Traders opt for contract farming because for reducing product supply uncertainties (Kirsten *et al.*, 2008).

Higher transaction costs are also incurred in situations of uncertainties (Hobbs and Young, 2001). For example during the field survey, the researcher found out that the traders deliberately harvest oranges in excess of the agreed amount forcing farmers into market uncertainties. Traders do this with the expectation of buying extra oranges at lower prices since farmers would be unable to store the produce until another buyer shows up. This is done more often during peak seasons. The biggest disadvantage of this practice is that farmers obtain low prices, which affect orange incomes. Table 14 shows forms of contractual arrangement used by farmers in Muheza District:

Table 14: Distribution of Orange Farmers and Forms of Contractual Arrangement

Forms of contract	Percentage of respondents (n=152)
Written contract without legal expert assistance	27.6
Verbal contract without legal expert assistance	15.8
None involved into contractual arrangement	56.6

Table 14 indicates that about 27.6% farmers signed written contracts without legal assistance, followed by 15.8% who entered into verbal agreements while about 23.7% determined future prices before signing contract, and while orange fruits were still immature.

In the study, trust and brokers' mediation were found to augment farmer-trader contract enforcement. Survey results showed further that legal means, reputation, harassment, clanship, ethnicity, and collective boycott are not widely used mechanisms of enforcing contracts. As a result, contract breaches by the parties involved in the contracts are a common phenomenon. However, any "losses and risks resulting from a breach of contract are also called *ex post* transaction costs" by Kirsten *et al.,* (2008). In view of the above,

smallholder orange farmers have been incurring more transaction costs in the study area as indicated in Box 1.

However, the prices are more uncertainties in orange sub-sector this is because the product quality can vary widely and the prices are tied to quality. See case 1 (in Box 1) of Mr. "X", which shows the degree to which contract arrangement can cause financial harm to orange farmers in many rural areas.

Box 1: Challenge of Orange Supply Agreement System

Mr. "X" is a smallholder orange farmer in Kwa-Mingoji Village; the village which is located in Misozwe ward, in Ngomeni Division of Muheza District. On 28th August, 2011, when I visited the area, Mr. "X" had 2.4ha planted with Early and Late Valencia orange varieties. And 0.6ha out of 2.4ha had already started to produce oranges in year 2010.

In November, 2009 Mr. "X" decided to enter into a contract with a trader while his oranges were still immature. The price of Tsh 15/= per orange was agreed upon and the trader was to pay Tsh 100 000 in advance before the signing of the contract. The harvesting time was also scheduled for July, 2010. Mr. "X" sold his oranges on the farm because he wanted money to send his children to school. In July, 2010 Mr "X" harvested 26 000 oranges whose value was 390 000 Tsh Then, the trader paid 290 000/= cash out of Tsh 390 000 after deducting Tsh 100,000 as down payment that was paid prior to the signing of the contract.

Further, Mr. "X" on behalf of his sister Miss "Y" sold 15 000 oranges to the same trader at Tsh 20/= on the same date. Mr. "X's" and his sister's ("Y") farms share a common border. Both farms were planted with Early Valencia type of oranges. "Y's" farm was only1.5 acres.

By selling her oranges out of contract at 20/= per orange, she earned Tsh 300 000 cash, out of 15 000 oranges. Therefore Miss "Y" earned more than her brother for not using contract arrangement.

Therefore, "X's" case shows that in fact contractual arrangements as this case shows were unfavourable to farmers. While a readymade market is assured, the contract price will most likely be lower than is the case with the open market price at harvest time.

Smallholder farmers have been entering into "orange supply agreement" before full maturity or while immature as an approach of risk mitigation. However, Box 1 shows that institutional arrangements may increase risks or shift risks to farmers who are less able to manage them. However, price uncertainty arises in a dynamic world if the prices are related to quality (Bailey and Hunnicut, 2012). At this transaction level, the farmer cannot

be sure of the prices loss in the future because of not knowing in advance of what will be the quality of the oranges thus leaving the farmer in uncertain situation and the risks of sustaining losses. Below is another case of Mr. "Z" showing how poor contract arrangements normally affect farmers' income.

Box 2: Implications of Breach of Orange Supply Agreements

Mr. "Z" is a smallholder orange farmer in Kwa-Lubuji village, at Kicheba Ward, located in Ngomeni Division of Muheza District. Mr. "Z" was 58 years old at the time of the field work. He had a 1.4ha orange farm. The main oranges grown were Early and Late Valencia cultivars. Mr. "Z" and his wife had seven children, two of whom were in secondary school.

Early 2010, Mr. "Z" had financial constraints. He then decided to look for money amounting to Tsh 500 000 to send his children to school. So, he decided to use his farm to get such amount of money. He signed the contract while the oranges were at pre-maturity stage. The following agreements were agreed in the contract:
1. Orange will be sold at a price of Tsh 11 per orange,
2. The orange trader (buyer) shall make advance payment of Tsh 500 000 on signing of the contract,
3. The farmer was obliged to clean the farm and safeguarding the oranges. But he was prohibited to harvest oranges without the trader's consent.
4. Once oranges mature, the farmer should inform the trader immediately before the oranges are attacked by *"Bactroceras dorsalis flies"* or falling down or/ picked by tress passers or both.

After the oranges matured, in June, 2010, Mr. "Z" (orange farmer) notified the trader to come and pick his oranges. Unfortunately, without any genuine reason, the trader did not turn up early because during that time he was waiting for the oranges to become scarce in the markets expecting to get relatively high market price that can give him profit.

When the trader finally turned up to harvest the oranges he found out that many of the oranges had already been attacked by "Bactoceras dorsalis flies", others had over-ripen and hence had fallen down and continued decaying on the ground.

At the end, the trader harvested 200 000 oranges. Among the oranges harvested, some had already gone bad. Only 30 000 out of 200 000 oranges harvested were good while 170 000 oranges were not good for consumption and left at the farmers' farm to continue rotting.

According to the contract, Mr. "Z" was supposed to be paid (200 000 x 11/=) Tsh 2 200 000. Mr. "Z" had already been paid an advance amount of Tsh 500 000 which is higher than the value of 30 000 oranges, (30 000 x 11/=) Tsh 330 000. Consequently Mr. "Z" ended up getting Tsh 170 000, which they agreed would be paid in the next agricultural season. Mr. "Z" suffered a total loss of (170 000 oranges x 11/=), Tsh 1 870 000. This shows that the contract entered was in reality not enforceable when there is a breach by either party. While in reality, there was no breach of contract on the part of the farmer. The farmer could have sought for legal recourse.

The results from box 2 show that farmers still face difficulties in accessing markets to sell their fruits profitably. Also delays in selling the produce at the right time compromise the quality of the produce. Other problems linked to contract business include low prices making most of the contract becoming ineffective. As Derek *et al.* (2008) argue, in order for contract farming to work, or at least to work efficiently and somewhat equitably, the institutional environment becomes important. To resolve this problem, some farmers therefore form orange farmers' organization and work collectively to reduce marketing inefficiencies or failures.

In view of the above, it appears that most of contract arrangements in Muheza district exploit orange farmers. As it was observed, the common practice is for traders to estimate the purchasing prices on the basis of blossoms or unripe oranges and pay the farmer 25% of the purchase price upfront at a price of Tsh 1/= per blossom, compared to TSH 20/= per ripen orange. This trading system is referred to forward selling. On the other hand, this trading system is also referred to in Kiswahili as *"Kinvekeza"* System.

Under this transaction system farmers bear most of the risks caused by uncertainty of transactions. Farmers face additional uncertainty in finding a buyer particularly with similar interests. This situation is problematic in the orange sub-sector. Market uncertainties increase the costs for searching information among farmers; as a result of this, around 56.6% of the interviewed farmers decided to join producers' organizations as explained in the next sub-section.

4.4.1.3 Co-ordination through farmers' organizations

Arguably, it is possible to reduce farmers' transaction costs in negotiating with suitable agricultural commodity buyers using farmers' organization system (Dick *et al.*, 2008). In

the study, four farmer cooperatives were found to have been registered in Muheza district, and these are Tanga Association of Best Orange Growers (TABOGO), Kilongo Farmers Association (KIFAA), Bonde Orange Farmers Co-operative (BOFACO's), and Kwa-Fungo Farmers Associations (KWAFAA). However, during questionnaire interview administering, it was revealed that performance of these organizations was poor. This is because the farmer cooperatives failed to co-ordinate and monitor their members' contracts collectively as well as coordinating group marketing for their members.

Due to these weaknesses, farmers were reported not to be enjoying the benefits of collective actions. These benefits would include obtaining better market prices, sharing market information, sharing transport costs, having access to supportive services such as agricultural credit facilities and extension services. However, these findings above are in contrast with the findings reported in a study by Mdoe and Mutabazi (2003), which showed that marketing through farmers' cooperatives, had a positive significant influence on profitability.

The rationale of group marketing is that members may manage risks and lower costs of transacting through risk pooling and costs sharing among smallholder orange farmers (Karaan, 2008). Group marketing reduces transport costs and increase the profit margins significantly; especially on the grounds that, (Hobbs, 1997) distant marketing is associated with high marketing costs and risks of losses due to quality deterioration and hence lowering orange farmer income.

Furthermore, overall 108 (71%) orange farmers interviewed were operating individually (Table 15). This implies that a large group of farmers were not in any joint operations and were thereby losing the benefits of operating under farmers' organizations. Such farmers'

organization ought to search for the best and reliable markets for their members, provide training on the best orange farming practices, link members with other stakeholders, price market information disseminate, promote collective actions, and initiate and promote orchards for the best orange seeds. However, about 44 (28%) farmers who joined farmers' organizations, reported not to have attained the benefits (aforementioned) of joining such organizations.

Table 15: Membership of Farmers to Farmer Organizations by Ward

Wards	Membership to organization		Non-membership to organizations	
	Yes	Percentage of respondents (%) (n=44)	No	Percentage of respondents (%) (n=108)
Misozwe	7	26.90	19	73.10
Mtindiro	11	23.40	36	76.60
Muhamba	4	44.44	5	55.56
Bwembela	4	14.81	24	85.19
Mkuzi	7	25.93	20	74.07

In other cases farmers enjoyed some benefits of joining farmers' association; for example, Kwa-bada and Mtindiro villages, it was observed that bulking produce, contacting buyers, negotiating price and other delivery conditions, organizing payment, and enforcing contracts were mostly achieved. This achievement is the efforts of farmers' association in improving orange production and marketing for members.

In Kwa-bada village, farmers were not selling oranges outside the limits of their common agreement; one such common agreement was not to sell oranges in informal contract arrangement system. In addition, the cooperative managed to establish orchards for the best orange seedlings production. This is done under "Maduma Seedlings Production

Association (MSPA)"; in Kiswahili is known as *"Umoja wa Wakulima wa Miche ya Matunda Maduma" (UWMMM)*. As noted by Karaan, 2008) effective collectiveness of poor farmers in product marketing is considered to reduce transaction costs compared with individual farmers who are working out of group marketing. However, such factors as risk, asset specificity, information asymmetry, and opportunism tend to favor farmers who are marketing products collectively.

However, one of the problems of operating outside farmers' co-operative is lack of market power. This creates uncertainty and risk of losses to individual farmer because of increasing possibility of facing transaction constraints. Consequently, farmers will continue to incur high transaction costs and receive low prices and low income from orange sells and ultimately continue to remain in income poverty. The consequence of poor marketing co-ordination among smallholder orange farmers is shown in Plate 4 below:

Plate 4: Unsold oranges left at the farm to rot, August, 2010

Plate 4 shows the problem of orange sorting[38] how it affects orange supply in the study area. Despite a great deal of sorting, oranges can still go bad due to being a perishable crop and reduce orange supply hence affect orange incomes. As Dick *et al.* (2008) confirms, perishable creates uncertainty for the buyer (traders) with respect to product quality and quantity of product supply. In the research area, this implies that traders incur more sorting costs to reduce risks of losses from picking damaged oranges.

As of the weaknesses of institutional arrangements, traders in the area of study have been picking oranges haphazardly and in excess of what they actually require and select very few oranges and leave many oranges rotting on the floor, and thus reducing orange income and increase income poverty among orange farmers in the study area due to weaknesses of terms and conditions on the part of contract signed. Thus, weaknesses in enforcement of the rules weakens farmers' confidence in the institution, and breaking this vicious cycle requires effective delivery of rules for actor breaches contract, without which it may be difficult to enforce remedy (Ainembabazi, 2009).

Moreover, some of the farmers visited reported that the services provided by their farmers' cooperatives were not suitable because farmers could still not receive better prices, incurred high transaction costs in terms of price market information and transport costs. The services provided by the farmers' cooperatives are indicated in Table 16.

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[38] In this view, transaction costs may have increased because of uncertainty stemming from regulations governing orange selling.

Table 16: Types of Services Provided by Farmers' Cooperatives

Type of services	Percentage of respondents (%) (n=152)
Finance (credit facilities)	32
Extension services (production training)	20
Both finance and extension services	48

Table 16 indicates that visited farmers, were receiving the services provided by farmers' cooperatives. The types of services provided were as follows: finance and extension services (reported by 48% of the respondents interviewed), followed by credit facilities (32%) and the least reported service was extension services (reported by 20% of the respondents interviewed).

This implies that the roles of farmers' organizations in Muheza district are very limited, despite North's (1990) arguments that coordinated action by farmers' organization essentially serves to reduce problems of information asymmetry and transportation costs and hence creating opportunities for smallholder farmers to access profitable markets. Hamilton (1995) argues that commodity groups can play a key role in the development of fair contract terms. The involvement of farmers' organizations is also likely to generate greater "sell-out" on the part of farmers faced with option of joining a closely coordinated supply chain by producing under contract for a specific investor.

In this study, especially during questionnaire interview administering, farmers reported that the organizations were not delivering critical services such as a search for better market prices, dissemination of market information, bringing orange farmers together, especially small holder orange farmers for buying orange production inputs (e.g. pesticide) collectively, and organizing transportation services collectively for town market trips. In this respect, it can be concluded that poor service delivery by orange farmers' organization

in the study area is one of the factors which influence high transaction costs incurred among smallholder farmers and hence affect orange income.

4.5 Assessment of Transaction Costs Influencing Income of Oranges of Smallholder Farmers

Transaction costs are incurred to reduce the risks parties may face as a result of doing business or product supply of off-farm gate (Dorward *et al.*, 2008). In this notion, the study agrees with the transaction costs theory that, no commercial exchange can be carried out without incurring marketing costs (Coase, 1937). Unlike physical production cost, transaction costs are often not easy to separate from other managerial costs (Hobbs, 1997). The complex nature of economic institutions means that the costs of their operations are not easy to quantify. Thus, there are tangible costs (i.e. transport costs) and intangible costs[39] (i.e. the cost of searching price information, the cost of searching orange trader to exchange, price negotiation costs, and agreement monitoring and enforcement costs). These ex-ante and ex-post costs associated with transaction costs among smallholder orange farmers are described hereunder:

In view of the above, searching of traders represents ex-ante costs orange farmers have been incurring in the research area as part of transaction costs. Normally, farmers search for orange buyers through brokers. As noted during the questionnaire interview administered, farmers have been searching for trustworthy traders. However, during the field survey, about 56.6% of the interviewed farmers had no market information particularly on prices available at the markets prior to the start of price negotiation (See Table 19), and opportunistic traders were not ready to share price information with

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[39] According to Hobbs and Young (2001), information, negotiation, monitoring, and enforcement costs arise in any economic transaction.

farmers. This is because the traders behave opportunistically to maximize profits after knowing that farmers have no adequate price information to be able to bargain for high prices (Kirsten *et al.,* 2008). Therefore, lacking adequate market information among orange farmers was among the factors restricting farmers from bargaining higher prices in the study area.

In the study area, famers have been facing uncertainty and risks of doing business because of asymmetry information face smallholder farmers. This is confirmed by Dorward *et al.,* (2008), that crop buyers can give farmers poor prices for their produce under the pretext that central market prices are very low, when this is not the case. As a result, farmers get low prices and hence lower orange farmer income.

Searching for price information is another ex-ante cost to orange farmers. In this study area, the orange sub-sector is characterized by imperfect pricing system. Thus, farmers were found to search for price information from middlemen. The price information flows back-ward. Rural farmers get price information from brokers or traders. However, the study found out that there was lack of price information transparence between farmers and middlepersons. This is because there have been unscrupulous traders who have been using lack of price information among farmers as a business opportunity for them to exploit farmers by setting low prices. Thus, lack of transparency in price information is among the impediments in the agricultural marketing crops (Emana and Gebremedhin, 2007) in the study area.

As a result of lack of transparency in price information, farmer bargain for higher price due to lack of adequate price information at the market. Thus, farmers incur more search costs to reduce market risk, which are created by opportunistic orange traders. As reported

in earlier, studies have shown that some types of contract farming are unprofitable to farmers as a result of opportunistic behavior of traders (Glove and Kusterer, 1990; Little and Watts, 1994).

In the orange sub-sector, the risk of opportunistic behavior increases monitoring and enforcement costs to smallholder orange farmers. In this respect, unforeseen risks and losses borne by lack of price information seems to be very high to rural orange farmers. Kirsten *et al.* (2008) consider losses and risks as an outcome of high transaction costs.

Monitoring contract agreements: After signing the contract, the third transaction cost to orange farmer is monitoring the terms and conditions to make sure that traders fulfill them accordingly. During the interview with farmers, the researcher observed that about 43.4% of the interviewed orange farmers had entered into market provision type of contract farming arrangement (See Table 14). This is because the role of farmers was to take-care of the safety and security of oranges at the farm until they mature and get ready for harvest. During this time of waiting before full maturity, normally traders do not have frequent communication with farmers. The farmers and traders meet during harvesting time. Majority of contracts had a clause requiring farmers to call back the trader for orange picking at the harvest stage.

In the study area, monitoring costs are very high during the orange counting phase. During questionnaire interview, farmers reported that during the counting process, for instance, when the enumerator reaches *"tisini"* (ninety) oranges, he shouts loudly *"sitini"* (sixty), which is not correct. The procedure is that, two or more enumerators are hired to undertake orange counting process simultaneously (Plate 1). As a result, monitoring cost by a farmer is very high during orange counting process. As stated earlier normally,

unscrupulous traders collude with enumerators to cheat on the number of the oranges. Traders usually compel farmers to permit the use of two or more orange enumerators simultaneously as the intention is to cheat. This becomes a particularly serious problem to illiterate farmers. Therefore, as stated earlier, monitoring costs tend to be very high to orange farmers during the harvest period due to moral hazard[40] caused by opportunistic behavior of traders wanting to maximize profit through cheating.

Enforcement of agreement is one of the ex-post costs incurred by orange farmers in the study area. After oranges have matured in the orange sub-sector, frequent follow-up (using physical visiting or phone calls) was the quickest enforcement measure which was seen to be applied by orange farmers interviewed in the study area. The enforcement cost is referred to as *"usumbufu"* (inconveniences) in making "follow-up" or "claim to the court" by orange farmers (See Box 4). During the interview, farmers complained about persistence malpractices carried out by orange investors (traders) especially on delaying to harvest oranges, inappropriateness in orange harvesting, and extraneous orange selection leaving oranges picked to rot on the farms (see Box 3 and Plate 4).

As stated earlier, during the field survey the researcher observed a good number of oranges left to rot on the farms (see Plate 4). Interestingly, farmers have no right to harvest or pick up oranges even though they are about to rot at the farm level without the buyer's (contractor's) consent. Worst still, during the period of waiting for traders to arrive and pick up the oranges, more oranges will have dropped on the ground have started rotting; and this amounts to a loss to the farmers. Interestingly, majority of farmers had not sought for legal recourse as there were no breaches of contract on the part of traders.

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[40] According to Kirsten *et al.*, (2008) moral hazard refers risk or losses that results from a change in conduct caused by an expectation of gain (compensation) for a negative outcome.

This implies that majority of such contracts are based on "trust relationship" between the farmer and the trader because terms and conditions on the contract are silent to both farmer and traders. According to Ainembabazi (2009), one of the characteristics of contract based on "trust relationship" is that they are difficult to effectively enforce bylaws because are dominated by terms and conditions which are not clear for enforce remed to farmers. These circumstances perpetuate non-compliance. Thus, only farmers are the main victims. Thus, Temu's (2008) argued that "market arrangements may rise increase risks for all market participants or shift risks to participants who are less able to manage them".

The tendency of shifting risks to farmers is common in the study area regardless if farmers are members of farmers' organization or not. Thus, it becomes very hard for the farmer to take relational contract to the court of law to seek legal remedy from the traders. Relational contracts are often supported by numerous unwritten rules, unspoken incentives, and unstated expectations which make it difficult to understand the important aspects of the contracting environment (Wu, 2005). Thus, contract farming has been directly or indirectly harming smallholder orange farmers in the orange sub-sector. Relational contract farming leaves farmers at a high risk on the hands of unscrupulous traders (contractor).

The study therefore concluded that transaction costs have increased because of poor marketing coordination among smallholder orange farmers and lack of necessary institutional support for least-cost information sharing, monitoring, negotiation and enforcement for rural farmers in the study area.

4.6 Constraints Affecting Income of Smallholder Orange Farmers

The study assessed constraints affecting the income of smallholder farmers from orange production in Muheza district. Table 17 shows a summary of constraints affecting income of smallholder farmers from orange production in Muheza District. During the interview, orange farmers mentioned the constraints affecting income among smallholder orange farmers; these are categorized into two groups, namely production constraints and market constraints as shown in Table 17:

Table 17: Constraints Affecting Income of Smallholder Farmers in the Orange Sub-sector

Major orange income constraints	Specific constraints affecting income of farmers
Production constraints	Poor orange inputs and seedlings access, poor farming practices, shortages of rainfall, problem of theft.
Marketing institution constraints	Lack of appropriate orange storage facilities, poor rural road networks, lack of small orange processing factories, poor orange price earned by farmers, lack of adequate market information access, poor orange quality and standards produce, unfavourable orange selection done by traders

4.6.1 Production constraints

According to Palmer (2006), low income is partly influenced by production constraints. In this respect, there is need to assess production constraints in this study. Orange production constraints relate to the availability and affordability of key orange inputs and seedlings. From the visited farmers, the following specific production constraints were found to undermine orange income in the study area:

4.6.1.1 Poor inputs and orange seedlings application

The study revealed that the adoption of improved orange inputs and seedlings for enhancing orange productivity (yields) is one of the serious constraints influencing income poverty in the study area. This practice seems to lead to low farm yields and lower orange income among orange farmers in the study area. Similar finding is reported by Kilima *et al.* (2010) that increase in income is partly influenced by the adoption of improved inputs and seedlings, which resulted into increased production (yields) and sales of agricultural products.

The Adoption of improve agricultural inputs and seedlings are the main drivers of enhancing productivity (yields) in agriculture (URT, 2005). Such agricultural inputs include pesticides and fertilizers. For example, the study observed that lack of use of pesticides increases orange diseases and hence increases losses among smallholder orange farmers in the study area. Visited farmers reported of there being flies attacking oranges during the early ripening stages, making the orange fruit change its colour before normal ripening time leading to spoilage which make farmers sustain big losses. In view of this fact, most of the smallholder orange farmers failed to adopt improved orange inputs and orange seedlings for enhancing orange productivity due to financial problems.

As noted in the MUVI report (2012), about 32 000 out of 79 830 tons of oranges produced in the entire district especially in the agricultural year 2010 were spoilt because of orange flies known as "*Bactocera dorsalis*[41]". Furthermore, about 40% of oranges produced in Muheza District are estimated to be damaged with pests and diseases (*Mwananchi* 16th February, 2012). In view of the above situation, pests were found to be a very serious

[41]According to European Plant Protection Organisation (EPPO), *Bactocera-dorsalis* is a new fruits fly species which was discovered in 2003 in Sri lanka. And later the fly was found in Tanzania mostly in the tropical zone where fruits are grown.

production constraint that affects orange income in the study area. Plates 5 and 6 show
Bactocera dorsalis fly and a damaged orange respectively.
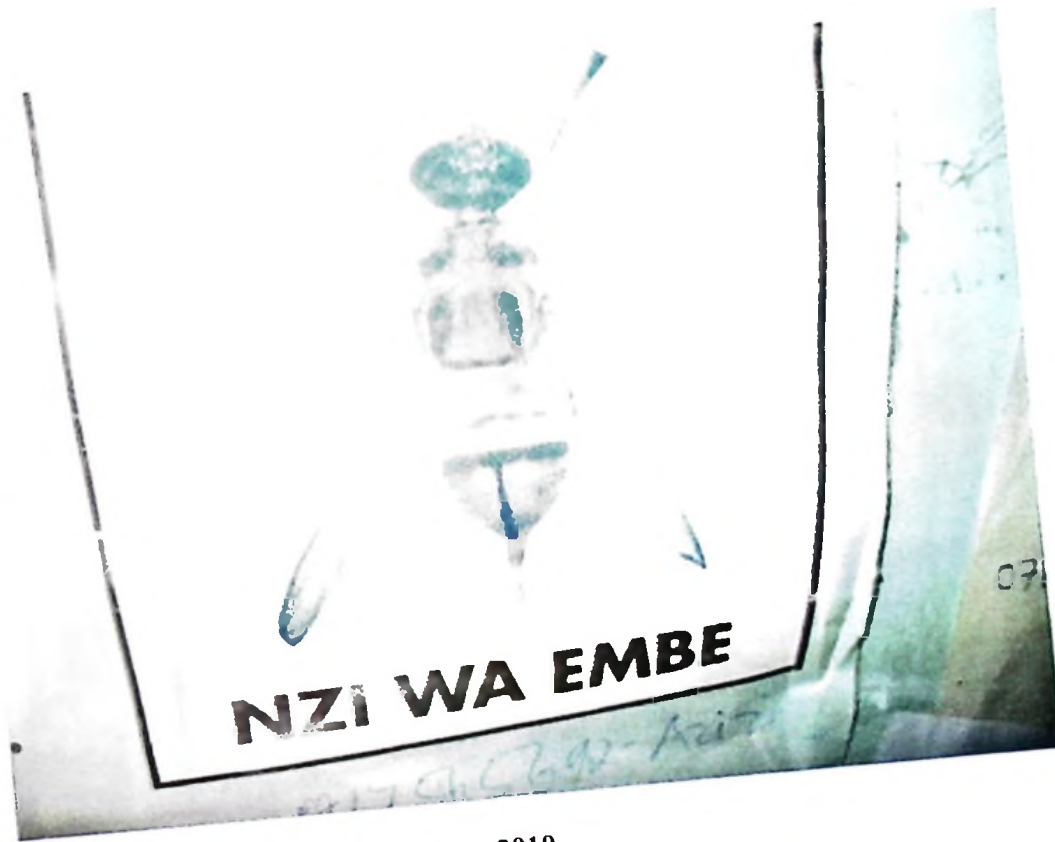
Plate 5: Bactrocera dorsalis, August, 2010

Plate 6: Damaged Orange, August, 2010

Therefore, incidences of pests as well as diseases have been leading to low yields and lower incomes among orange farmers.

4.6.1.2 Poor farming practices

During field survey, the researcher observed tall grasses which grew on the orange farms thus inhibiting orange trees from producing adequate and better quality oranges. Lack of pruning and weeding is another factor which lowers orange productivity and reduces orange income among smallholder orange farmers. In practice, frequent farm cleaning, pruning and weeding are recommended.

According to Mbwana[42] (2010), the recommended number of orange trees at the farm is 84 per acre, pin a space of 7 x 7 metres, 2 trees. However, majority of farmers interviewed were found to have planted less orange trees than the recommended population above. For example, most farmers interviewed reported to have planted less than 70 trees per acre. Moreover, most of these planted in a space of 6 x 6 metres against the recommended spacing of 7 x 7 metres. Consequently, in the year under study 2010, orange productivity dropped from 50 000 oranges (which is the expected standard orange production per acre) to between 25 000 and 30 000 oranges. According to URT (1993), increased orange production is likely to come from improved husbandry practices and intensification of production to attain higher yields and in turn higher income.

4.6.1.3 Shortage of rainfall

Based on the institutional analysis and development (IAD) framework, that rainfall is a crucial determinant of agricultural crop production (Kristen *et al.,* 2008); the more favorable the conditions are the higher the possibility for the orange production growth and income poverty reduction, *ceteris puribus*. An increase of orange production reduces income poverty through direct effects on farm productivity and incomes (Kirsten *et al.,* 2008; Adeoti and Sinh, 2009; Bezemmer, and Headey, 2008; Byerlee *et al.,* 2005; Popli, 2010; Thirtle *et al.,* 2001; Valenzuela *et al.,* 2005).

During the field survey, shortage of rainfall mentioned as a major problem inhibiting orange production in the study area. Some of the orange trees were found to have wilted and others were found to have shed their leaves because of drought caused by shortage of rainfall. In turn, shortage of rainfall makes orange farmers produce unattractive and small

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[42] Naida Mbwana Personal Communication (2010): This is district horticultural Expert in Muheza District.

sized oranges (Plate 7), which have severe   consequences to orange production and ultimately affect orange income.

Plate 7: Oranges on the Tree Shrinking due to Drought (Shortage of Rainfall) in one of the Orange Farms visited in Mindu Village, August, 2010.

Indeed, according to Chang and Petersen (2003), orange trees require water at different stages of growth in order to achieve good quality fruits and yields. These stages include flowering, fruit set, new flush development period, fruit development period, and after harvesting period. In this view, rainfall seems to influence orange production in the study area.

4.6.1.4 Problem of theft

Most of the interviewed farmers in this study were complaining about theft of oranges carried out by trespassers on their farms. Orange theft reduces orange income among

smallholder orange farmers. Theft is a frequent problem with the farms located in the remote areas and with less or no proper supervision.

Also theft was reported to be a serious problem during orange counting process. There is no transparency during orange counting process between trader and farmer. Lack of transparency during product counting process increases high monitoring and enforcement costs (Hobbs, 2007) among smallholder orange farmers. These transaction costs are incurred to reduce the risks associated with orange theft. Farmers do not do the counting themselves, orange traders hire other people to do the counting on their behalf as shown in Plate 1.

4.6.2 Market institution constraints

According to Agricultural Marketing Policy of 2008, investments in rural infrastructures, particularly rural roads, water supply, transportation, processing facilities, communications, electrification, and crops markets are critical in stimulating increased agricultural production, marketing, and income opportunities. However, despite the implementation of agricultural marketing liberalization policy, certain barriers with regards to access to profitable market were found to be constraining income generation among smallholder orange farmers in the study area. One the most important obstacles to the profitable market access in Muheza district include poor rural road networks, lack of storage facilities, and lack of processing facilities in the orange production areas (both are physical marketing infrastructures); lower prices received by farmers, poor market information access, poor orange quality and standards, and poor orange selected by traders. Each of these aspects is elaborated below.

4.6.2.1 Lack of appropriate orange storage facilities

During field survey, the study found that orange farmers are constrained with lack of storage facilities for mature oranges, and which are highly perishable. As a result oranges were getting spoilt after ripening. In another study, Malcolm (2010) also found out that storage facilities were not available in the study area. Storage of fresh oranges could add value to oranges because farmers could be able to supply orange throughout the year and getting high prices especially when oranges are scarce in the market.

The problem is still compounded by the fact that traders prolong harvesting or collecting time; in this case, farmers suffer losses from damaged oranges caused by lack of storage facilities. In this respect, URT: Research Report (1993) recommends for the building of cold room or any other appropriate storage facilities for reducing post harvest losses and increasing high orange income. Lack of appropriate orange storage facilities in the study area limit orange farmers from going into long price negotiation for better prices. This problem is severe for farms located in the remotest parts of Muheza district.

Similar situation also exists in urban markets; many orange end up going bad due to lack of appropriate storage facilities in the markets. For example during the survey, in one of the famous fruit markets in Dar-Es-salaam, Tandale Market in Kinondoni the researcher observed garbage collection trucks parked near the market and rotten orange fruits were being loaded onto the trucks. The researcher also observed orange fruit traders in the same market complaining about sustaining losses in terms of buying and selling fruits some of which end up in the dumps.

4.6.2.2 Poor rural road networks access

During the field survey, most of the farms were found located in the remote areas where feeder road networks were poor. According to Kirsten *et al.* (2008); Lyne (2002), poor rural road networks increase transaction costs to both traders and farmers. In the study area, poor feeder road networks increase time and inflating cost of transport and compelling famers to sell the oranges at the farm gate and thereby getting low prices. However, smallholder orange farmers who are located closer to the main roads or markets had better chances of negotiation price as opposed to farmers located in the rural remote areas.

Similar findings were reported in studies by URT (2009); ECI (2003); and Lyne (2002), who observed that farmers who are very close to tarmac roads often get better deals from traders. Thus, the URT: Research Report (1993) recommends for improved rural-urban feeder roads network as a pre-requisite for further improvement in horticulture production and marketing. This is because poor rural-urban feeder roads network often restrict poor smallholder farmers from participating in lucrative markets[43]. These findings confirm what Josephat, *et al.* (2006) observe, that Tanzanian smallholder farmers in the remote areas are mostly poor because of high transportation costs resulting from bad rural–urban road network.

According to TCEs, close proximity to good roads and urban markets reduce transaction costs (e.g. costs related with transportation, price information searching, and costs of searching traders for exchange oranges) and consequently improve farmers' income from oranges. The study also observed that farmers who are far from urban markets face high marketing costs. Such costs are related to searching for traders and price information for marketing their produce.

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[43] Thus, oranges are sold at farm gate and making farmers obtain low prices.

4.6.2.3 Lack of small orange processing factories in Muheza district

During the field survey, most of the oranges which were found to have been discarded were rotting on the farms. According to MUVI Report (2010), an average, three-quarter of the total orange produce each year in Muheza district have been decaying before reaching in markets. Similarly, lack of adequate processing capacity for horticultural crops is one of the problem facing producers in Tanzania (URT: Research Report, 2010). There was no even a single orange processing factory in the district during field work, despite the fact that Muheza District is known for its booming orange and tangerine fruits cultivation in Tanzania, and there a serious problem of post-harvest losses in the study area. Processing of these fruits would have provided greater incentives to farmers to increase orange production and thereby resulting in higher incomes among smallholder orange framers. However, this study has an opinion that the level citrus production in Muheza district is not large enough to sustain large processing plant. Citrus production level in Muheza seems can sustain small processing factories. However, it needs further research for justification.

Currently, as many fruits are rotting at the farm gate and in the markets, some businesspeople are busy importing fruits, juice and/ or juice concentrates substance for manufacturing juice. Importing of fruits reduces the demand of local oranges in our local processing industry and thus affecting the price of oranges from Muheza district. For example, Dar es Salaam markets are full of imported juice, much of which are from countries such as Dubai, Kenya, Zambia and South Africa.

The establishment of foods and vegetables processing factory (namely MUWAMU Enterprises) and Muheza Fruits canning Co. Ltd (MFCC) were expected to reduce the problem of unreliable markets for oranges. Also, farmers were expected to get higher

prices for oranges. These factories were expected to buy oranges in large quantities from orange farmers and at better prices; but these projects were not successful and the factories closed down. Farmers were seen selling unprocessed oranges at the lowest price and most of which are sold before ripening time. Indeed, the sales of unprocessed oranges connected farmers to low price markets as opposed to adding value[44] to their produce.

4.6.2.4 Poor price received

Based on the findings in Table 18, the interviewed orange farmers reported that the prices of orange in Muheza District are dictated by orange traders. As stated earlier, most of the smallholder orange farmers have no choice other than accepting the middlemen's offer because they cannot afford the cost of transporting their oranges to markets which offer good prices.

Table 18 Methods of Pricing Determination

Price determination/influence	Percentage of respondents (%) (n=32)
Orange farmers (sellers)	23.7
Orange traders (buyers)	43.4
Both negotiate	32.9

Table 18 shows that about 43.4% of the interviewed orange farmers said traders influence market prices, about 32.9% of the farmers said that market prices were determined by both parties (farmers and traders), and about 23.7% of the respondents said that orange farmers influence market prices. These findings imply that traders have market powers; this is because local traders have imposed entry barriers against outside traders. As a result,

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[44] Value addition is an important aspect in increasing the prices of the produce in the orange market chain. Value can be added in various forms; and one of them is improving the quality of the orange fruit through processing into juicy; another way is to sell oranges according to quality and size after sorting. Obviously, farmers who add value to their product, such a product stands a better chance of receiving higher selling price.

orange markets in Muheza district become less competitive and hence farmers get poor prices and thereby affecting orange income of orange farmers.

4.6.2.5 Lack of adequate market information access

The problem of poor market information access, which is associated with information asymmetry, often increases the costs of transacting products. For example during the field survey, the study observed farmers getting low prices due to lopsidedness of market information access system as indicated in Table 19. Table 19 presents information on respondents who access and those who do not access market information, and the methods used to collect such market information:

Table 19 Market Information Access Level and Collection Methods

Market information	Percentage of respondents (%) (n=152)
Market information	
Yes	43.4
Not	56.6
Methods used in collecting market information	**Percentage of respondents (%) (n=152)**
Direct visit to the markets	2.6
Cross check with fellow farmers	40.8
Frin extension officers	0.7
None	55.9

Table 19 shows that only about 43.4% of the farmers interviewed were directly accessing price market information and 56.6% were not accessing price market information directly. Famers who accessed price information reported to have been obtaining this information from their fellow farmers within their villages or from nearby villages. Among farmers who accessed market price information, 40.8% reported to have obtained the information from fellow farmers; 2.6% cited direct visit to the markets as a source of information, and 0.7% cited extension officers as a source of their market information.

These findings imply that a large group (55.9%) of farmers who do not have market information access directly from urban market are at risk of getting poor deals. This may influence opportunistic behavior among traders against farmers. During the interview, traders were reported to pledge prices based on farmers' understanding on market prices. Often, the traders have been acting opportunistically to maximize profits in the orange trade (Hobbs, 2007), because farmers have no sufficient market information which could enable them bargain for higher market prices.

4.6.2.6 Poor orange quality

The quality of a product is a critical factor in establishing a share in the world liberalized market (Shepherd and Farolfi, 1999). There is no consistency for a considerable amount of the oranges produced by the farmers in terms of quality. The main challenges faced by most farmers, especially in accessing international markets or Tanzanian supermarkets such as Shoprite or Imalaseko include low and inconsistent quality. Also, lack of processing plant for processing juice is a result of poor orange quality standards produced in Tanga region as a whole (Mwananchi, 31st January, 2015).

4.6.2.7 Poor orange selection/sorting done by traders

One of the orange income constraints is poor orange harvesting and selection carried out by traders. Inappropriate orange picking behaviour was found to be a common practice among orange traders. Traders just harvest oranges randomly without considering the client's demand. They harvest oranges either by shaking the orange tree or by hitting oranges with a piece of tree without spreading enough collection grasses under the trees; as a result, mature oranges are mixed with immature oranges. Traders were also found using sacks when carrying the oranges to the assembly points for sorting and packaging. After harvesting, traders would select oranges to be taken to the markets, leaving behind

some oranges on the farm grounds to rot. Careless harvesting of oranges would normally lead to poor selection of oranges. .

However, some traders train harvesters to deliberately become reckless in orange selection in some cases. This is especially done by traders with ill intentions of wanting to buy unselected oranges, at minimum prices though such oranges may have been in good condition. In this respect, traders increase orange income while reducing farmers' orange income.

Below is one of the cases where a smallholder farmer became a victim of poor oranges selection, a case of **Mr. "W":**

Box 3: Inappropriate Orange Harvesting Habit

Mr. "W" is a smallholder orange farmer. He was farming oranges as his primary economic activity in Mbwembela village at Bwembela Ward in Muheza district. He started orange farming in the year 1998. During this study, he had 1.5 acres planted with Nairobi and Early Valencia type of orange trees. In the year 2009, one acre started to produce oranges.

As usual, due to financial problems in 2009, Mr. "W" decided to enter into informal contract arrangement of selling oranges to a junior broker located in the same village. This agreement was done when oranges were at a immature stage. They both agreed that one orange would be sold at Tsh 11 and the trader would pay Tsh 50 000 in advance after the signing of the contract. The contract was written and signed without being notarized.

In July, 2010, the senior broker (investor) accompanied with his harvesters went to harvest the oranges. He picked and assembled 16 000 oranges and then left without carrying the oranges for 7 days because he had more than two places to visit. On his absence, Mr. "W" was forced to be a watchman until he came back because he was not paid. However, when he came back to collect his oranges he had a FUSO truck full of oranges, so he collected and paid for only 9 000 oranges, out of 16 000 oranges. 7 000 oranges were left down unpaid because of poor contract terms. Mr. "W" had nothing to do and he encountered a loss of 7 000 oranges.

Therefore, the senior broker (investor) paid (9 000 x 11/=) Tsh 49 000 after deducting down payment of 50 000 Tsh. For the 16 000 oranges he could have received Tsh 176 000.

Despite the fact that Mr. "W" was connected to the market, still the price he received did not favour him as a farmer. In spite of the fact that he received a total cash of Tsh 99 000, he sustained a loss of Tsh 77 000 as the result of 70 000 oranges were left down unpaid by a trader.

Box 3 shows a description of improper orange harvesting practice and unfavorable orange selection by traders. After harvesting, traders left the oranges at the farms for two or more days without taking them to the market. Since, farmers were unable to store the oranges thus many of them got spoilt as a result of late harvesting and collection.

In the study area, some traders were found to be engaged in more than one orange purchasing contract. This practice has severe consequences or risks of getting losses because such traders would normally harvest and collect oranges late. As stated earlier, such traders would harvest in the first contracted farm and then proceed to the next contracted farm; the oranges would have reached past prime stage before the traders come to the final contracted farm. Furthermore, after harvesting the oranges, they would go to the next farm, before collecting the oranges harvested in the previous farm. Thus, the oranges harvested earlier would usually be collected late and thus many oranges would be rendered unfit for sale and become rotting garbage. Consequently it reduces amount of orange supply by farmers and also reduces farmers' revenues from orange sales.

Post-harvest losses are associated as an outcome of high transaction costs reducing orange income in the study area. If these costs are very high, the likelihood of increasing market uncertainties to farmers also is high (Dorward *et al.,* 2005). In this study, farmers have been losing large percentage of orange farm income because of improper harvesting practices as shown in boxes 3 and 4.

Another similar case is that of Mr. "K" who got his right through the court as presented in box 4 hereunder:

Box 4: Contract Enforcement through the Court

On 28th August, 2011 the researcher interviewed a 68 years old Mr. "K", who had6 acres of oranges at Kivindo village in Lusanga Ward since 2004. Apart from being an orange farmer, Mr "K" is also a retired officer from Tanzania Peoples Defence Force. In his farm, he planted Early and Late Valencia.

In March, 2010 Mr. "K" entered into a contract with a junior broker/trader on behalf of a senior broker who lives in Muheza town, for the sales of oranges at a price of TSH 20/= per orange. Secondly, the broker was to harvest the oranges at only the required amount and not otherwise. They both agreed on the terms and conditions by signing a selling and buying contract.

After some time, the senior broker went to harvest the oranges, in which he hired three orange pickers. Orange pickers picked from the trees a total of 20 000 oranges four times over the required amount by the trader, which were 5 000 oranges. The trader was asked to pay for all 20 000 oranges by the farmer but he refused. Instead he paid Tsh 100 000 for 5 000 oranges and left 15 000 oranges at the farm gate decaying.

Eventually, Mr. "K" (farmer) sent the matter to the primary court and asked to be paid 15 000 oranges which were left on the farm. The court ordered the trader to pay Mr. "K" for his 15 000 oranges immediately. He was paid Tsh 300 000. If Mr. "K" had not taken the matter to the court, obviously he could have lost Tsh 300 000.

4.7 Assessment of Orange Marketing Performance of Actors in the Study Area

Marketing performance is measured by assessing profit margins (Fafchamps, 2004; Haji, 2008). If profit margins of actors are assessed using margins analysis approach (Cramers and Jensen, 1982), orange market performance of actors in the orange sub-sector was assessed using margins analysis as well. In this study, the study calculated operating/marketing variable costs prior to calculating actors' margins as described below:

4.7.1 Operating/marketing costs of each market actor in the orange value chain

It is the notion of this study that, marketing costs after liberalization may decrease because of increased competition as transaction costs may also increase stemming from the breakdown of institutions that guided exchange. In view of this, the study assessed operating costs incurred by actors determine who was cost efficient in the study area and why. The measurement criterion was that (Bailey and Hunnicut, 2002) the actor who had low operating costs was considered to perform better than others in term of operating efficiency.

4.7.1.1 Farm operating costs analysis

During field survey, almost all the farmers were not selling oranges directly to central markets. Instead, farmers approach traders especially if they have no money to support their families. This practice makes them sell oranges while still immature at the farm gate and farmers to incur intangible costs and risks of production and of getting orange buyers for orange purchasing as mentioned above. In this study, however, the researcher managed to capture the following operating costs as cited in Table 20.

Table 20: Costs of orange farmers (n=152)

Cost Item	Cost in Tsh	% of total cost
Harvesting/Picking (Tsh/orange)	0.01	0.6
Labout charges (Tsh/orange)	0.13	7.7
Transportation changes (Tsh/orange)	0.07	4.2
Loading and off-loading charges (Tsh/orange)	0.03	1.8
Pruning charges (Tsh/orange)	0.03	1.8
Weeding charges (Tsh/orange)	0.98	58.2

Source: Average figures computed from data provided by orange farmers, Muheza, 2010.

According to Table 20, about 58.2% of the total costs are spent in weeding activities, followed by 27.4% in pruning costs. Farmers spend low cost in harvesting activities amounting to 0.6% of the total costs incurred. Therefore, the total costs spent by farmers is Tsh 1.68/= per orange.

As stated above, farmers in this study were approached by traders when they had no money to support their families and this made them sell oranges when still immature. Therefore, most of the marketing costs were absorbed by traders. Such costs include harvesting, assembling, counting, and transporting to traders' truck; all such costs were paid for by orange traders, unless farmers attempted to sell oranges directly to centre or urban markets

4.7.1.2 Wholesalers: marketing costs analysis

The study assessed marketing costs of wholesalers in comparing marketing performance among the actors in the orange chain. Thus, Table 21 shows marketing costs incurred by wholesalers who buy oranges from Muheza district.

Table 21: **Marketing Costs of Wholesalers from Muheza District to Market Destination (n=31)**

Cost item	Muheza Cost in Tsh	DSM Cost in Tsh	Arusha Cost in Tsh	Nairobi Cost in Tsh
Buying price per orange	12	21.09	24.75	10.00
Harvesting/picking**	1.59	0.84	1.10	0.78
Counting	2.00	2.92	3.14	2.63
Loading	0.92	0.72	1.05	2.63
Off-loading	2.10	0.40	0.00	1.71
Village levy**	0.86	0.67	0.52	0.47
Market levy	0.80	0.46	0.40	0.31
Transport charges	0.87	12.42	11.55	0.00
General charges	0.00	0.11	0.06	0.00
Customs (Tsh 0.50, Kny 2.74)	0.00	0.00	0.00	3.24
Packing materials	0.00	0.00	0.00	0.56
Road levy	0.00	0.00	0.00	0.26
Driver and conductor	0.00	0.00	0.00	0.04

Note: ** These are costs incurred by traders in Muheza District prior to transport of oranges to the Dar es Salaam, or Arusha or Nairobi markets. Moreover, these costs are added-up with other variable marketing costs to obtain total marketing costs and divide by total orange traded for a particular market to obtain average marketing cost per fruit as mentioned above. Source: Average figures computed from data provided by orange wholesale traders from Muheza, DSM, Arusha, and Nairobi, 2010.

Table 21 shows that wholesalers in Muheza town market incurred the lowest total marketing cost per oranges at Tsh 21.14 per orange, followed by wholesalers from Dar-es-Salaam who incurred Tsh 39.63 per orange, wholesalers from Nairobi incurred Tsh 40.79 per orange, and wholesalers from Arusha incurred Tsh 42.57 per orange. Accordingly, the highest marketing costs were incurred by wholesalers from Arusha, followed by wholesalers from Nairobi, Dar-es-Salaam, and lastly Muheza.

As evidence shows wholesalers who are closer to the central markets have greater chances of incurring low marketing costs (URT Research report, 2009; Lyne, 2002; Kirsten *et al.*, 2008). Thus, higher marketing cost incurred by wholesalers from Arusha is a reflection of high transportation costs from Muheza to Arusha market.

4.7.1.3 Retailers: Marketing costs analysis

In this sub-section, the study assessed the retailer marketing costs and compared among market players. The assessment of market costs was done by calculating retail costs of each market where the respondents were interviewed. Table 22 shows a summary of retailers' marketing costs from various market areas where the respondents were interviewed.

Table 22: Retail Marketing Costs (n=31)

Cost item	Muheza Cost in Tsh	DSM Cost in Tsh	Arusha Cost in Tsh
Buying price (Tsh/orange)	47.03	73.96	56.4
Transport charges (Tsh/orange	11.11	0.00	0.00
Market levy (Tsh/orange)	0.44	3.67	0.00
General charges (Tsh/orange)	1.19	0.00	4.66

Source: Average figures computed from data provided by orange retail traders from Muheza, DSM, and Arusha, 2010.

The study analyzed each retail market to determine which retail market enjoys cost efficiency benefit in the study area. According to Table 22, the analysis shows that the lowest retail costs amounting to Tsh 59.77 per orange was found in Muheza market, followed by Tsh 61.06 per orange in Arusha market. The highest retail cost amounting to Tsh 77.63 per orange was found in Dar-es-Salaam market. Therefore, the implication is that retailers from Muheza are better off in terms of cost performance compared with retailers from the other three markets studied. On the other hand, retailers from Dar-es-

Salaam and Arusha were not doing so badly. However, a retailer has to pay wholesalers'

value addition made on oranges.

4.7.2 Average Marketing Price Spread to Each Market Actor

Table 23 shows the average market price received by each market player in the market

channels.

Table 23: Average Market Price Earned by Each Actor

Market channel levels	Average selling price (Tsh)	Price spread (Tshs)
Farmer price at farm gate (Tsh/orange)	20	20
Wholesaler (Tsh/orange	65	45
Retailer price (Tsh/orange)	100	35

Source: Average prices computed from data provided by farmers, wholesalers, and
retailers, during file survey, 2010.

Despite that the retailer pays a higher buying price than the farmer's price, the retailer also

receives a higher market price. Table 23 shows that the retailer sells orange at an average

price of Tsh 100/= per orange, followed by wholesaler who sells at an average price of

Tsh 65/= per orange and lastly a farmer who sells at an average price of Tsh 20/= per

orange. However, these prices spreading from each chain player are a reflection of

marketing value addition that they have made to the orange.

Moreover, the price spread between farmers and consumer price is Tsh 80/=, from the

retailer to wholesaler the price varies by Tsh 35/=. The consumer price was Tsh 100. The

variation in the selling price between the farmer and the retailer was four times larger than

that of the retail price. The implication here is that more efforts are needed in adding value

to orange in order to make it marketable. In the study, most of the orange farmers do not

add value to the oranges produced. Farmers sell orange trees while oranges are at a

flowering or pre-mature stage. Worse still, the selling price is agreed between a wholesaler and farmers before oranges have matured.

4.7.3 Margin analysis

In this study, marketing margin was used to measure the share of the final selling price that is captured by a particular player in the orange marketing chain (Mendoza, 1995). Therefore, marketing margin is the difference in the prices from one player to another (Kohls and Uhl, 1985). The assumption here is that wholesalers buy oranges directly from the farmers. Table 24 shows net profit margins of each actor in the area of the study in the year 2010:

Table 24: **Summary of Net Profit Margins of Players in the Market Channels in Year 2010**

Market item	Farmer (n=152)	Wholesaler (n=31)				Retailer (n=31)		
	MHZ	MHZ	DSM	ARUSHA	NAIROBI	MHZ	DSM	ARUSHA
Selling price per fruit (1)	20.0	65.00	62.00	64.00	62.00	100.00	100.00	100.00
Buying price per fruit (2)	0.00	12.00	21.09	24.75	19.00	47.03	73.96	56.40
Marketing margin (1-2)	20.00	53.00	40.91	39.25	43.00	52.97	26.04	43.60
Total cost per orange (3)	1.68	21.14	39.63	42.57	40.79	59.77	77.63	61.06
Net margin (1-3)	18.32	43.86	22.37	21.43	21.21	4023	22.37	38.94

Note: All costs and returns are valued in Tsh per orange. Source: Average figures computed from data provided by farmers, wholesalers, and retailers, during field survey 2010.

Based on the survey findings, Table 24 shows that, all the market players realized positive net returns though at varying levels. From the variation of net margins, it can be argued that, market players experience varying operation efficiencies. All this demonstrates the potential of orange sub-sector in poverty reduction among orange farmers. The variation

in income performances in terms of net margins is due to variation in the marketing costs incurred by players. This implies that the lower the marketing costs, the higher the net profit margins (Mutayoba, 2005).

4.7.3.1 Profit margins for farmers

At farm gate level, Table 24 shows that on aggregate the highest net margin (43.86 Tsh/Orange) is obtained by wholesalers from Muheza urban market followed by retailer net margin (40.23 Tsh/Orange), and the lowest net margin (18.32 Tsh/Orange) is earned by farmers. As Abbott and Makeham (1990) observe, greater net margin implies better performance and low net margin denotes poor performance.

Despite that orange farmers were not performing marketing activity, yet they (farmers) were not doing well as compared to wholesalers and retailers. Evidence shows that farmers in the study have been incurring high intangible transaction costs which are associated with low farm earnings. Furthermore, high transportation costs seem to restrict poor farmers from participating in lucrative markets and that most of the interviewed farmers were not differentiating their oranges in term of cultivars. In view of these facts, sales in this study (Hobbs, 1997) are influenced by transaction costs.
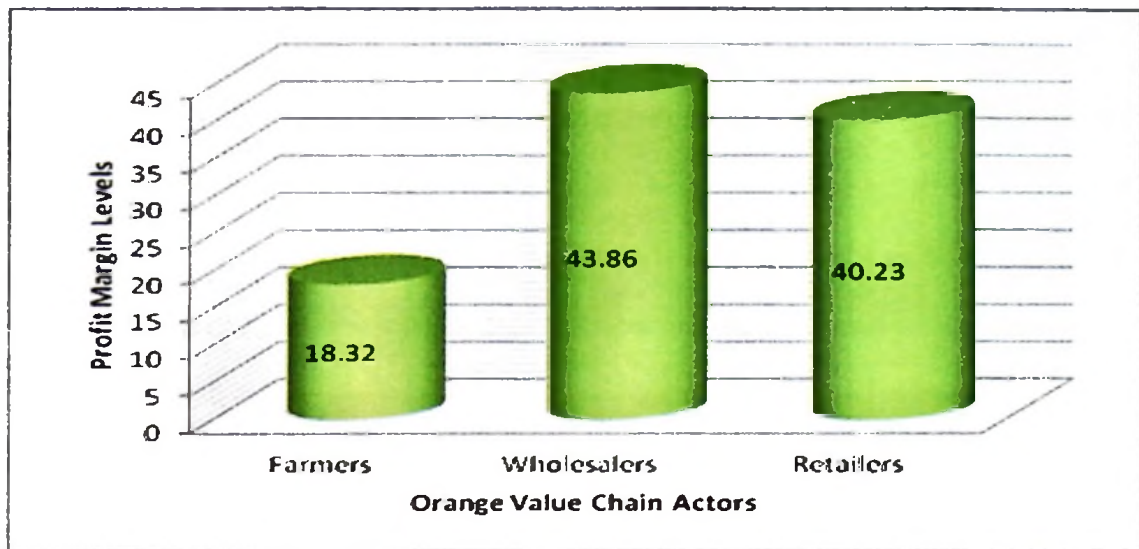
Figure 4: Profit Margins Received by Players in the Orange Value Chain in Muheza District

In Muheza District, farmers earned the lowest net margins (Tsh 18.32 per orange), while wholesalers accrued the highest Net margins, ranging from Tsh 21.12 to Tsh 43.86 per annum (Fig. 4).

During the field survey, two major orange marketing seasons one during low and another during peak orange seasons were observed as stated earlier. Farmers from the study area would have made big profits per orange if they would demarcate cultivars on their farms for low season (i.e. late Valencia) and for peak season (i.e. Early Valencia, Washington, Nairobi, and etc). High profits in the low season are due to supply driven pricing. Therefore, rational producers would therefore take initiatives to spread their production season as wide as possible into the low production season. This can be accomplished with the introduction of low ripening cultivars.

4.7.3.2 Profit margin for wholesalers in the city markets

From wholesalers' markets, Table 24 shows that the highest wholesaler net margin of Tsh 43.86 per orange was also found in Muheza urban market followed by net margin of Tsh 22.37 per orange in Dar-es-Salaam, then a wholesaler net margin of Tsh 21.43 per orange in Arusha. The lowest net margin of Tsh 21.21 per orange was found in Nairobi market. For the border trade the findings show that the Nairobi wholesalers purchase oranges at Muheza in Tanzanian shillings and sell the fruits in Nairobi using Kenyan shillings which ultimately make them get super profits.

The implication here is that a wholesaler who buys and sells oranges in the Muheza district can get higher net margin than any other wholesaler. Wholesalers who operate within Muheza district incur less marketing cost than those who sell in Nairobi, Arusha, and Dar-es-Salaam. Wholesalers from Muheza market benefit from not being too far from the farms taking into account the fact that the supply of oranges is associated with perishability rate and costs of transportation and handling. These findings are consistent with the findings in the previous studies (e.g. Altoum, 2008; URT, 2009; Lyne, 2002; ECI (2003) which show that, middlemen who are very close to the farmers or central markets incurred low costs and obtain higher net margins as opposed to middlemen located in distant markets. Thus, the lowest net margin of Arusha market incurred by wholesalers reflects high transportation and handling costs.

4.7.3.3 Profit margins for wholesalers by routes

The net margins for wholesalers by route are summarized in Table 25. The net margins for wholesalers also decreased with an increase of distance from the producing areas. Wholesalers using the Muheza – Nairobi route obtained the lowest gross margins (Tsh 21.21per Orange) while those using the farm - Muheza town market route obtained the

highest gross margins (Tsh 43.86 per Orange). The Net margins were largely determined by transport and handling costs mostly based on the time spent in transporting the fruits, the risks involved en-route and the magnitude of costs incurred by the truck driver upon returning.

Table 25 Wholesalers' Profit Margins by Route

Market route	TR (Tsh/Fruits)	TVC (Tsh/Fruit)	PM (Tsh/Fruit)	PM (%) (PM/TR* 100)
From the farm – Muheza town	65	21.14	43.86	67.5
Muheza – Dar es Salaam	62	39.63	22.37	36.1
Muheza – Arusha	64	42.57	21.43	33.5
Muheza – Nairobi	62	40.79	21.21	34.2

Note: TR-Total Revenue; TVC-Total Variable Costs; and PM-Profit Margin; Profit per orange being sold. Source: Average figures computed from data provided by wholesalers, 2010.

Findings in Table 25 show that wholesalers who buy oranges from the farmers and trade in Muheza town earned higher net margin of 67.5% of the total selling of oranges followed by traders who transport fruits to Dar es Salaam (36.1%), Nairobi (34.2%), and lastly Arusha (33.5%). These findings indicate that the net margins were inversely related to distance from the farms to the market.

4.7.3.4 Profit margins for retailers

At retailers' markets, Table 24 also shows that the highest net margins of Tsh 40.23 per orange were found at Muheza market, followed by retail net margin of Tsh 38.94 per orange in Arusha. Dar-es-Salaam earned relatively small net margins of Tsh 22.37 per orange. Similar findings were reported by ECI (2003) which showed that, retailers obtain a fairly high margin per orange, although the turnover is generally low. This implies that retailers from Muheza perform better than those from other locations. This is because retailers from Muheza district enjoyed the effect of spill over accrued in the marketing

costs. Furthermore, the role of retailers especially in grading the fruits by size and packaging in perforated plastic bags as well as peeling at retail level played a part in adding value to the produce making the retailer obtain better prices.

According to transaction cost economics (TCEs), agents who are very close to the markets have greater opportunity of making higher profit as compared to those located far (Fafchamps, 2004; DeeVon and Lyne, 2002). Majority of interviewed retailers were procuring and selling oranges in the centre markets hence earning better orange prices.

4.7.4 Marketing efficiency analysis

The study assessed marketing efficiency of each marketing player. Many studies have used Sherpherd's formula (Sherpherd, 1993) to measure marketing efficiency. Studies done by Emam (2011); Malaisamy (2012); and Mogaji *et al.* (2013) have used this method. The current study also adopted the Sherpherd formula to assess orange marketing efficiency in the study location. According to Sherpherd formula, higher efficiency index (score) means better performance; lower efficiency index (score) denotes poor performance (Abbot and Makeham, 1990).

Based on the findings in Table 26, farmers in this study had realized impressive efficiency index scores compared to traders. This is because wholesalers incur higher marketing costs as compared to farmers who sell oranges when they are on the trees. According to TCEs, marketing costs must be incurred to influence better sales (Hobbs, 1997). Wholesalers incur many marketing costs before reaching central markets as shown in Table 21. For example, wholesalers who take oranges to Arusha town statistically have low efficiency index because of transportation costs. The assessment of operating/marketing efficiency of orange players is shown in Table 26.

Table 26: Evaluation of Operating Efficiency of Players using Sherpherd Formula

Market item	Farmer (n=152)	Wholesaler (n=31)				Retailer (n=31)		
	MHZ	MHZ	DSM	ARUSHA	NAIROBI	MHZ	DSM	ARUSHA
Selling price per fruit (1)	20.0	65.00	62.00	64.00	62.00	100.00	100.00	100.00
Buying price per fruit (2)	0.00	12.00	21.09	24.75	19.00	47.03	73.96	56.40
Marketing margin (1-2)	20.00	53.00	40.91	39.25	43.00	52.97	26.04	43.60
Total cost per orange (3)	1.68	21.14	39.63	42.57	40.79	59.77	77.63	61.06
Marketing efficiency Index [(1/3) – 1] (Tsh)	10.90	2.07	0.56	0.50	0.52	0.67	0.29	0.64

Source: Average figures computed from data provided by farmers, wholesalers, and retailers from Muheza, DSM, Arusha and Nairobi, 2010. Key: Estimates are valued in Tanzanian shillings per orange.

At farm level, Table 26 indicates that farmers got the highest operating efficiency index of 10.90^{45}, wholesalers got 2.07 and retailers got marketing efficiency index of 0.67 in Muheza district. According to Abbot and Makeham (1990), high marketing efficiency index means better performance, while low efficiency denotes poor performance. This means that farmers incur minimal operating costs because the common practice is for traders to purchase the fruits at the farm gate while on the trees and immature.

Thus, an increase in operating efficiency at farmer's level is associated with the reduction of operating costs in such things as transportation, market levy, village levy, harvest/picking, loading and off-loading, and other cost items as shown in Tables 20 and 21. However, despite the fact that farmers were selling oranges at the farm gate, they still could reduce operating costs by operating jointly and access urban markets where they

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[45] And still they are the least gross profit earners due to low price earned in market as a result of selling oranges while immature.

could obtain better prices and thereby improving their profit margins and reducing income poverty.

At wholesale market level, Table 26 shows the highest marketing efficiency index of 2.07 was recorded for Muheza market while Dar-es-Salaam market recorded 0.56 efficiency index, Nairobi market recorded 0.52, and Arusha market recorded the lowest efficiency index of 0.50. A market that is efficient does not only bring sellers and buyers together, it enables entrepreneurs to take advantage of opportunities, to innovate and improve in response to demand and price changes (Fakayode *et al.*, 2010). In this study, the highest index of marketing efficiency in Muheza market implies that wholesalers pay low prices and accrue high profits.

At retail market level, Table 26 indicates that Muheza market recorded the highest index of marketing efficiency compared to market and Dar es-salaam markets. While Muheza market recorded the highest 0.67 marketing efficiency index, Arusha and Dar-es-salaam markets recorded 0.64 and 0.29 (the lowest) marketing efficiency indexes respectively. This means that Muheza retail market carry out marketing activities more efficiently than the other two markets because the retailers Muheza pay low prices and accrue high profits.

Therefore, at retail markets, Dar-es-Salaam market appeared to have the lowest marketing efficiency than the other two because of the highest marketing cost activities carried out by retailers in Dar es-salaam market. Interestingly, wholesalers had higher net margin at the same times low marketing efficiency in Muheza market as opposed to farmers. Similar results are reported by Trotter (1992) who reveals that large profit margins may not necessarily express high marketing efficiency. Likely small gross margins may co-exist with inefficient resource use and poor marketing governance structure which is applied.

4.8 Assessment of Smallholder Farmers' Income from Production of Oranges

This section assesses different economic activities carried out by orange farmers and their impact in total household farmers' incomes, followed by analysis of intrinsic characteristics of smallholder orange farmers influencing income from orange production in the study area. Before the study analyzed intrinsic characteristics of smallholder orange farmers influencing income from production of oranges, the study firstly assessed contribution of economic activities of farmers as shown below:

4.8.1 The contribution of economic activities to total household income

Based on survey results, the study pinpointed different sources of income generating activities carried out by smallholder farmers. Such sources include formal employed (i.e. employed in local government as teachers, nurses, etc), farming income (which comes from orange farming and non-orange farming activities), livestock keeping, and business (selling of charcoal, retail shops, and brews). These income generating sources are divided into two categories: farm incomes and non-farm incomes. Table 27 and Figure 5 present the contribution of each economic activity in the income of farming households. Figure 4 shows different sources of farmers' income and their degree of income inequality among orange farmers.
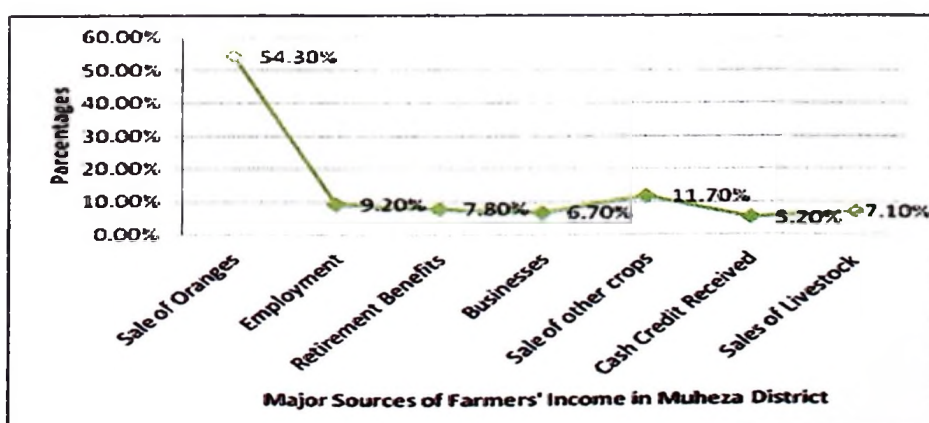
Figure 5: Economic Activities and Farmers' Income in Muheza District

Figure 5 indicates that the main source of income of orange farmers is orange trade (54.3%), followed by formal employment, which accounts for 9.2%; retirement benefits which accounts for 7.8%; business accounting for 6.7%, other crops, accounting for 6.1%; cash credit received accounting for 5.2%; and livestock keeping accounting for 4.1%. This implies that farmers have diverse sources of income particularly in the study location.

Table 27 shows different sources of farmers' income and their amount for the study sample in Muheza District.

Table 27: Sources of Farmers' Income Among Orange Farmers (n=152)

Source of revenue	Amount (Tshs)	Mean (Tshs)	% of total revenue contribution
Sale of oranges	278 211 500	1 830 338	54.3
Sale of other crops[46]	42 159 600	277 365	11.7
Employments	30 454 000	200 355	9.2
Retirement benefits	27 777 000	182 743	7.8
Sale of livestock	21 820 000	143 552	7.1
Business	18 756 000	123 394	6.7
Cash credit received	3 560 000	23 421	5.2
Total income	422 738 100	2 781 168	100.0

Source: Annual figures computed from data provided by farmers, Muheza, 2010); Note: Other crops include vegetables and fruits (Mangoes, Banana, Tangerines, jackfruits etc).

Orange production contributes about 278 211 500 (54.3%) of the total household income as shown in Table 27. The remaining percentage of household income contribution comes from other sources such as other crops (11.7%), livestock (7.1%), and non-farm (26.7%). This implies that orange is the major source of rural farmers' income in Muheza District. Any improvement in orange production and orange supply to markets may therefore lead to an increase in farmers' orange income and thus leading to the reduction of orange income poverty.

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[46] It involves income raised from sales of fruit crops (such as mangoes, jackfruits, tangerines, and banana), non fruit crops (such as coconuts, cassava, paddy, maize), and sales of vegetables.

4.9 Econometric Analysis of Intrinsic Characteristics of Smallholder Farmers Influencing Income from Production of Oranges

This section assessed intrinsic factors influencing income of smallholder farmers from production of oranges. According to Bailey and Hunnicutt (2002), unfavourable intrinsic socio-economic characteristics are associated with high transaction costs, which would reduce farm incomes. This particular study applied multiple regression method to explain factors that influence income of farmers in Muheza District. The specification of respective regression model is presented below:

$$OI = \beta_o + \beta_1 TBO + \beta_2 OFEXP + \beta_3 OFED + \beta_4 OPR + \beta_5 MIA + \beta_6 OFAG + \beta_7 QOM + \beta_8 TRANSCOST + \varepsilon_i ..(7)$$

Whereby:

OI	=	Orange farmer's Income (Earnings from orange sold in Tanzanian shillings) as dependent variable
TBO	=	Trees bearing oranges
OFEXP	=	Experience of orange farmer in orange trade
OFED	=	Education of orange farmer
OPA	=	Orange price Received
MIA	=	Market information access
OFAG	=	Age of orange farmer
QOM	=	Quantity of orange marketed by orange farmer
TRANCOST	=	Transportation costs
ε_i	=	Stochastic error term $[\mu_i \approx N(0, \delta^2)]$
β_o	=	Intercept
$\beta_1 .... \beta_{10}$	=	Regression coefficients

4.9.1 Technical considerations

At the outset, this study assessed technical issues related to neoclassical regression assumptions, multicollinearity, and regression results validity. Meeting the assumptions of regression analysis is essential in ensuring that the results obtained are (Joseph *et al.*, 2006) truly representative for the researcher to be able to generalize the results. Therefore, the following examination of basic assumptions of regression analysis was done, namely

linearity, homoscedasticity, and normality examinations, multicollinearity and further testing of the overall relationship after model estimation.

4.9.1.1 Neoclassical assumptions of regression analysis

Linearity[47] is measured to test each independent variable's relationship to see if it is linear to ensure its best predictive power in the regression model (Gujirati, 2006; John, 2011). The partial regression plot was done for each independent variable and the results of the test did not show any nonlinearity pattern in the model (Appendices 7&8). In this respect, the study confirms that the overall independent variable's relationship is linear as the residuals fall within a general random pattern (John, 2011). The tests show that the values fall along the diagonal with no substantial or systematic departures or serious outlier (Appendix 7and 8).

Normality[48] test was checked with visual examination especially normal probability and histogram plots. The histogram plot test shows the independent variable values fall within distribution curve as it appears in Appendix 9. As the study findings were in line with Gujirati (2006) observation that, normal distribution consideration is vital in regression analysis. The test of normality shows that the assumption of normality is met. Homoscedasticity was also checked in this study through assessing the degree of consistence of the residuals values of the independent variable before embarking into regression analysis. The examination results show that there is no pattern of increasing or decreasing residuals as graphical presentation shows in Appendix 9. It therefore, indicates that there is no problem of concern in the model.

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[47] The study also used *Q-Q Plots Test* to check linearity assumption of regression model in this study.
[48] The study also used *Histogram Plots Test* to check normality assumption of regression model in this study.

4.9.1.2 Multicollinearity

In all the families of regression models, it is inappropriate to enter into the same regression model predictors which are highly correlated with each other. It also makes modest sense to include independent variables in the model that are highly correlated as they would not be making any exceptional contribution to the regression model. This is because of the danger of masking each other's effects in the model. If the variables are highly correlated among themselves, the predictive power of the predictors will definitely endanger the predictive power of the response variable. It can be noted further that there is a possibility of having very high multicollinearity (sometimes perfect multicollinearity) even if the coefficients of correlation between all pairs of variables are not very high, but still it was important to check for the presence of multicollinearity before embarking into modeling so as to have prior determination of the behaviour of explanatory variables to be included in modeling.

The multicollinearity check was performed using correlation matrix and the Variance Inflation Factor measure (VIF). In the correlation matrix, the correlation between independent variables were not more than 0.7 (Foster *et. al.* 2006), to warrant the inclusion of the variables selected in the model. Also the multicollinearity test, which is shown by low tolerance, indicated that both tolerance and VIF were in the region of 1, the value which indicates the absence of high correlation between independent variables to be included in the model (Appendices 10& 11).

Furthermore, the criteria used by Myers (1990); Bowernman and O'Connell (1990); and Andy field (2005) to measure the problem of multicollinearity stipulates that, if the value of variance inflation factor (VIF) is higher than 10, then there is a cause for concern, suggesting the possibility of multicollinearity. Also, if the Tolerance value is less than

0.10, then there is a serious problem, indicating multicollinearity. Therefore, this study used cut-off points for determining the presence of multicollinearity (tolerance value of less than .10, or a VIF value of above 10). Based on these measurement criteria above, the test of multicollinearity shows that the collinearity is met. As appendences 9 and 10 show Variance Inflation Factor (VIF) values range from 1.066 (i.e. TRANCOST variable) to 1.383 (i.e. QOM variable) and the values of tolerance range from .723 (i.e. QOM variable) to .938 (TRANCOST variable) (Appendix 11).

4.9.1.3 Validation of the results

The study considered further the fitness of the model to ensure that the results are valid and can be generalized to the "population" studied, and not only for the "sample" used in estimation. The most direct approach for assessing validity of results is to increase the sample size. Alternatively, the researcher can assess the validity of the results in several approaches, including an assessment of the Adjusted R^2 or estimating the regression model on two or more sub-samples of the data (Joseph et al., 2006; Robert and Daniel 2010 Robert and Daniel, 2010; Gujirati, 2006; John, 2011). In this respect, the validity of results in this study was assessed using Adjusted R^2 Value check-up method (Appendix 12). As Table 28 shows, the adjusted R^2 = 91%, which means that the model is fit for explaining the variance of orange farmer's income and the results can be generalized (Joseph *et al.*, 2006).

4.9.2 Regression analysis results

In this study, multiple regression model specified intrinsic factors that influence income of oranges realized by the farmers. The regression output is shown in Table 28 (Appendices 11, 12 & 13). The findings indicate that four out of eight independent variables [i.e., trees bearing oranges (TBO), orange price received (OPR), quantity of oranges marketed

(QOM), and transport costs (TRANCOST)] had significant effect on the orange farm incomes as shown in Table 28.

Table 28: Results of OLS Regression Analysis of the Effect of Intrinsic Characteristics of Smallholder Orange Farmers on the Orange Farm Incomes (n=152)

Variable	Expected Sign	Std error	Coefficient	T-ratio significance
TBO	232.919	628.054	2.696*	.008
OFEXP	18 473.096	-30 488.558	-1.650	.101
OFEDU	66 161.061	17 902.658	.271	.787
OPR	9 056.204	89 516.838	.9.885	.000
MIA	277 751.844	-324 676.821	-1.170	.244
OFAG	10 374.969	-6 629.110	-.639	.524
QOM	.956	28.285	29.589	.000
TRANCOST	.520	-1.473	-2.834	.005
Constant	902 101.273	-1.121	-1.243	0.216

$R^2 = 91.5\%$ Note: *Significant at the 1% level
Adjusted $R^2 = 91\%$
F-Value = 191.575*
Durbin Watson =1.888

Dependent Variable: Orange Income of the Farmers (continuous variable).

Based on Table 28, the regression model fits the data quite well because the variables included jointly explained about 91.5% of the variation in the total income of oranges of smallholder orange farmers for the year 2010. The significant F-statistic value of 191.575 is an indication that the four variables (i.e. amount of oranges marketed, prices received, trees bearing oranges, and transport costs) exerted joint significant impact on income of oranges.

Based on the survey results, Table 28 shows that the coefficient of number of trees bearing oranges was significant and positively affected orange farm incomes. This means that an increase in the number of trees bearing oranges would increase income of oranges of smallholder farmer, other things remaining constant. As noted by Khalid and Temu

(2009), an increase in the value of productive assets (e.g. number of trees bearing oranges at the farms) has the potential of increasing the intensity of productivity and hence would increase farm income. In addition, distribution of assets like trees has major implications in the distribution of income (Kirsten *et al.*, 2008), implying that highly unequal distribution of trees bearing oranges reflects deeper income disparities among orange farmers, other things remaining constant.

Based on survey results, Table 28 indicates that the coefficient of farmer's experience in orange trade was insignificant and negatively affected orange farm incomes, which *did not conform to the expectation*. The notion was that, farmers who stay in orange business for a long time would have developed a cost-effective and profitable way of transacting and may have identified and conquered possible niche markets. The entrepreneurship theory links business experience (age) with the development of entrepreneurial skills through a myth of learning by doing. In this study, however, the study findings are in contrast with the findings of Adeoti (2007) and Chan (2004), which show that having adequate business experience increase production and income. Similarly, Mutabazi and Mdoe (2003) argue that experience of entrepreneurs has a positive significant influence on profitability (income). Old entrepreneurs are more likely to convert their experiences in the market places into economic returns than their younger counterparts.

Education plays an interesting role as a determinant of activity income (Khalid and Temu (2009). The coefficient of education level of orange farmers was insignificant and positively affected orange farm incomes as noted in Table 28. This result is *not in conformity with a priori expectation* that the higher the level of education of the household head, the higher the household income in the orange business activities. This finding agreed with the finding in a study done by Ugwumba *et al.* (2010) who observed that

farmers who are educated can combine many viable enterprises and can be more efficient in fruits and vegetables marketing and consequently realize more income.

In addition, the low level of education of orange farmers, coupled with their inability to communicate in the business language (e.g. lack of bargaining skills or inability to identify poor contract), also contribute to high transaction costs among farmers. High transaction costs in marketing of commodities often exclude poorer farmers from participating in growth opportunities (Lyne, 2002).

The coefficient of orange price received was significant and positively affected income of smallholder orange farmers as noted in Table 28; this result is *in line with a prior expectation*. However, farmers were generally selling oranges at low prices, which in turn, led to obtaining low income of oranges. The effect of price on orange income is small probably because of the farmers' propensity of approaching traders when they have no money to support their families and in turn force them into accepting lower prices and hence lowering income of orange farmers.

In the study location, oranges as perishable crops face low prices due to market uncertainty. Uncertainty often puts farmers in a more difficult situation. As noted by Kirsten *et al.,* (2008), crop buyers can give farmers poor prices for their produce under the pretext that central market prices are very low, when this is not the case. Thus, the price offered is not reflecting the opportunity costs of the resources that are locally used for producing oranges. Unless this snag is addressed, if not the producers will continue to be losers in this trade.

Survey results in Table 28 indicate that coefficient of market information access was insignificant and negatively affected orange farm incomes; this result is in contrast with

the prior expectation. The result implies that the income of the household orange farmers is affected by information asymmetry in the study area. Information costs are very high. Rural farmers in developing countries have been getting market information from buyers (Hobbs, 2007). Similarly in the study area, orange farmers have been getting price information from traders. This implies farmers had little access to market information prior to the sale of oranges. This puts farmers in a situation where they lack confidence in negotiating prices due to information asymmetry. Consequently, this increases uncertainty of getting low prices by buyers and hence getting low orange farm incomes.

The results of this study in Table 28 show that the coefficient of age of the farmer was insignificant and negatively affected income of orange farmers; this result was in *contrast with the prior expectation*. This implies that income of orange farmers is negatively influenced by age of the orange farmer. The notion here is that the older the farmer, the less productive s/he gets and hence the low the income generated. This result disagree with theoretical view that older farmers tend to have more personal contacts, allowing trading opportunities to be discovered at low cost, and are likely to experience lower transaction costs and use more marketing channels (Lyne, 2002), and get higher farm income. However, African youth do not like to engage in agricultural crop production rather they like to market the produces (Kirsten *et al.,* (2008).

Survey results in Table 28 show that the coefficient of quantity of oranges marketed was significant and positively affected income of household orange farmers; this result was in *line with the prior expectation*. This implies that income of smallholder orange farmers is positively influenced by the amount of oranges sold (Table 28), all things being equal. This finding conforms to the finding in a study by Aikaeli (2010), that farm output is associated with variation in the total income of a farmer within a farming season. In

addition, the result is in line with the findings by Mdoe and Mutabazi (2012:62), which shows that profitability increases significantly with the increase of the number of products traded. This is referred to as the theory of economies of scale, which holds that (Dorward *et al.*, 2009) the more the quantity traded, the more the firm minimizes operational cost per unit sold and hence maximizes profit[49], all things being equal. An increase in the number of products traded obviously spreads markets risks and maximizes sales economies of scale benefits (Mdoe and Mutabazi, 2003).

Lastly, Table 28 shows that the coefficient of transport cost was significant and negatively affected income of orange farmers. This result is *in line with a prior expectation* that the adoption of any measures focused on reducing the costs of transportation (Dorward *et al.*, 2009) will lead to an increase in net profit margins. This finding is in line with Olawepo's (2010) findings that Transport cost adversely affect income of farmers. The farmers operating closer to tarmac roads or main central markets would tape such potential and accrue more profit than those operating far from central or urban markets. Central markets can potentially prosper (Fafchamps, 2004) due to relatively high-income elasticity of demand like oranges. Application of the right institutional control arrangements (e.g. collective action system) would be expected to have a positive effects on reducing transaction costs especially transport costs and improving income of farmers (Hobbs and Young, 2001: Bailey and Hunnicutt, 2002; Kirsten *et al.*, 2008). This effectively reduces their market costs (Kariuki, *et al.*, 2006). Otherwise, poorly developed market institutions would lead to low farm gate prices receipt due given by farmers (Barrett *et al.*, 2005).

The result also reflects the conduct of marketing activities which are dominated by farmers whose farms are located far from the main market town centres (Nyoro, 2004).

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[49] 'Since many transaction costs are fixed per transaction, increasing traded volumes can also reduce transaction cost per unit of oranges transacted" (Dorward *et al.*, 2009:22).

Such farmers are unable to take advantage of marketing coordination (McCulloch and Ota, 2002). As noted further by Hella and Nyiti (1999), rural farmers have been adversely affected by high transport cost because of being far from lucrative markets. Similarly, Mutabazi and Mdoe (2003) argue that increased distance from the urban center markets reduces the profit margins accordingly, though not significantly. However, urban centers are potential markets due to relatively high incomes by urban dwellers.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

This study analyzed economic and institutional factors that affect the incomes of smallholder orange farmers in Muheza district, in Tanzania. More specifically, the study analyzed orange institutional arrangements and their influence on prices and incomes of orange farmers; transaction costs and how they influence incomes of orange farmers; and how intrinsic characteristics of smallholder orange farmers and their organizational settings affect the incomes of farmers as well as market the performance of orange business in the study area.

Data for the study were collected from secondary and primary sources. A large part of primary data were collected using open and close ended questionnaire administered to a total of 152 smallholder orange farmers. Check lists were used to gather information from 25 key informants including District Agricultural Development and livestock officer, District Horticultural Specialist Officer, Ward Agricultural Extension Officers, and Village Executive Officers. The check lists were also used to gather information from 52 traders including wholesale and retail orange traders.

The data were analyzed using a combination of qualitative and quantitative analysis methods. Qualitative data analysis method was used to assess transaction costs that influence incomes of orange farmers. On the other hand, quantitative analysis method and descriptive statistics such as frequencies, mean comparisons and percentages were used to assess intrinsic socio-economic characteristics of farmers as well as to analyze orange institutional arrangements and their influence on the prices and incomes of orange farmers. The gross margin analysis was applied to assess the market performance of

oranges in the study area and regression analysis method was used to analyze how intrinsic characteristics of smallholder orange farmers and their organization settings affect farmers' income. This Chapter presents conclusions and recommendations emanating from the major findings of the study.

5.1 Conclusion

The conclusions in this study focus on institutional arrangements and their influence on prices and farmers' incomes, transaction costs affecting incomes of smallholder orange farmers, orange market performance, and the effects of intrinsic characteristics of smallholder farmers that influence orange income.

5.1.1 Institutional arrangements and their influence on prices and farmers' incomes in the study area

Based on the empirical evidence in this study, first, the study concluded that farmers have been entering into contractual arrangement with orange traders under orange supply agreement to have ready-made markets and reduce market uncertainties. Secondly, farmers have been entering into contractual arrangement with orange traders because of financial resource constraints which often face farmers during off season. Thus, farmers sell oranges to traders during flowering or immature stages without the former having adequate price information. This arrangement is not favourable to farmers because the prices are fixed during the signing of the contracts. There are no production inputs supplied by traders to farmers, neither is there any transparency on market information. There is no any written clause that demands traders to pick oranges on time. In this view, more oranges overripe and drop off from the trees at farmers' risk and hence diminish orange revenues to farmers. This is because most of the contract arrangements are based on "trust relationship" between traders and farmers and not on legal basis.

Based on the empirical evidence, farmers' organization is one of the institutional arrangements farmers have been using to lower transaction costs and risks associated with orange business. However, majority of interviewed farmers were not members of any organizations. Thus, there is a serious problem of market power among smallholder farmers particularly in influencing prices. In view of the above, the study therefore concludes that if majority of farmers would be members of any organization then it would reduce problems related with market uncertainties and risks of doing orange business, *ceteris puribus.*

5.1.2 Transaction costs affecting incomes of smallholder orange farmers

The analysis of transaction costs that affect income of smallholder orange farmers show that low income earned by smallholder oranges farmers are associated with high transaction costs as a result of information asymmetry. Information asymmetry on price information prior to the start of price negotiation is higher. Traders have been opportunistic in dealing with farmers so as to maximize profits especially when they know farmers have no adequate price information to be able to bargain for higher prices. This is because opportunistic traders are not ready to share price information with farmers in the area of the study. Consequently, information asymmetry has been restricting rural orange farmers from bargaining for higher prices and hence getting low income from oranges business. In this respect, this study therefore concludes that there is a need to lower transaction costs (e.g. information, monitoring and enforcement costs) through promoting access to the right governance structure so as to increase participation of smallholder orange farmers in remunerative marketing.

5.1.3 Orange market performance in the study area

The empirical evidence of the analysis of profit margins indicate an interesting variation in terms of profit margins with the highest profit margin obtained by the wholesalers, followed by the retailers and the farmers had the lowest profit margin figure. The analysis of market performance concluded that market institutions such as poor rural feeder road networks, lack of appropriate orange storage facilities, lack of orange processing plants, poor orange quality produced also affect orange prices earned by farmers and hence affect income of smallholder orange farmers in Muheza district. Based on the empirical evidence of this study, the analysis of gross margin concludes that low profit margin received by farmers is because of poor marketing infrastructures and weaknesses of institutions on enforcing regulations and provision of training to smallholder farmers on the production of quality oranges.

5.1.4 The Effects of intrinsic characteristics of smallholder farmers that influence income from production of oranges in the study area

Based on the empirical evidence from the area of study, there are four intrinsic characteristics among smallholder farmers and that influence incomes of smallholder orange farmers. These findings suggest that the number of trees producing oranges in the farm, the amount of oranges traded, orange prices received, and transportation costs are the main intrinsic factors influencing incomes of the orange farming in the study area. It is therefore concluded that if the number of trees bearing oranges, orange prices received, the quantity of oranges marketed, and transportation costs are well improved then the income of smallholder orange farmers would gradually increase. This interpretation is true if other factors are held constant.

5.2 Recommendations

In a country like Tanzania whose economy is highly dependent on agriculture and whose biggest proportion of her agricultural productive force is comprised of smallholder farmers, there is a need for increased efforts in improving the livelihoods of these smallholder farmers. This also applies to smallholder orange farmers in the area of study. Based on the findings of the current study, the following are recommendations suggested for improving orange farm incomes in Muheza district and elsewhere:-

a) The empirical evidence in this study shows that institutional arrangements are inadequate to reduce market uncertainties and lowering transaction costs. In this respect, the study recommends that the government should be proactive and a driver in influencing the right modes of governing transactions among smallholder orange farmers. This can be done by providing training to farmers and that would enhance farmers' knowledge on effective ways of managing institutional arrangements including farmers' organizations and contract farming. Such training would enable farmers get into constructive contractual arrangements with traders.

b) The government and other development partners in the orange sub-sector should provide training to farmers especially on how to improve orange quality in order to enhance farmers' chances of getting lucrative prices and thereby improve household income.

c) According to the findings of this study, marketing inefficiency of smallholder farmers is associated with weak marketing institutions which constrain farmers from bargaining for high prices. In this respect, the study recommends that proactive actions should be taken to ensure that there is a suitable business

environment to empower smallholder farmers to do orange marketing in Tanzania. The recommended interventions would minimize the costs of the oranges transacted through improvement of orange market infrastructures (for example, communications, rural roads networks, processing factories), and institutional changes (for example, enforcement of regulations, training on orange quality and standards, control measures to ensure the country's involvement in the international standard settings).

d) Based on the empirical evidence on how intrinsic characteristics of smallholder farmers affect the smallholder farmers' income from cultivation of oranges as shown in the regression analysis, this study recommends for the government's intervention on promoting farm management practices especially increasing the number of trees bearing oranges at the farm as well as influencing institutional changes. This will have a positive impact on increasing the incomes of smallholder orange farmers in the area of study. This recommendation is true if other factors are held constant.

e) The findings also show that the current practice is that traders enter into contract with farmers before oranges are harvested. This puts farmers in a disadvantaged bargaining position with regard to the price they receive. Traders buy oranges at very low prices as the oranges would still be immature. Once the farmer sells to the trader, he is deprived of the benefits of price improvements that may arise at a later time. In this respect, the study recommends the following: one of the ways is to support farmers to store oranges. Such storage facilities will enable them to store oranges during harvest season and reducing the gap of prices between

harvesting season and orange scarcity season. If such facilities are available processing investors may also be attracted to invest in the orange business.

f) The findings show that pests and diseases are a serious problem. These problems largely affect the quantity of the oranges supplied and the orange farm incomes in the study area. In this regards, the problem of pests and diseases in the orange sector may require public and private sector collaboration whereby the government would provide the research component, public oriented control measures and streamlined access to knowledge by farmers. On the other hand, the private sector would be expected to supply and utilize the pesticides and chemicals.

g) According to the study findings, majority of orange farmers are not members of any organization. By not being members, they are not able to exploit some of the advantages and opportunities. The organized farmers could exploit the economies of scale by performing some of the functions together i.e. collective purchase agricultural inputs and transport oranges to urban markets as well as share market price information[50]. Also, one way of achieving market power is to encourage orange farmers to co-ordinate activities in various ways throughout the production and marketing chain. In this respect, the promotion of farmers' cooperatives is needed and the government can be a key stakeholder. The role of the government in this regard would be to create circumstances whereby stakeholders in orange sub-sector would be motivated into organizing and promoting their interests. If farmers are better organized, they can be able to bargain for better prices, access to

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[50] Asymmetry market information has been restricting farmers from bargaining for higher prices and as a result they have been getting low incomes from the orange business.

market information[51], collective purchase of pesticides, and collective transportation of oranges to urban markets. On the other hand, it is through this process that farmers and traders would co-operate to carry out orange trading to Kenya. This effort would be supported by conducive government policy aimed at enhancing smooth trade with Kenya.

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[51] Working under cooperatives would enable market information on prices and related aspect to flow easily among members, and thereby enhancing their bargaining powers for better orange prices.

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APPENDICES

Appendix 1: Items Identified as Problematic in the Pre-Survey Study

Item		Action Taken
B21	How many oranges have you produced in the year 2008, 2009, 2010 in tons	Rephrased
B21	Rephrase: How many oranges did you produced in the last three seasons (in tons)	
K63	How much you pay per oranges for brokerage fees?	Deleted
K62	How much costs did you pay for drafting contract	Deleted
E38	Where are the market outlets for your oranges?	Rephrased
E38	Who are your customers? Brokers, wholesalers, retailers, consumers	
D26	Rephrase: Where is your market outlets for oranges produced?	Rephrased
D26	Rephrase: Who are the buyer of your oranges?	
D33	How many oranges sold in the low season and in high season for the last three years (Kg)	Deleted
D37	How many quantity of oranges did you sale during the last orange production season	Rephrased
D37	New rephrase: How many quantity of oranges did you sale to the markets in year 2005 and 2006	

Appendix 2: Random Numbers Table

```
73735   45963   78134   63873
02965   58303   90708   20025
98859   23851   27965   62394
33666   62570   64775   78428
81666   26440   20422   05720

15838   47174   76866   14330
89793   34378   08730   56522
78155   22466   81978   57323
16381   66207   11698   99314
75002   80827   53867   37797

99982   27601   62686   44711
84543   87442   50033   14021
77757   54043   46176   42391
80871   32792   87989   72248
30500   28220   12444   71840
```

Source: Kothari, (2004)

Appendix 3: Questionnaire for Orange Farmers

Dear respondent, I am requesting you to participate in this study by filling in a questionnaire and respond to a few questions. As an interviewee you are very important part in this study because you present million of farmers in Tanzania who are not in the selected sample. I assure you that your answers will be used for scientific purposes in the framework of this study. Thus, your information will be treated strictly confidentially and will be presented in the form of statistical reports. This is PhD studies based at Sokoine University of Agriculture. The Overall objective of the study is to identify and analyzing factors affecting smallholder farmers' income in orange based farming system in Muheza District. The focus on this study is Smallholder Orange Farmers, Orange Traders and, Government Officers in the study area.

Therefore, kindly you are requested to participate in this study by filling in this form. The information that you give will be treated as confidential and that anonymity, is guaranteed. Thank you in advance for accepting to participate in this study.

SECTION A: GENERAL INFORMATION
Name of Interviewer: ....

A1: Name of Respondent	A2: Date of Interview	A3: Village	A4: Ward	A5: Division
A6: Age	A7: Gender Male Female	A8:Marital Status Single Married Widowed Divorced	A9:Education level 1. Primary Education 2. Secondary Education 3. Post Education 4. Adult Education 5. No formal schooling	A10: Main Occupation Farming Livestock Business Employed

A11: What is your secondary occupation?   1. Farming   (   )
2. Livestock Keeping   (   )   3. Business   (   )
4. Other (Specify)...

A12   What is your household size? i) Adults...........................
ii) Children...

A13   Type of shelter owned by respondent (if more than one, please characterize the main building):
[1] Brick walls, tiled or iron sheet roofing   ( )
[2] Consolidated mud walls, with iron-sheet roofing ( )
[3] Simple mud walls with thatched roofing ( )
[4] Others...

SECTION B: INFORMATION ON LAND AND ORANGE PRODUCTION

B14 Do you own farm (s) Yes ( ) No ( )

B14.1 If yes, how many acres do you own? [1]. Less than 5 acres ( )
   [2] 5 to 10 acres ( ) [3] 11 t0 15 acres ( )
   [4] 16 acres and above

B15 How many acres are cultivated, planted with orange trees, area harvested oranges, and quantity of oranges harvested during the last season?

B13a:Farm Area Cultivated (Acres)	B13b:Farm planted with orange trees (acres)	B13c:Area harvested oranges (acres)	B13d:Quantity harvested (QTY)

B16: Does the farm covered by orange trees increased, decreased, or remained the same for past three year? Yes/No

B16.1. If declined or increased or remained the same, give the reasons...

B17. Has the quantity harvested increased or decreased or remained the same during the last three seasons? ....

B17.1 If decreased or increased or remained the same, give the reasons..

B18 When did you start farming oranges? [1] 5 years ago( )
   [2] 6-10 years ago ( ) [3] More than 11 years ago   ( )

B19. What type of orange (s) are you growing most? (Tick Appropriate)

Variety of oranges			
Late Valencia	Nairobi	Zanzibar	Pemba
Washington	Jaffa	Early Valencia	Others (Specify)

B19.1. Give reason(s) for your choice above...

B18. How many orange trees did you start with......................................? (Trees)

B20: Current, how many orange trees are in the farm that producing oranges..

B21. How many oranges you produced in the last three seasons?

Oranges	Year		
	2010	2009	2008
Acre			
Farm yield(per ha)			
Average production			

B22. Apart from orange production, what are the others food and cash crops grown by the household? Indicates the values of each crop obtain after harvest in the last three seasons if any:

Cash Crops	2010		2009		2008	
	Acreage	Output	Acreage	Output	Acreage	Output
Pineapples						

Food Crops	2010		2009		2008	
	Acreage	Output	Acreage	Output	Acreage	Output
Maize						

SECTION C: LABOUR AND OTHER INPUTS USED IN ORANGES PRODUCTION

C23   If hired labour was used, indicate cost per man-day (Tshs.) per acre:

Activity/operation	Oranges	
	Frequency	Costs (Tshs)
Land preparation		
Planting		
Weeding		
Pruning		
Fertilization and spraying		
Transportation		
Others (Specify)		

C24. Did you purchase any inputs for the orange farming purpose? 1. Yes/2.No

C24.1 If yes, indicates such inputs and its costs:

Oranges Inputs	2010		2009		2008	
	Quantity	Price/qty	Price/qty	Quantity	Price/qty	Quantity
Hand hoe						
Pruning Knives						
Fertilizer						
Others (specify)						

C25   Which equipments do you use to store and carry oranges after harvesting?
       [1] Plastic container   (   )   [2] Drums   (   )
       [3] Traditional granaries   (   )   [4]   others
       (specify)................................

SECTION D: MARKETING AND DISTRIBUTION CHANNEL OF ORANGE FRUITS

D26　Who are the major buyers of your oranges?

　　　[1]..................................[2].........................

　　　[3]..............................

D27　Where do you normally meet with your buyers?

　　　[1] At home [2] At the field/farm [3] At the market [4] Others (specify)..................

D28　Do you supply orange fruits throughout the year?　1. Yes/2.No

D28.1　If yes to qn. 2.5, which months in a year there is a high demand of orange fruits?

D29　What is the peak month(s) of orange fruit production　　.........................?

D30　Do you normally have enough orange to meet demand?　1. Yes/2.No

D30.1: If **no** to qn. 2.8, how do you ensure constant supply of orange fruit..?

D31　What are the major challenges facing orange fruits production?

　　　[1] ....　　[2]　　　　　　　　　　.........................

　　　　　　　[3]..............................

D32　What should be done to improve Orange fruits production?

　　　[1]............................　　[2]...............................

　　　[3]...............................

D33:　What are the major challenges facing Orange fruits marketing?

　　　[1] ....　　　[2]..................

　　　[3]...............................

D34　What should be done to improve orange fruits marketing?

　　　[1] .... [2] .... [3]..

D35　What is the total quantity of orange fruits are purchased by big buyers along the chain　.........................?

D36　What is the total quantity of orange fruits did you produce in this production season...........................?

D37　What is the total quantity of orange fruits did you sell in this marketing season.............................?

SECTION E: INFORMATION ON MARKET ACCESSIBILITY

E.38　Where is your market outlets for oranges produced? [1] Wholesalers ()

　　　[2] Retailers　(　　)　　[3] Truckers　(　　)　　[4]　　　　　Others (Specify)..........

E39　Where do you sale your oranges?　　　　[1] At the farm gate　(　　)

　　　[2] At the town market ()　　[3] both at the farm gate and town market ()

E39.1　If you sale at the farm gate, how much you sale per orange? .... (Tshs.)

E39.2　If you sale at the market place, how much you sale per orange? ... (Tshs.)

E39.3 If you sale in town /local market, where do buyers coming from (Physical location)? ....

E40　How far is your selling point located from your orange farm? .... (KM)

E41　How determine orange price? [1] Farmer　(　　)　　[2] Buyer ()

　　　[3] Negotiated ( )

E42　Do you have access to market information for your produce? 1. Yes/2.No

E42.1　1If yes, how do you get information on market prices for your oranges?

　　　[1] Direct visit to the market　(　　)　　[2] cross check with fellow farmers in the village　(　　)　　[3] From extension officers　(　　)

　　　[4] Others (Specify)...

E43   Which stage do you start marketing your oranges?
      [1]Flowering stage   (   )   [2] Pre-maturity stage (   )
      [3] Maturity stage   (   )
E44   What marketing costs did you encountered during the process of marketing orange?

Type of cost	TSHs per quantity
Transportation	
Market fee	
Labour charges	
Taxes	
Others (Specify)	

E45   What means of transport do you use in transporting oranges to the market?
      [1] Head carrying   (   )   [2] Bicycle   (   )   [3]   Public
      transport   (   )
      [4] Own Vehicle   (   )   [5] Hired vehicle   (   )
      [6] Others (Specify)...
E46   By your experience, what are the problems associated with orange marketing?
      ....
E47   Have post harvest losses increased or decreased or remained constant for the past
      three years? ....
E47.1 If increased, why? ....
E: 47.2 If decreased, why? ....
E47.3 If remained constant, why? ....

SECTION F: MARKETING EFFICIENCY IN PERFORMING DIFFERENT OPERATIONS IN THE CHAIN IN TERMS OF PRICING AND MARGINS OBTAINED BY DIFFERENT ACTORS

F48   Revenue and operational cost of orange fruits production

Particulars (Tshs)	Units	Price/unit	Average price/Orange
Buying price (Bp) (A)			
Selling price (Sp) (B)			
Marketing margin (MM)			
Operational Cost (C)			
Production costs (Tshs.):			
Land preparation			
Planting			
Weeding			
Pruning			
Seedlings			
Harvesting			
Storage infrastructure cost (if hired)			
Loss due damage			
Cost of bags, string any protective materials (if any)			
Fertilization and spraying			
Transportation			
Others (Specify)			
Marketing Costs (Tshs): (D)			
Transportation			
Market fee			
Labour charges			
Taxes			
Others (Specify)			
Total operational costs (E): A+C+D			
Gross Margin (GM) (B-E)			

SECTION G: OFF-FARM ACTIVITIES

G49: Do you have any of the following sources of off-farm income?

Source of income	Frequency in a year	Income (Tshs.)	Total Income
Salary from employment			
Salary from business			
Salary as agricultural worker			
Salary from public work.			
Remittances from family/friends			
Income from sale of charcoal			
Income from renting land			
Other (Specify):			

SECTION H: INFORMATION ON FARMER'S INCOME

H50   What are the sources of income of your household?

[1] Farming activity   ( )   [2] Employment   ( )   [3] Business   ( )

[4] Livestock keeping ( )   [5] others (Specify)...

H50.1 Out of farming activities indicates quantity and prices of each crop produce in the last three seasons.

Oranges Inputs	2010		2009		2008	
	Quantity	Price/qty	Price/qty	Quantity	Price/qty	Quantity
Oranges						

H51   Apart from crop farming activities, what other activities bring income into your household? And how many you obtained for the last three years consecutively?

Sources of income	2010 (Tshs)	2009 (Tshs)	2008 (Tshs)
Formal employment			
Business			
Livestock keeping			
Others (Specify)			

SECTION I: LIVESTOVK ACTIVITIES

I52   Are you keeping any livestock? 1. Yes/2.No

I52.1 If yes, mention what type of livestock are you keeping?

Type of livestock	Number of livestock hold	Remarks (1. Household consumption, 2. Business, 3. Both consumption and business
Cattle		
Chicken		
Goats		
Pigs		
Others (specify)		

SECTION J: CAPITAL AND ACCESS TO FINANCE INFORMATION

J53   What was your source of initial capital used for orange farming?
[1] Own saving   ( )   [2] Family   ( )   [3] Inherited ( )
[4] Others (Specify)...

J54   Have you ever applied and received financial credit for orange farming improvement in recent year? 1. Yes/2.No

J54.1   If yes, from which source of finance?

Source	Amount (Tshs)	Interest rate (Tshs)	Term of payment (1. In cash; 2.In King; 3.Both

J54.2   If no, what do you think it could be the reason for not obtained?
[1] Not available   ( )   [2] High interest rate ( )   [3] High risks ( )
[4] Returns from oranges are too low to offered credit repayments (   )
[5] Others (Specify)..

SECTION K: MEMBERSHIP TO COOPERATIVE/ORGANIZATION AND RELATIOSHIP WITH OTHER ACTORS IN THE ORANGE CHAIN

K55   Are you a member to any orange farmers' organization (s)? 1. Yes/2.No

K55.1   If yes, which orange organization..?

K56:   What services do you get from the organization...?

K57   Do have access to any extension services? 1. Yes/2.No

K57.1   If yes, what kind of services...?

K58   Do you have any contractual arrangement with any orange trader? Yes/No

K58.1   If yes, indicates which among the following?
[1] Contract with orange inputs supplier (s) only   ( )
[2] Contract with orange buyer only ( )
[3] Supply orange inputs and buy oranges produced in the particular year agreed ( )
[4] Others (specify)..

K59   What are the key terms of contract?[1] Sell and buy at specific time ()
[2] Supply inputs and buys on specific price ( )   [3]   others (specify)...........

K60   Please what form of contract you have?
[1] Verbal contract ( )   [2] Written contract with lawyer assistance ( )
[3] Written contract without lawyer assistance ( )

K61   How do you get paid for your product?   [1]   Cash ( )   [2] In Kind( )
[3] In Credit ( )   [4] others (specify)..

SECTION L: ASSETS (PHYSICAL, LAND, AND LIVESTOCK)

L62   Please indicates name of assets, quantity, value, and when acquired in the table below:

Name of Asset	Quantity	Value	When Acquired (year)

SECTION M: LIVELIHOOD

M63: New house construction or rehabilitation of old house	How many new buildings constructed using income from orange farming based project------------------, improvements made to an hold house (walls, iron sheet)-- --------------------
M64: Equipment and tools acquired using income from orange farming based	What kind of household assets, means of transport and farming tools acquired using income from orange farming based
M65: Land acquired using money from orange farming based	Mention size of land in term of acres acquired and its costs as a result of orange produced, if any.
M66: Livestock purchase using income from orange produced	Mention number and value of livestock purchased using income generated from orange farming sub system, if any.
M67: Proportion of income from orange farming sub system used to paying school fees	How much income from orange farming sub system used for school fees as % of fees paid
M68: Number of school children benefiting from the orange project	Mention number of children using income from orange production for school fees and other educational need such as book, pens etc

Appendix 4: Questionnaire for Orange Retailers and Wholesalers Who Trade Oranges to Domestic Market

Name of the Enumerator: ....
Date: ....

A: IDENTIFICATION
1.   Questionnaire number.....................
2.   Name of the Market........................
3.   Name of the Respondent: ....

B: SOURCES OF THE PRODUCE
4.   Indicate the source and the price you pay in purchasing the produce

Supplier market	Years					
	2010		2009		2008	
	Price (Units)		Price (Units)		Price (Units)	
	Low season	Peak season	Low season	Peak season	Low season	Peak season
1.Producer						
2.Wholesaler						
3.Trucker						

C: QUANTITY OF PRODUCE HANDLED
5   Indicate the quantity of produce (Oranges) you normally handle during the low and peak seasons:

Season	Years					
	2010		2009		2008	
	Quantity (Units)		Quantity (Units)		Quantity (Units)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1.Low						
2.Peak						

D: MARKET OUTLETS AND PRICES
6.   Indicate market outlet where you sell your produce and prices you receive.

Outlet Market	Years					
	2010		2009		2008	
	Price (Units)		Price (Units)		Price (Units)	
	Low season	Peak season	Low season	Peak season	Low season	Peak season
1.Consumer						
Others (Specify)r						

E: MRKETING COSTS

7.   Indicate the expenses you incur in selling your produce (Oranges)

Item	Cost (TSHs)					
	2010		2009		2008	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1.Transport						
2.Labor						
3.Market fee						
4.Tax						
Other (Specify)						

8.   Do you own/operate means of transport? 1. Yes   ( )   2. No ( )

9.   If yes, indicate the type of transport, ownership and capacity

Type of transport	Ownership		Capacity (give units)	
	Own	Hired		
Pushcarts				
Donkey/Oxen drawn carts				
Bicycle				
Tricycle				
Pick-up				
Truck				
Others (specify)				

Appendix 5: Questionnaire for orange wholesalers who transfer oranges to Nairobi

Central Market

Name of the Enumerator: ....
Date: ....

A: IDENTIFICATION
1. Questionnaire number...
2. Name of the Market..
3. Name of the Respondent: ....

B: SOURCE OF THE PRODUCE
Indicate the source the produce, buying and selling price:

Year	Supplier	Quantity per trip		Buying price (TSHs/fruit)			Selling price (Kshs/bag)	
		Min	Max	L/peak	Peak	E/peak	Min	Max
2010	Trucker							
2009	Producer							
2008	Middleman							

Indicate the expenses you incur in selling your produce (oranges)

C: MARKETING COSTS IN TANZANIA
a) Transport charge

Year	2010	2009	2008
Tshs/trip			

b) Allowances for both driver and conductor

Year	2010	2009	2008
Tshs/day			
Kshs/day			

c) Customs and excise duties at Namanga border

		2010	2009	2008
Tz-Side (TSHs/truck)	Inn			
	Out			
Kny side (TSHs/Truck)	Inn			
	Out			

Additional tax unit the produce is finished

	2010	2009	2008
Kshs/truck			
TSHs/truck			

Labor charge (Off-loading and repacking)

	2010	2009	2008
Kshs/truck			
TSHs/truck			

Packing materials cost

	2010	2009	2008
Kshs/truck			
TSHs/truck			

Minimum time for selling one truck ....

M-aximum time for selling one truck..

Losses per truck (%)...

Appendix 6: Check List for Key Informants

**1.0   General Information**

1.1   What is your designation? ……..   1.2 Name of Wards…….. 1.3 Village………

2.0   Specific Questions

2.1   What types of crops are cultivated in your geographical area?

2.2   How many types of oranges are you cultivating in your area?

2.3   How many hectares planted orange trees in your area?

2.4   On average, how many oranges (in figure) produced and sold per year in your area?

2.5   What types of orange value additional activities are done in your area?

2.6   How many orange farmers associations registered in your area?

2.7   What services these associations have been providing to members?

2.8   What orange production and marketing constraints facing orange sub-sector in your area?

2.9   On average, how many oranges are produced in one acre especially in your area?

2.10 What types of institutional arrangements have been applied by smallholder orange farmers in your area? And how does it work?

2.11 What types of services does your organization provide farmers?

2.12 On average, what is the price of one orange during peak and off-seasons in your area?

2.13 How many orange traders associations registered in your area?

2.14 What roles are they doing to help farmers if you exclude the role of buying oranges?

Appendix 7: Linearity Consideration
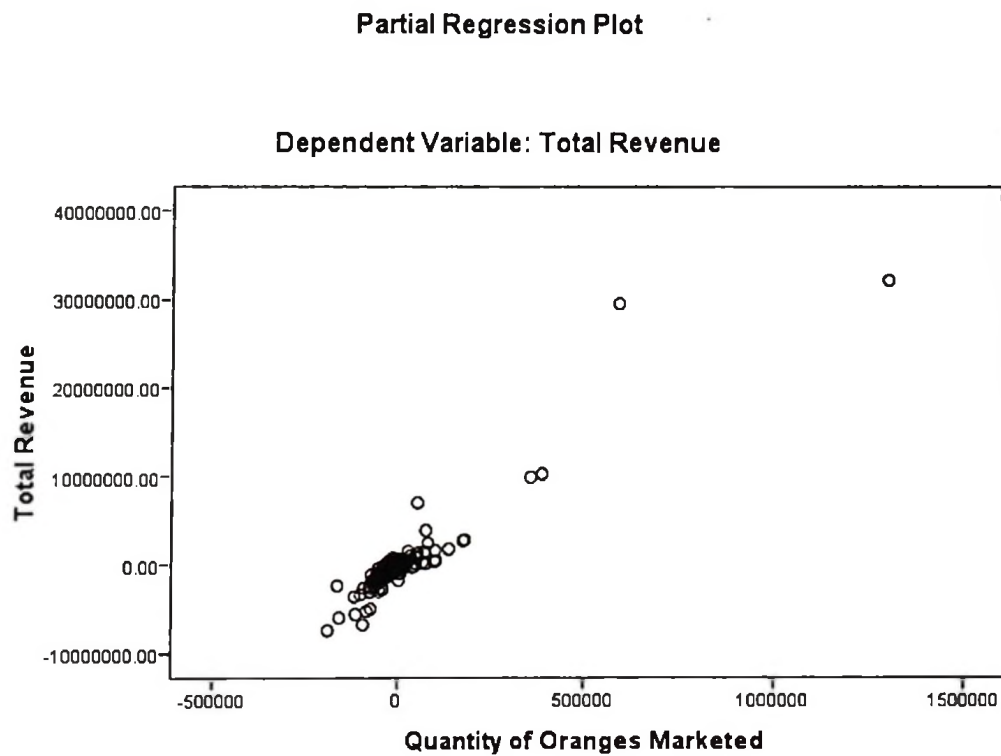
Partial Regression Plot

Dependent Variable: Total Revenue

The figure above, confirms that the overall independent variable's relationship is linear as the residuals fall within a general random pattern. The values fall along the diagonal with no substantial or systematic departures or serious outlier.

Appendix 8: Linearity Consideration
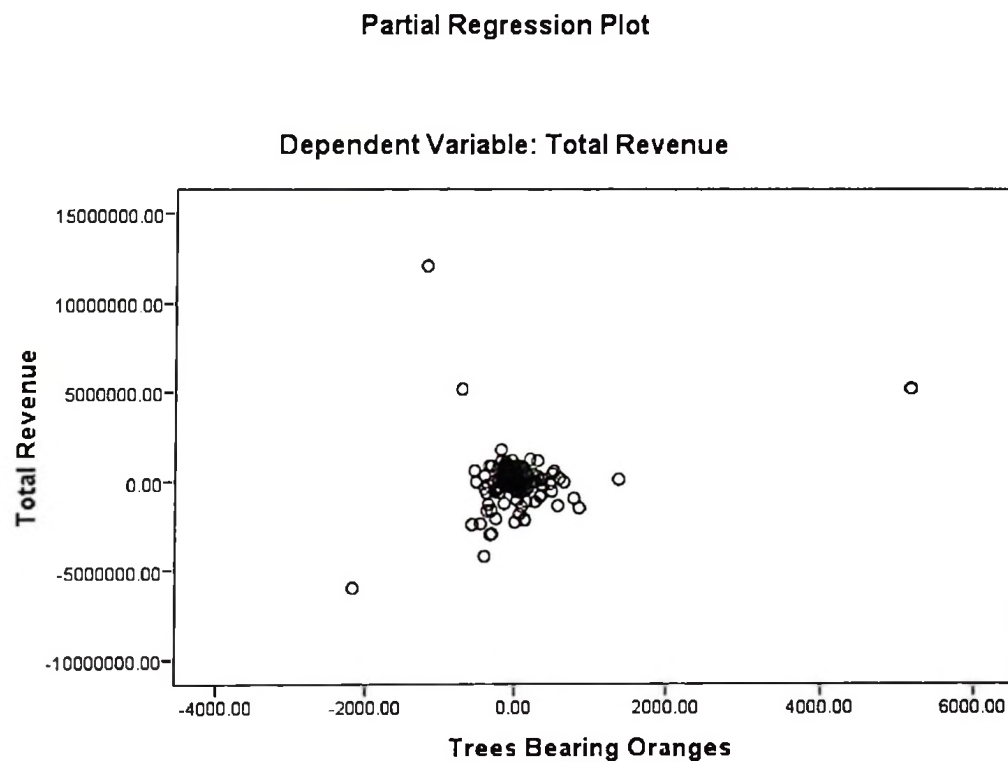
Partial Regression Plot

Dependent Variable: Total Revenue

The figure above, confirms that the overall independent variable's relationship is linear as the residuals fall within a general random pattern. The values fall along the diagonal with no substantial or systematic departures or serious outlier.

Appendix 9: Histogram indicates the data are normal distributed in the model

Histogram

Dependent Variable: Orange Income (Y)

Mean =1.24E-16
Std. Dev. =0.973
N =152
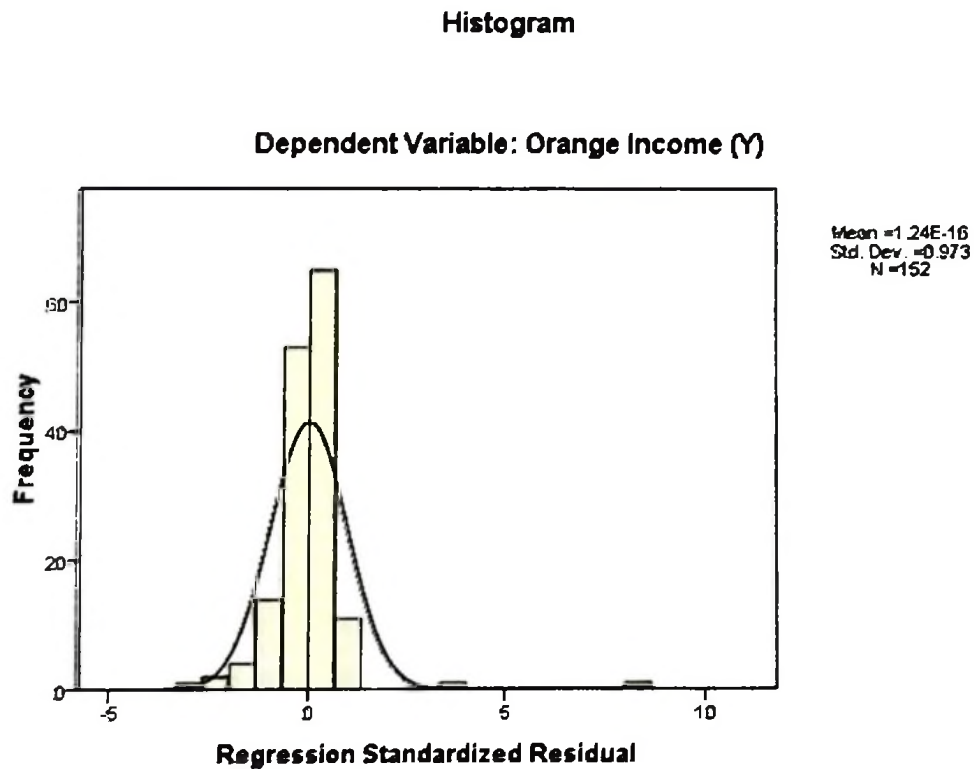
Normality test was checked with visual examination especially normal probability and histogram plots. The histogram plot test shows the independent variable values fall within distribution curve. It therefore, indicates that there is no problem of concern in the model.

Appendix 10: Pearson Correlation Matrix for Measuring Malticollinearity

		OI	TBO	OFEXP	OFEDU	OPR	MIA	OFAG	QOM	TRANSCOST
OI	Pearson Correlation	1								
	Sig.(2 tailed)									
	N	152								
TBO	Pearson Correlation	.485**	1							
	Sig.(2 tailed)	.000								
	N	152	152							
OFEXP	Pearson Correlation	.138	.203	1						
	Sig.(2 tailed)	.090	.012							
	N	152	152	152						
OFEDU	Pearson Correlation	.004	-.005	.097	1					
	Sig.(2 tailed)	.962	.949	.234						
	N	152	152	152	152					
OPR	Pearson Correlation	.413**	.195*	.089	.013	1				
	Sig.(2 tailed)	.000	.016	.276	.870					
	N	152	152	152	152	152				
MIA	Pearson Correlation	-.166*	.015	.024	-.209*	-.041	1			
	Sig.(2 tailed)	.041	.853	.765	.010	.620				
	N	152	152	152	152	152	152			
OFAG	Pearson Correlation	.088	.030	.169*	.051	-.200*	.000	1		
	Sig.(2 tailed)	.282	.710	.037	.530	.013	.995			
	N	152	152	152	152	152	152	152		
QOM	Pearson Correlation	.915**	.451**	.169*	-.004	.172*	-.149	.189*	1	
	Sig.(2 tailed)	.000	.000	.038	.965	.034	.068	.020		
	N	152	152	152	152	152	152	152	152	
TRANSCOST	Pearson Correlation	.056	-.228**	-.022	.057	.069	-.020	.004	.107	1
	Sig.(2 tailed)	.490	.005	.788	.488	.398	.811	.965	.190	
	N	152	152	152	152	152	152	152	152	152

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

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix 11: Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-1.121E6	902101.273		-1.243	.216		
TBO	628.054	232.919	.077	2.696	.008	.726	1.378
Orange Farming Experiences	-30488.558	18473.096	-.042	-1.650	.101	.906	1.103
Orange Farmer's Education	17902.658	66161.061	.007	.271	.787	.937	1.067
Orange Price Received	89516.839	9056.204	.256	9.885	.000	.893	1.120
Market Information Access	-324676.821	277517.844	-.030	-1.170	.244	.921	1.086
Orange Farmer's Age	-6629.110	10374.969	-.017	-.639	.524	.880	1.137
Quantity of Oranges Marketed	28.285	.956	.850	29.589	.000	.723	1.383
Transport Costs	-1.473	.520	-.071	-2.834	.005	.938	1.066

a. Dependent Variable: Orange Income (Y)

Appendix 12: Regression Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.956[a]	.915	.910	1.53443E6	1.888

a. Predictors: (Constant), Transport Costs, Orange Farmer's Age, Market Information Access, Orange Farming Experiences, Orange Farmer's Education, Orange Price Received, Trees Bearing Oranges, Quantity of Oranges Marketed

b. Dependent Variable: Orange Income (Y)

Appendix 13: ANOVAb

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3.608E15	8	4.511E14	191.575	.000[a]
Residual	3.367E14	143	2.354E12		
Total	3.945E15	151			

a. Predictors: (Constant), Transport Costs, Orange Farmer's Age, Market Information Access, Orange Farming Experiences, Orange Farmer's Education, Orange Price Received, Trees Bearing Oranges, Quantity of Oranges Marketed

b. Dependent Variable: Orange Income (Y)