ECONOMIC ANALYSIS OF GRAPE PRODUCTION IN TANZANIA: A CASE STUDY OF DODOMA REGION

ARISTIDES ABDALLAH NALYOTO

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CERTIFICATION

The undersigned certifies that he has read and hereby is recommending for the acceptance by the Open University of Tanzania a dissertation entitled “The economic analysis of grape production: A case of Dodoma Municipal Council” in partial fulfillment of the requirements for the Degree of Master in economics of the Open University of Tanzania.

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Prof. Deus D. Ngaruko

(Supervisor)

.....

Date

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DECLARATION

I, **Aristides Abdallah Nalyoto**, declare that, the work presented in this dissertation is original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfillment of the requirement for the Degree of Science in Economics (MSc-Econ.).

……

Signature

……

Date

DEDICATION

This dissertation is dedicated to my lovely wife Ainia Athuman Mseli for her support given to my work, my children Bernadeta Aristides, Irene Aristides, Anselm Aristides and Ivone Aristides, for their patience, without them I could not have completed this work

ACKNOWLEDGMENT

I'm very humble to give my thanks to all who contributed in one another in the construction and accomplishment of this dissertation. These people including my father Abdallah Nalyoto and mother Wilhelmina Yondani for delivering and caring me in a good condition, my wife Ainia Mseli my children Bernadeta Aristides, Irene Aristides, Anselm Aristides, and Ivone Aristides, my grandfather, grandmother and young brothers, for their tolerance during my work, academic staffs of OUT- Dodoma regional center, OUTSO leaders, nonacademic staffs, my fellow students and other people who helped me in typing, setting proof reading, printing and submission of this dissertation.

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ABSTRACT

The aim of this study was to assess the contribution of production and profit efficiency of grapes production from farmers in Dodoma municipal council. The research used two approaches quantitative approach and qualitative approach. From a sample of 118 respondents from grape farmers were provided with questionnaire inorder to tackle three specific objectives. These are to determine the production cost on grape production in Dodoma urban district, to determine institutional factors on grape production in Dodoma urban district and to assess the socio economic factors on grape production in Dodoma urban district. The study used Statistical Package for Social Sciences (SPSS) program version 20 in statistical data analysis and regression method. The regression uses variables such as land, seedlings, chemicals, fertilizers and labour. The study findings show that grape production contribute a lot in economics of the household since it contribute the income of the household up to profit of 667,419 Tzs per acre. Therefore several strategies should be initiated as key factor to boost grape production. Strategies like formation of groups or cooperative agriculture expertise should establish close relationship with farmer and simple storage facilities should be provided with collaboration with different partners like individual, private sectors and government. The study concluded that, socioeconomic, institutional and inputs costs factors collectively contribute to efficiency for gape production. Therefore, it is recommended that strategy for production should be initiated in corroborations with different partners like individuals, private sector and government.

Keywords: *Economic efficiency, Grape Production, Institutional Factors, Socio Economic Factors*.

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LIST OF ABBREVIATIONS

ASDP	Agriculture Sector Development Strategy
ASDS	Agriculture Sector Development Strategy
AE	Allocative efficiency
CETAWICO	Central Tanganyika Wine Company
DEA	Data Envelopment Analysis
EE	Economic efficiency
KG	Kilogram
MLE	Maximum likelihood Estimator
OLS	Ordinary Least Square
TE	Technical efficiency
UWAZAMAM	Ushirika wa Wakulima wa Zabibu na Masoko Mpunguzi

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Grape production is one of the world's largest fruits crops with approximately 67.5 million tons produced each year. Grape grows best in the Mediterranean type of climate with long relatively dry summers and mild winters. Worldwide, Grape is mainly meant for wine production however, a certain portion is dried into raisins and a major part is marketed as fresh fruit, making table grapes is one of the world's prominent fresh fruits crops (Khoshroo *et al*., 2013).

According to FAO (2010), approximately 71 percent of the world grapes production is used for wine, 27 percent as fresh fruits and 2 percent as raisins (dried fruit), on the other hand, the peel of grapes is the source of essential oil and pectin. Also serve as a raw material for the production of cattle feed and in preparation of candies (Kumar, 2010). Consumption of fresh grapes in US has increased from 2.9 pounds per person in 1970 to 7.9 pounds in 2009 (ESR, 2009). Moreover, grape is the most important and economical garden fruit crop in the world (Shahraki, Dahmardeh and Karbasi, 2012).

Year 2012 US and Canadian market, price for fresh grapes jumped to $1,340 per tons compared to prices last peaked at $986 per tons in 2006 (NASS), 2013). The major grape producing countries includes China which rank top position with production percent share of 12.8, Italy 11.57 percent and USA 9.24 percent, Spain 9.07 percent and France 8.69 percent together accounting for 51.42 percent of total world production (FAO, 2012).

In the developing countries, labour is abundant, making production of grapes to be well suited as they are more labour intensive. Thus, this stimulates rural employment and the workers can improve their standard of living (Mencarelli and Bellincontro, 2005). In a way when farmers can engage in trade activities they can create job opportunities for their communities. According to Zhang et al. (2016), the most important factors that influence the consumption of grapes is its taste and rich nutrition. In contrast to a study that was done by Feng et al. (2012), it was found that quality and safety are the two most important factors that influence consumers' consumption and purchasing power for grapes.

Africa grapes are produced in many countries, South Africa being the leading country in Africa, more than 80% of table grapes are produced in the Western Cape Province, and other production areas include Northern Cape, Eastern Cape, Limpopo, Free State and Mpumalanga (DAFF, 2012). The Limpopo Economic Development (LED) (2010) indicates that the Northern Cape Province is the dominant producer for table grapes. Even though Limpopo Province is recognised among the table grape producers, it depends on only two districts (Waterberg and Sekhukhune Districts) out of the five districts. This shows that Limpopo Province has limited farmers who are producing table grapes. It has approximately 90 farms that are supplying grapes to the international market. The market for table grapes has shown growth.

Tanzania grapes are produced in Dodoma region (Kulwijira *et al*. 2018). Grapes is the one of the major fruit crops of economic importance in Tanzania, it considered as one of the most important cash crops, raw materials and source of employment,

Dodoma is the main region in Tanzania where grapes are grown, according to 2014/15 season data compiled by the Dodoma regional agricultural office there were about 4,810 acres (1,924 ha) under grape production in the region. In the year 2015 the total annual production was 10,800 tons, equal to an average yield of 2.25 tons per acre. Grape production is the main stay for many farmers in Dodoma Municipal and the nearby districts of Chamwino and Kongwa. Dodoma urban produces 70% while Dodoma rural produces 30% of the grapes (SNV Tanzania a report on fresh fruits, 2005).

Grape production trend in Dodoma has steadily increased over the last 5 years, partially due to the increased processing capacity of local processors. The recent introduction of smaller and more affordable processors such as Central Tanganyika Wine Company (CETAWICO), ALKO VITAGE Co.Ltd and Ushirika wa Wakulima wa Zabibu na Masoko Mpunguzi (UWAZAMAM) given farmers incentive to produce grapes. As more processing options become available to farmers, production will increase as farmers are able to respond to the demand which influenced by the price received. Aside from price, farmers consider many other factors to determine profitability of grape farming, including production, inputs, transport and labor cost. (LWR, 2016).

Grape can be marketed in different utilities like form, time, place and possession which crate wide chance to increase farmers welfare also it has multi usage like eaten as raw or can be used for making jam, juice, jelly, wine, grape seed extracts, raisins, vinegar and grape seed oil. Regardless of potentiality of grapes, small holder grape growers in Tanzania are facing production, processing and marketing

problems such as inadequate product quality, few processing plants or winery industry, low price, high cost of inputs, low incentives, low output, unreliable rainfall, insufficient agricultural extension services, late payment, low labour productivity, poor infrastructure and poor harvest management and product grades (MITM, 2008; and MAFC, 2006). As a result farmers ending up having unreliable markets and receive low price for grapes produced as business firm tends to be price maker and farmers price taker.

1.2 Problem Statement

It is possible to attain economies of scale in agriculture by expand cultivated area and productivity, regardless of increase in area cultivated and increase productivity of grape in Dodoma regional from 2010 to 2015 where by area cultivated increase from 892 ha to 1 924 ha while production raise from 5 576 tons to 10 813 tons (SNV, 2005). At the same time there is no clear statistic of how grape farmers are efficient in using factors of production per unit area as well as profit gained after marketing their products. Sustainable production depends much on production efficiency and profit gained, while most researchers on agriculture focused on how to achieve certain level of yields (e.g. Nakano, 2010 and Zacharia *et al*, 2013) without considering the need to increase agricultural productivity through proper utilization of resources.

However few researchers consider rational resources allocation to improve efficiency, this study will measure the technical efficiency of grape production in Dodoma and identify socio economic factors that determine technical efficiency, achievement of technical efficiency will facilitate grape farmer to produce their

output with cheap cost while increase productivity as well as increase profit margin.

1.3 Research Objectives

1.3.1 General Objective

The general objective of this research is to determine economic factors on grapes production in Tanzania

1.3.2 Specific Objectives

i. To determine the production factors costs on grape production in Dodoma Urban district
ii. To determine institutional factors on grape production in Dodoma Urban district
iii. To assess the socio- economic factors on grape production in Dodoma Urban district

1.4 Research Hypotheses

Ho: Production factors costs has no impact on grape production

Ho: Institutional factors has no impact on grapes production

Ho: Socio- economic factors has no impact on grape production

1.5 Significance of the Study

The findings of this research will help the government through Ministry of Agriculture to reduce the price of inputs, to provide encentives, to employ more extension officers, to find and provide reliable market and set or creat reliable price. The study also will help farmers to organize themselves to form groups or coorperatives and to encarage young people to envolve in grape production.

1.6 Scope of the Study

This study was conducted in Dodoma region in Tanzania, specifically at Dodoma municipal council. The study covered two wards, the choice of study area were based on the grape production potential within the district according to Dodoma regional agricultural office report (2018).

1.7 Organization of the Study

This study was arranged or organized in five chapters. Chapter one was dealt with the introduction and background of the study, statement of the problem, objectives of the study, research questions, significance of the study, scope of the study, and limitations of the study. Chapter two was concerned with theoretical literature review and empirical literature review, definition of terms and conceptual framework of the study. Chapter three dealt with research methodology including research design, area of the study, population of the study, sample size, sampling procedures (purposive sampling and random sampling), data source, interview, and questionnaire methods, validity and reliability of instruments, processing and analysis of data, ethical issues and expected research findings. Chapter four dealt with presentation, analysis and interpretation of data and discussion of findings and chapter five dealt with summary of findings, implication of the study, conclusion, recommendation, limitations, and recommendations for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1. Chapter Overview

The economic analysis reflects the ability of farmer to maximize output or minimize cost from the level of inputs. One can trace back the beginning of theoretical development in measuring (output –oriented) technical efficient to the work of (Debreu, 1951; 1959). Since then there is a growing literature on the technical on smallholder farmers. The explanations of this chapter base on six subsection which are, definition of key concepts which compiles all concepts used to formulate the title, theoretical literature review describe all concepts with relation to relevant theory which build concepts, empirical literature review this is the review of current and similar research done, policy review, research gap and conceptual framework to show the causality between variable. Study focus on smallholders' includes (Basnayake, 2002; Barnes, 2008; Duvel *et al*., 2003; Shapio *et al*.,)

2.2. Definitions of Key Concepts

This section dealt with definition of different terms used in this study, including, economic efficiency, grape production, institutional factors and socio economic factors

2.2.1 Economic Efficiency

The concept of economic efficiency is commonly used in the production of agricultural produce. According to Ogundari and Ojo (2006), Economic efficiency is a measure that provides inputs and or outputs in quantities such that all users have the same marginal benefit and all producers operate at the same marginal cost.

2.2.2 Grape Production

According to Aung (2012), grape production refers to the ability of a farm to increase output for a given set of inputs and also at the lowest cost. On the other hand, grape production is the extent to which farmers make efficient decisions on how to use inputs to the level to which their marginal contribution to production value equal the cost. It is a good analysis of production as it outlines whether a farmer is operating at a good level of output or not.

2.2.3 Institutional Factors

Scott (2014) defines institutional factors as 'composed of cultural-cognitive, normative, and regulative elements that together with associated activities and resources. Institutional factors refers to factors that affect agricultural land markets are discussed, such as land market institutions and regulations, transaction costs, credit market constraints and levels of profitability, the legal means of contract enforcement and land use alternatives.

2.2.4 Socio Economic Factors

The socio-economic factors (Boardman 2003), refers as the joint contribution of the socio-economic characteristics (age, gender, marital status, educational qualification, years of farming, family size, and farm income per month) to the prediction of farmers' use of inputs for agricultural information.

2.3. Theoretical Literature Review

This study based on production theory. The theory explained that a rational firm seeks to maximize profit or minimize cost during allocation of production factors,

there is three important theory used to measure efficiency, technical, economic and allocative. Technical efficiency {TE} refers to the ability of a firm to produce the maximum output from a given level of inputs. Allocative efficiency {AE} refers to the ability of using the inputs in an optimum way given their respective prices and the production technology, while Economic efficiency {EE} refers to the capacity of a producer to produce a predetermined quantity of output at the minimum cost given a certain level of technology. Proposed study will examine TE grape farmers in Dodoma region.

2.3.1. Production Efficiency

Lwelamira, *et al.,* (2015) studies the grapevine farming and its contribution to household income and welfare of smallholder farmers in Dodoma which involve total sample size of 252 respondents. The results show that grape farming contributes more than 35.6 percent which is more than one third of total household income and plays an important role in household welfare, also study identify number of challenges facing grape growers which includes low price of grapes, high costs of inputs, limited access to market, prevalence of pests and diseases, inadequate storage facilities and limited access to quality seedlings.

Kalimang`asi, *et al.,* (2014) in his study found that smallholder female farmers were more efficient they produced 2000Kg/1.60 acre than males who produced 1480Kg/1.72Acre, as well results indicates that unmarried smallholders were more efficient (2000kg/1.00acre) compared to married who produced 1590 kg/1.75acre. Also, youngest farmers had the largest grape output (average 2170kg/1.33 acre) compared to elders (1540 kg/1.75 acre). The study reveal that grape production was

mostly practiced by people with low education level and each smallholder grape producers sold an average 1530 kg per year which account for 91.4 percent of market share as well as major challenges faced by smallholder grape producers were decline of the quality of grape due to delayed payment, diseases and unreliable market.

Njiku, *et al.,* (2018) conduct research on determinants of technical efficiency and factors contributing to their inefficiency of small scale sunflower oil processing firm in Tanzania by using panel design of three years data with 219 sample size. Results reveal that 75 percent of the firms operate under capacity with steadily declining technical efficiency as well as Capital and factors input of production contributed statistically significantly to the output of the firms under the study. Firm age, location, ownership type, age and education of the owner were found significant determinants of technical efficiency in sunflower oil processing firms in Tanzania.

Ibrahim, *et al*., (2014) in his study which conducted in Nigeria based on the relationship between input use and inefficiency in maize production, respondent were surveyed and data on inputs use, cost of production and yields were obtained. Stochastic frontier production function used to analyze data. The finding reveals that there is technical inefficiency in the use of inputs and certain socio economic factors contribute to inefficiency. Asela, (2017) conducted research on technical efficiency by comparing production efficiency of maize crops among smallholder farmers in Tabora and Ruvuma regions respectively, using maximum likelihood estimation and ordinary least square on Cobb-Douglas production function and OLS on technical inefficiency model. Findings indicated that, Tabora smallholder farmers were more

technically efficient with mean technical efficiency of 61 percent compared to 53 percent of Ruvuma farmers. Farm size was most important factor that increased maize output and Tractor asset being the most in optimal used factor keeping other factors constant, in both regions. From the technical inefficiency model variable age, household size, primary education and inputs costs increased technical inefficiency while credit access, capital assets, good living condition and crop farming as main activity increased technical efficiency in both regions.

2.3.2. Cost Efficiency

Paudel and Matsuoka (2009) conduct study to estimates the cost efficiency from 180 maize farmers in Nepal by using stochastic frontier model, among other parameters cost of manure, labour, tractor, animal power, fertilizer, pesticides and seeds were used. The maximum livelihood estimates of the parameters reveal positive except pesticides while the average cost obtained from the cost function showed cost efficiency of 1.634 which indicates that the average maize farms incurred 63% cost above the frontier which is inefficiency.

Hidayah *et al*. (2013) studies a production and cost efficiency analysis on paddy farming system in Indonesia by using frontier stochastic approach to determine the level of production and cost efficiency with Integrated Plant and Resources Management, maximum likelihood methods was used to estimates the parameters. One hundred and twenty was the total number of respondents obtained by using simple random sampling methods. The finding reveal that variation of error term in both models a highly influenced by inefficiency factors (production 0.933 and cost 0.948) rather than stochastic factor, while the average technical and cost efficiency

was 0.855 and 0.86 respectively.

Stochastic Frontier production function used to measure and compare production frontiers and technical efficiencies of rice production in India and Thailand, the results reveal that all inputs has shown positive relations with output but factors seeds and pesticide indicated negative effect for both India and Thailand on rice output. Technical efficiency score is increase in India from 0.87 in year 2002 to 0.98 in 2014 while in Thailand TE is decrease from 0.96 to 0.94 during the same time (Sirikanchanarak *et al*.2017).

2.3.3. Agricultural Production Economics Theory

The agricultural production economics theory is based on the assumption that agriculture is an economic activity which is influenced by economic variables (Debertin, 2012). Proponents of the theory such as Colman and Young, (1997) have argued that in order to facilitate development to the producers and country in general, agricultural activities need to take into account four groups of economic factors. The first set of factors is market factors that influence demand and supply of agricultural products. The second set of factors includes production factors that include inputs such as supply of labour, machinery, fertilizers and finance capital. The third group includes efficiency utilization of resources. The fourth set includes impact of technology change.

The theory further assumes that that the main objective of the farm manager is Profit maximization through sales of the crops produced. Profit maximization results from process that transforms inputs into final goods and services involves inputs and

technology choices that maximizes output with least cost and thus the principal motive of smallholder farmer as economic agent is to maximize profit either by minimizing cost or maximize output. Profit maximizing objective of the farm household leads to agricultural commercialization (Debertin, 2012; Tirkaso, 2013).

This theory guides determine economic factors on grapes production in Tanzania among small holder grape farmers. The study examined the interface between economic factors and production of grape agriculture in Dodoma region. In support of this view Colman and Young (1997) have also argued that the theory can guide the analysis of relationship between economic variables and agriculture. The agricultural production economics theory explains the relationship between inputs and outputs, which is the transformation of factor inputs into outputs (Thomas and Maurrice, 2008). Debertin (2012) defines Production function as the technical relationship that transforms inputs (resources) into outputs (commodities).

According to Rasmussen (2012) the theory of production economics is special in that the limits of economic behaviour are defined by the technical production possibilities. Production technology is the decisive factor regarding the quantity produced and how it may be produced. Therefore, a very important part of the theory of production economics consists of describing the production technology which defines the framework for the economic behaviour. Production technology is, in its most general form, a description of the relationship between input and produced output. The description of production technical relationships is based on empirical observation of relationships between inputs and outputs. Generally, production always includes at least two, and often more, inputs. A complete

description of the production technology for a given product will therefore assume a multi- dimensional illustration providing a simultaneous illustration of the relationship between output and all inputs (Rasmussen, 2012).

Furthermore, the study was guided by production theories in which farmers make a decision on the choice of production socio economic factors that maximizes profit subject to resource constraints. Productivity and profitability are some of the basic concepts in economics of agricultural production. This theory fits to the study due to fact that, Agricultural production economics theory assumes that farmer's main objective is at profit maximization through sales of the crops produced. The theory highlights economic factors which play a great role in fueling up commercialization of rice production. Therefore, this theory helps to determine the way in which small holders' famers will utilize economic factors and output in grape production.

2.3.4. An Endogenous Growth Model (the AK model)

Rebelo (1991) provided a simplest version of the endogenous growth model, the AK-model. It is characterized by the following production function:

$Y = Ak$.....(1)

Where;

Y is the level of income,

A is some constant that ensures proportionality of income to capital and

K is the capital stock.

This model belongs to the first generation of the endogenous growth models (Acemoglu, 2008, ch.11) and explains cross country differences in the growth

rates of income through the differences in the saving rates which in turn can be influenced by the economic policy conducted by the government (Rebelo, 1991; Jones, 2002, ch.8). It is assumed that the production function is linear in its only factor of production, the capital stock. Population is assumed to be constant (Rebelo, 1991) and, thus, the population growth rate is equal zero. An endogenous character of the model is based on a result that government economic policy has long run implications on the saving patterns of the households and, thus, on the growth rate of a country. The assumption about the production function rejects a possibility of exogenous technological change implied by the Solow model and leads to the conclusion that the technological growth rate must equal 0. (Rebelo, 1990).

With technological progress together with the constant returns to capital the growth would be accelerating, which we do not see in reality. The main feature of the AK model is constant returns to scale exhibited by the production function and in particular the constant return to the accumulated factor of production, capital. Rebelo (1990) explains the presence of constant returns to scale through the absence of such finite resources as land in the process of capital stock production. Based on these assumptions, the production function becomes proportional and linear in capital with the share of income paid to capital owners equal to 1 (since α - 1).

The capital stock is accumulated through the process of savings and this can be expressed by the following equation:

$$\dot{K} = sY - \delta K \qquad (2)$$

Constant returns to the capital accumulation guarantee a constant addition to the total output equal to *A* per unit of additional capital (Jones, 2002, ch.8). From the equation of the capital accumulation (2) it is seen that savings and depreciation can be represented by straight lines (Jones, 2002, ch.8). Therefore, the capital stock is always growing, which leads to an unlimited growth in the level of income.

If we divide both sides of the capital accumulation equation (2) by *K*, the growth of capital equation will be derived:

$$\dot{K}/K = sA - \delta \quad \text{.....(3)}$$

Recalling the production function (1), it is seen that the growth rate of output is equal to the growth rate of capital (Jones, 2002, ch.8):

$$\dot{Y}/Y = \dot{K}/K = sA - \delta \quad \text{.....(4)}$$

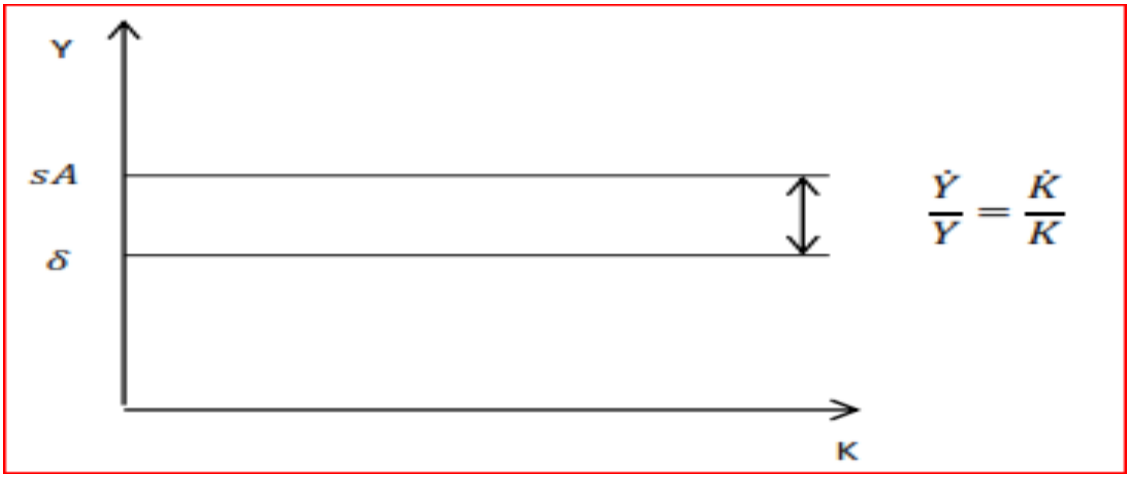

Figure 2.1: The Basic AK-model Equation

The income growth equation (4) shows that the linearity implied by the assumptions of the AK model leads to the infinite growth in income (see Figure 2.1). Thus, the economic policy orientated on an increase in investments through

savings will have long run effects on the income growth of a country and will result in substantial income differences between countries (Rebelo, 1991). This is the core conclusion of the AK-model which is quite different from the Solow model where this mechanism does not exist.

2.4. Empirical Literature Review

Economics analysis (technical and cost efficiency) grouped into parametric and non-parametric frontiers; the main difference between the two is the assumption on the distributional form. Parametric frontiers impose a functional form on the production function and make assumption about the data and non-parametric frontiers do not impose the functional form on the production frontiers and do not make assumption about the error term (Battese and Coelli, 1995).

Furthermore, parametric models can be separated into deterministic and stochastic, deterministic models assume that any deviation from the frontier is due to inefficiency, while the stochastic approach allows for statistical noise. According to Green (1992), the fundamental problem with deterministic frontier models is that any measurement error, and any other source of stochastic variation in the response variable is embedded in the one- sided component making the resulting technical efficient estimates sensitive to outliers. Fortunately, the stochastic frontier model addresses this problem by incorporating a composed error structure with a two sided symmetric term and a one- sided component. The one sided component reflects inefficiency, while the two sided error captures the random effects outside the control of the production farm (Bravo-Ureta *et al*., 2007).

The non- parametric technical efficiency models are also referred to as Data Envelopment Analysis (DEA). These are based on mathematical programming techniques. The main feature of DEA methods is that they do not require the specification of a functional form for the technology as it is the case for parametric models. The fact that these methods are deterministic, they suffer the effect of extreme observations. Another characteristic of DEA methods is the potential sensitivity of efficiency scores to the number of observations as well as to the dimensionality of the frontier (Ramanathan, 2003). Common variables that have been used in estimating technical efficiency in previous studies are farm size, farming experience which sometimes exchanged with age of a household, education level, credit use and use of extension services.

Tschering (2002), conducted a profitability analysis of bean production in Honduras ,the study was based on record keeping data collected from Honduran bean farmers during the period 1998- 2000. His study focused on assessment of profitability analysis of bean production for farmers growing traditional and improved bean varieties. It was observed that farmers growing improved varieties had higher average yields and got higher profit compared to traditional varieties. Ehinmowo and Ojo (2010) conducted a study on economic analysis of Kola-nut production in Nigeria using gross margin analysis. The result revealed that Kola-nut production was a profitable enterprise.

Olorunsanya *et al*. (2009) used cost and return analysis in the economic analysis of soyabean production in Kwara State, north central Nigeria. The result obtained shows a gross margin gives an indication of high profitability of soybean

production in the study area. Masuku and Xaba (2013) conducted a study on factors affecting the productivity and profitability of vegetables production in Swaziland using multiple linear regression, the results showed that the factors that significantly affected productivity of vegetable farmers were access to credit, selling price, fertiliser quantity, distance to market and gender of the farmer and had a positive relationship with the productivity of vegetable farmers. The same study revealed that the determinants of profitability of vegetable production were level of education, land under vegetable production and type of marketing agency and had a direct influence on profitability of vegetables.

Masuku and Dlamini (2012) conducted a research on profitability of smallholder sugarcane farming in Swaziland using linear regression the results indicated that 18 variables such as farm size, farming experience, sucrose price, labour cost per hectare and fertilizer cost per hectare significantly influence the profitability of smallholder sugarcane farmers' associations in the study area. Similarly, Zulu (2011) in her study of Profitability of Smallholder Cowpea Production in Zambia using gross margin and regression analysis found that production of smallholder cowpeas in Zambia was found to be profitable.

The study conducted by Birachi *et al*. (2011) revealed that production losses, land size allocated to bean production, production assets, group membership and type of seed variety planted significantly influence output. Moreover, Hoqueand Haque (2014) conducted a study onsocio-economic factors influencing profitability of rice seed production in Bangladesh using multiple linear regression, the results showed thatfarm size, contact with information sources, knowledge on quality rice

production and age of the respondents were identified as significant contributors in profitability of rice seed production.

2.5. Policy Review

The study based on increase grape productivity through use of improved inputs/technologies for the purpose of increase income and livelihood of the farmer. In order to improve living standards of the people must give particular attention to increased production and productivity in the agricultural sector. National Agriculture Policy revolves around the goals of developing an efficient, competitive and profitable agricultural industry that contributes to the improvement of the livelihoods of Tanzanians and attainment of broad based economic growth and poverty alleviation. This study is on line with Tanzania National Agriculture Policy as well as Agriculture Sector Development Strategy (ASDS).

2.6. Research Gap

Efficiency production is one of the strategies being investigated to improve small-holder food and cash crop production which was introduced in Tanzania with the effort to increase country crop productivity based on the quantity produced (Cornel University, 2015)–efficient growing practice includes the uses of technologies like fertilizer, irrigation and pesticide etc while inefficiency practices include the use of traditional practices (Stoop *et al*., 2002; Uphoff *et al*., 2002). Most of the research done investigation on efficiency based on tone/ hector of the yield produced by firms, these studies include research done by Tusekelege, *et al*., (2014) and Katambara *et al.* (2013) who argue that efficiency has higher yields compare to inefficiency without considering technical efficiency and inefficiency of different

parameter. This research attempt to investigate the performance of efficiency against inefficiency productivity practice used on parameter for and individual farmers and profitability. In order to investigate technical efficiency level of grape production, we used the stochastic frontier approach due to its strengths in measuring technical efficiency in order to obtain reliable efficiency estimates.

2.7. Conceptual Framework

Conceptual framework of the study will base on production theory, the approach assumes that a set of independent variables are responsible for influencing the situation and behavior of economic agents in a given firm, where policy factors have an important influence on grape productivity since they affect all the other factors. Institutional factor affect production factors whereby some institutional and socio-economic factors tend to reinforce each other. Such as female gender influences access to credit which has influence on off-farm income.

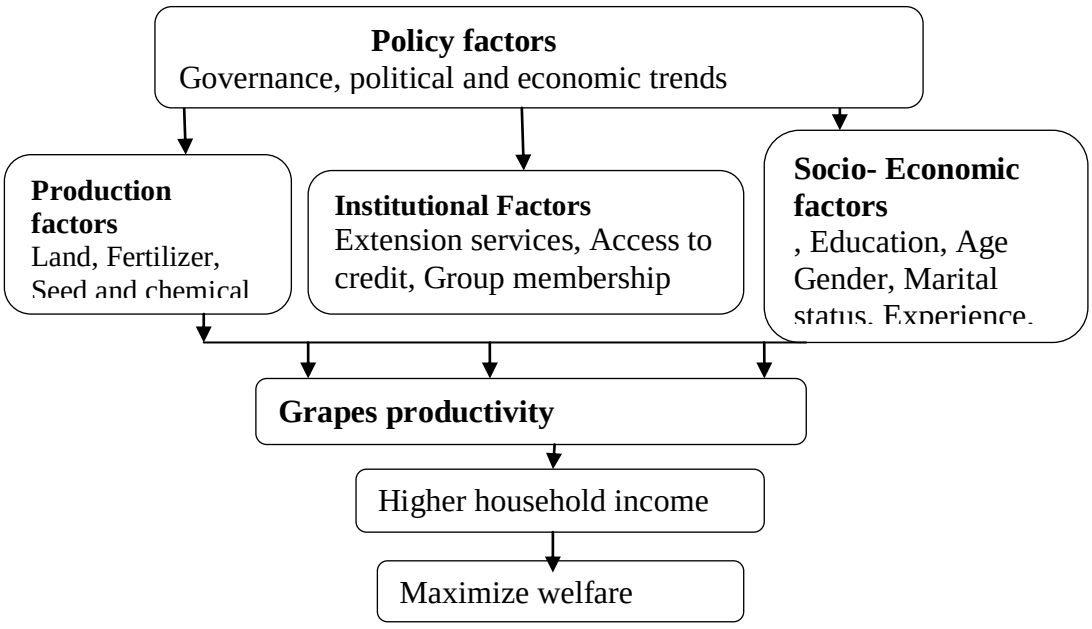

Figure 2.1: Conceptual Framework

Factors of Production are used directly into production process but availability and distribution of these inputs is affected by policy which in turn affects grape productivity. Institutional and socio-economic factors influence grape productivity, like farmer group, credit access and presence extension services. All these were expected to have a positive effect on productivity meanwhile, a factor like age, education and lack of experience is expected to have a negative effect.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Chapter Overview

This chapter deal with different procedures on finding answers to questions; it was covered the following areas: research design, research approach, area of the study, population of the study, sampling design and sample size, sampling procedures, data source, data collection methods, data analysis procedures, and ethical issues that guided the study.

3.2. Research Design

This study used a cross sectional research design for this study descriptive explanatory research design that was particularly based on case study design to enable the research to cover the area and be able to collect the required data through various different data collection methods such as interviews, and questionnaires. It is important that the case study design was also used manageable sample size to represent the whole population of that particular area. A cross sectional research design was used for this study in line with Babbie (2010). The design allows for data to be collected from a sample selected at single point in time. The reason for choosing this design is due to its suitability for description purposes as well as the determination of the relationship between the variables (Bryman, 2015).

3.3. Area of the Study

This study was carried out in Dodoma Urban district of Dodoma region. The study targeted smallholder grape producers within the district. Four village of Mpunguzi, Mpunguzi A, Mpunguzi B and Matumbulu were studied. The choice of study area

ware based on the grape production potential within the district.

3.4. The population of the Study

Kamuzora (2008) Population is the totality of the object under investigation. In this study, the targeted population was 4 villages found at DMC which were Mpunguzi, Mpunguzi A, Mpunguzi B and Matumbulu and 2 extension officers.

3.5. Sampling Design and Sample Size

3.5.1 Sampling Design

This study used two sampling designs, which are purposive sampling and simple random sampling.

3.5.1.1 Purposive Sampling

A multistage sampling technique was used for the study, first stage purposive sampling was used to region, second stage one district were selected on the basis of maximum grape production, third stage of sampling, a complete list of wards in the selected district were prepared and out of which, two wards were selected randomly. At the fourth stage of sampling, two villages from each selected ward were selected randomly and final stage of sampling,30 farmers were selected from each village randomly to constitute a sample size of 120 farmers.

3.5.1.2 Simple Random Sampling

Kothari (2004) defines simple random sampling is a method of sample selection which gives each possible sample combination an equal probability of being picked up and each item in the entire population to have an equal chance of being included in the sample. Kothari explains that once an item is selected for the sample, it cannot

appear in the sample again. This study used simple random sampling to select 4 villages and also used simple random sampling to select 30 grape production farmers from each village to constitute a sample size of 120 farmers.

3.5.2 Sample Size

Kothari (2004) defines a sample size as a number of items to be selected from the universe to constitute a sample. According to Kothari (2007) sample is a collection of some parts of the population to be a true representative of the population (i.e. number of items to be selected from the population). The sample size of this study consisted 120 individuals. These 120 individual samples were observed in three years to make a total of 321 sample observations. In finding sample size, this study considered sampling suggestion argued by Tabachnick and Fidell, (2007) who suggested the use of $N > 104 + m$ for testing individual predictors. Hence used $N > 104 + m$.

Where N stands for the individual sample size and

m stands for the number of independent variables.

This study had a total of three independent variables which are formal financial institutions credit, semi formal financial institutions credit and informal credit.

Using, $N > 104 + m.$,

Where m = 3;

Thus, $N > 104 + 3$ and N = 107 was the minimum sample.

This study used a sample size of 120 farmers

Table 1.1: Sample Distribution N=120

Type of respondent	Number of respondent expected	Questionnaire Distribution (%)	Sampling techniques
Mpunguzi Village	30	25	Random Sampling
Mpunguzi A Village	30	25	Random Sampling
Mpunguzi B Village	30	25	Random Sampling
Matumbulu Village	30	25	Random Sampling
Total	**120**	**100.0**	

3.5 Method of Data Collection

Cross sectional research design were used during data collections, the method involved

collecting data at one point in time (Kothari, 2007). Primary and secondary data were used in reporting writing.

3.5.1 Primary Data

The study collected data for the 2019/2020 cropping season whereby sound structured questionnaire was administered to obtain raw data from knowledgeable and influential person in the household.

3.5.2 Secondary Data

Secondary data were used as well to facilitate report writing from relevant institution like, respective District Agriculture Office and NGO's related to grape production.

3.6 Data Collection Tools

There are so many tools for data collection in the field of research, but in this study two tools were employed, namely interview and questionnaire tools.

3.7 Validity and Reliability of Instruments

3.7.1 Validity of Instruments

Kothari (2004) validity refers to the extent to which a test measures what we actually wish to measure. On the other hand, Kothari continues to argue that validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested. In this study, the instruments which were used for data collection covered the chosen sample of the relevant population and provide data which were expected. Also the study ensured validity through proper setting of objectives and that the instruments responded to those objectives by collecting reliable and accurate data and information.

3.7.2 Reliability of Instruments

Reliability has to do with the accuracy and precision of measurement procedures (Kothari, 2004). He explains that a measuring instrument is reliable if it provides consistent results. In this study questionnaire and interview methods were used for data collection. To assure reliability of these instruments, questionnaires were constructed and posted to respondents three weeks before the time of data collection begin to provide a room for respondents to give right answers to questions. Also reliability was assured by constructing open and closed ended questions relevance to the study before launching the interview. Similarly data were drawn from the known and authorized source to ensure reliability of them.

3.8 Processing and Analysis of Data

The data, after collection, has been processed and analyzed in accordance with the outline laid down for the purpose at the time of developing the research plan,

processing implies editing, coding, classification and tabulation of collected data so that they are amenable to analysis (Kothari, 2004). According to Kothari, the term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data groups. In this study data analysis has been done by using statistical package for social science (SPSS) computer software version 16 and Ms Excel version 2007.

The analysis will involve computation of descriptive statistics such as estimates of frequencies, percentages and means. Non parametric statistical test, chi square was tested the significance of association of study variable or attributes. This study also used Microsoft Excel for data analysis on editing, coding, classification and tabulation of facts from filled questionnaires by respondents and from interviewing specific participants of the same population.

3.9 Testing for Assumptions

The values of a dependent in relation to one or more independent variables were estimated using a regression model. The naturally study predicts the relationship between dependent variable with independent variables. Multiple regressions involve an application of any number of predictors (independent variables) in predicting the dependent variable. By the use of multiple regression model, it was easy to demonstrate how the independent variables (determinants of grape production) influenced the grape production. By putting them in a regression model, let's assume X and Y represents two variables where X stands for an independent variable and Y a dependent one. Thus if we formulate a linear regression of X and Y it was:

$Y = ß0 + ß1X + e$, ……..(5)

Such that ß0 and ß1 was coefficients of regression and e being an error term which gives a clarification for the distinction between the results of the model and actual observed results. Integrating the regression model with this study objectives, Y is represented as level of grape production (a dependent variable) and X represents any of the independent variables i.e. factors for grape production.

For the purpose of maintaining the data validity and robustness of the regressed result of the research, the basic classical linear regression model (CRLM) assumptions should have been tested for identifying any misspecification and correcting them so as to augment the study quality. There are four CLRM assumptions that are required to be satisfied and that must be tested in this study, The assumptions are: errors equal zero mean test, homoscedasticity, and Multicollinearity and linearity tests.

3.9.1 Linear in Parameters

The assumption states/explains that the relationship between each pair of correlated variables is linear. This assumption can be tested by looking at the bivariate scatter plots of the variables to be used in correlation analysis. The scatter plot takes one of the variables at the x-axis (Factors for grape production) and the other one at y-axis, (Level of grape production) and then the observations are plotted. The resulting scatter plot showed a linear trend, i.e. the dots were aligned in shape of a straight line.

3.9.2 Heteroscedasticity

This assumption of linear regression states that the residuals have constant variance at every level of x. This is known as homoscedasticity. When this is not the case,

then the residuals are said to be heteroscedasticity. When heteroscedasticity is present in a regression analysis, the results of the analysis become not easy to trust as the variance of the regression coefficient estimates keeps increase; this makes it likely for a regression model to be declared that a term in the model is statistically significant, when in fact it is not. The *fitted value vs. residual plot* is the simplest way used to detect heteroscedasticity. Once you fit a regression line to a set of data, you can then create a scatter plot that shows the fitted values of the model vs. the residuals of those fitted values.

3.9.3 Multicollinearity

Multicollinearity is simply defined as the situation in which independent variables are highly correlated; resulting in a paradoxical effect, whereby the regression model fits the data well, this occurs when no independent variables has a significant impact in predicting the dependent variable (Gujarati, 2004). Researchers interpret values of regression coefficient in assessing the impact of independent variables on the dependent variable when their Collinearity is small (Keith, 2006). In order to test Collinearity among independent variables, VIF (variance inflation factors) and Tolerance Rate proposed by Osborne and Waters (2002) have been used. Variance inflation factors (VIF) measures how much the variance of the estimated regression coefficients is inflated as compared to when the predictor variables are not linearly related.

3.10 Ethical Issues

Ethics refers to the act of observing rules and regulations at a certain place when doing a right thing in a right way. In conducting a research, the study considered and

respected all rights and dignity of all respondents, maintained confidentiality of respondents involved in the study for the completion of the research. Without ignoring, the permission for conducting a research was requested from the Directorate of Research Publications and Post Graduate Studies Office of the Open University of Tanzania (OUT).

3.11 Analytical Framework

The major tool of analysis used in this study based on stochastic frontier model as proposed by (Battese and Coelli, 1995). Farrell, (1957) was the first to use frontier production function to measure grape production; the method involves estimating a frontier production function to measure grape production. The frontier production function model is estimated using maximum likelihood procedure due to the fact that it consider being asymptotically more efficient than the corrected ordinary least square estimators (Coelli, 1995). The stochastic frontier production function model is specified as follows:

$Yi = f(Xi, \beta) + (Vi - Ui)$

Where:

Y_i is the output of the $_i^{th}$ farm,

X_i is a 1 x k vector of input quantities of the $_i^{th}$ farm,

β - is a vector of unknown parameters to be estimated,

V_i - Are random which assumed to be normally distributed iiN $(0, \delta_v^2)$ random error and independent of the U_i. It is assumed to account for measurement error and other factors not under the control of the farmer (non negative random variable).

U_i - Are non-negative random variables, (half normal or truncated to zero) called

technical inefficiency effects (Aigner *et al*., 1977).

3.10.1 Production Efficiency

Analysis tools of this study based on stochastic frontier model which explained by (Battese and Coelli, 1995), estimating the frontier production and cost function to measure technical and cost efficiency separate. The frontier production function model is estimated by using maximum likelihood procedure (MLE). The stochastic frontier production function on this study specified for cross sectional data which error term complies two components, random effect and technical inefficiency. Model used was expressed as follows,

$$Y_i = f(X_i\beta) + (V_i - U_i)$$

Where,

Y_i = quantities of grape output

X_i \= vector of grape input quantity,

β = a vector of parameters,

ε = error term, defines as $=V_i - U_i$

V_i – error due to random effect

U_i – error due to inefficiency

3.11.2 Cost Function

Production and cost inefficiency were expressed by U_i, which cause firm to operate below stochastic frontier, Stochastic frontier cost function error term specified as $(V_i + U_i)$.

Expression for stochastic cost frontier function

$$C_i = C(Y_i, P_i; \beta) + V_i + U_i$$

Where:

C_i is the total production cost,

P_i is the vector of variable input price

Y_i, is the grape output produced in kg,

β - is a vector of unknown parameters to be estimated,

V_i are random disturbance costs due to the factors outsides the farmers

U_i - Are non-negative random variables, (half normal or truncated to zero) also define how far did firm operated above the frontier, especially for the frontier cost function

3.12 Empirical Model

3.12.1 Technical Efficiency and Factors influences Technical Efficiency

To address the first objectives, a stochastic production frontier were used. The stochastic production frontier was estimated to find the TE of each respondent. Technical efficiency was expressed as the ratio involving observed production and the production output from the frontier production function.

$$\mathrm{TEi} = \frac{Yi}{\exp\left(Xi\beta + Vi\right)} = \frac{\exp\left(Xi\beta + Vi - U\right)}{\exp\left(Xi\beta + Vi\right)} = \exp\left(-\mu\right)$$

Whereby $0 < TE_i < 1$

Computed TE of each grape farmer were regressed against a set of socio-economic and institutional factors to identify the factors affecting grape production. Farell, (1957) defines TE as the ratio of the observed output to the actual output along the frontier, as estimated from the composed error term and then the production function were used to define the stochastic production.

The Cobb-Douglas production function estimation using MLE method is represented as follows:

$LnY_i = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_5 + V_i - U_i$

Where:

Y = Grape output of the respondents measured in Kg

X_1 = Farm size (acre),

X_2 =family and hired labour (man-day),

X_3 = Grape seeds (kg),

X4 = Fertilizer (kg),

X5= Pesticide (mls)

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = are Parameters to be estimated

The inefficiency model is represented by U_i which is defined as follows:

$U_i = d_0 + d_1 z_1 + d_2 z_2 + d_3 z_3 + d_4 z_4 + \ldots + dn z_n$

U_i = Technical inefficiency,

z_1 = Age (years), z_2 = Access to extension services (Yes = 1, No = 0), z_3 =Level of education (years), z_4 = Access to credit (Yes = 1, No = 0), z_5= Subsidies (Yes=1, No=0), z_6 = off farm income (Tsh), z_7= farm size, d_0, d_1, d_2, ……d_n = Parameters to be estimated.

3.12.2 Cost Efficiency

To address the objectives three, a stochastic cost frontier was used. The stochastic cost frontier was estimated to find the CE of each respondent. Then, the computed CE of each grape farmer was regressed against a set of socio-economic and institutional factors to identify the factors affecting grape production. Farell, (1957)

Measurement formula for cost efficiency explained by equation

$$CEi = \frac{C(Yi, Pi; \beta)\exp\{Ui\}}{Ci}$$

Where, CE_i is the possible minimum cost ratio with specific inefficiency level toward actual total cost. When $C_i = C(P_i Y_i;\beta).exp(U_i)$, the CE_i was equal to 1 which implys farming system is in the full efficiency condition in the time *i.* Otherwise, when the actual cost bigger than the minimum estimated cost ($0 \leq CE_i < 1$) the farming system are inefficient.

In order to obtain sources of cost inefficient computed CE for each grape farmer was regressed against a set of socio-economic and institutional factors to identify the factors affecting grape production

$$LnY_i = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_5 + Vi + U_i$$

Where:

Y = Grape Output

β_0 = Intercept, $\beta_{1\,=}$ (i= 1,2,…5) Parameters to be estimated

X_1 = Cost of hire land/acre,

X_2 =Labour cost/ acre,

X_3 = Grape seeds cost/kg,

X_4 = Fertilizer cost/kg,

X_5= Pesticide (cost/botle)

The Inefficiency Model is represented by U_i which is defined as follows:

$U_i = d_0 + d_1z_1 + d_2z_2 + d_3z_3 + d_4z_4 + \ldots + d_nz_n$

U_i = Technical inefficiency,

z_1 = Age (years),

z_2 = Access to extension services,

z_3 = Level of education

z_4 = Access to credit

z_5= Subsidies

z_6 = Off farm income (Tsh)

z_7= Farm size

d_0, d_1, d_2, ……d_n are Parameters to be estimated.

3.13 Gross Margin

To address the objective four of determining levels of profit of grape farmers in Dodoma region Gross Margin Analysis method were used. GM method is used in this study because it does not consider land value. The GM were expressed as

$$GM = \frac{Total revenue(TR) - Total Variable cost(TVC)}{Total revenue(TR)}$$

CHAPTER FOUR

RESEARCH RESULTS AND DISCUSSION

4.1. Chapter Overview

This chapter answers and explain the three objectives, to describe socio economic status of households cultivating grape, to determine the technical efficiency and factor influencing grape production in Dodoma and to assess the gross margin of grape farmers in Dodoma region (like stated in chapter one above) it employed different methodologies which based on efficiency production concept as explained in chapter three with main assistance from chapter two of reference which try to seek assistance from other scholars to make relation of different variable like age and sex, status of household head.

4.2. Sample Description

One hundred and twenty grape farmers were sampled to represent farmers from four villages but during data cleaning two farmers were not qualify as the representative. Therefore one hundred and eighteen farmers were used. Three villages provide 30 representatives from each while one village has only 28 farmers. One hundred and eighteen as a total sample were used to find famers characteristics as well as production and cost efficiency.

4.3. Social Economic Status

4.3.1. Age and Sex of Respondent

From the analyzed information according to Table 4.1, Respondent means age for female lies in 15 to 35 age group and for males lies in 36 to 55 age group. This shows the importance of grape production in the area, since majority of participants

lies in the low and middle ages and most of them are capable farmers and still energetic in involving in grape production. Mulashani (2016), declared the importance of age as the factor that can explain the level of production and efficiency, and it is thought for young population to be more productive than older population. Furthermore findings indicated that only few people above 56 years of ages engaged in grape farming activities among the selected sample.

Based on gender most female participating in production aged from 15 to 55 were 41.5 percent while male ranged 15 to 55 were 44.4 percent this gives a clear picture that males are highly involved in grape production than female. Also the findings shows that males at the age of 36 to 55 depend on grape production at 26.3 percent than female who engages more in 15 to 35 of ages taking 22 percent (Table 4.1)

Table 4.1: Age and Sex of Respondent (N= 118)

Age	Female		Male		Total	
group	Number	Percentage	Number	Percentage	Number	Percentage
15-35	26	22	19	16.1	45	38.1
36-55	23	19.5	31.	26.3	54	45.8
56-75	9	7.6	6	5.1	15	12.7
76≤	2	1.7	2	1.7	4	3.4
Total	60	50.8	58	49.2	118	100

Source: Field Data 2020

Also it was found that among the sampled farmers for this study are involved as per season production of grape in the area. More farmers involved in grape production the more their knowledge increased and efficiency in grape production.

4.3.2. Status of Household Head

The findings in Table 4.2 shows that number of male headed is greater than female headed, In the area 63.6 percent were male headed engaged in grape production

while female were 36.4 percent; this means most of grape farmers are male headed households implying that most of resource controller and decision makers in the family are men. Also this shows that for the male headed family grape production is given priorities than female headed.

Table 4.2: Status of Household Head (N= 118)

	Female headed		Male headed		Total	
Village	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Mpunguzi A	14	11.9	17	14.4	31	26.3
Mpunguzi B	15	12.7	19	16.1	34	28.8
Mpunguzi	9	7.6	17	14.4	26	22
Matumbulu	5	4.2	22	18.6	27	22.9
Total	43	36.4	75	63.6	118	100

Source: Field Data 2020

4.3.3. Education of the Respondents

Basing on Logic educated farmers are expected to have more produces compared to uneducated farmers. This is basing on the fact that new technology and techniques in production are easily adopted by farmers with education. From the descriptive statistics of the study there are total of 11 percent farmers uneducated, 60.2 percent with primary level, 25.4 percent with secondary level, 3.4 percent with university level. Table 3 shows that farmers with primary education and secondary education involved in grape production followed by uneducated farmers while farmers with university education were very few. In the study two villages of Mpunguzi B and Matumbulu were found with grape farmers with university level. Thus the result show that grape production was practiced mostly with low education farmers and farmers with higher education were not effectively engaged in grape production (Table 4.3). This portray that the higher education level the lower involvement in agricultural activities.

Table 4.3: Education of Household Head (N= 118)

	Level of Education				Total
	None (%)	Primary (%)	Secondary (%)	University (%)	(%)
Mpunguzi A	5.1	14.4	6.8	0.0	26.3
Mpunguzi B	0.8	14.4	11.9	1.7	28.8
Mpunguzi	5.1	15.3	1.7	0.0	22.0
Matumbulu	0.0	16.1	5.1	1.7	22.9
Total	11.0	60.2	25.4	3.4	100

Source: Field Data (2020)

4.3.4. Potential Crops in the Study Area

The study area is found in the central plateau zone which is famous in production of fruits. According to Ministry of agriculture and food security- Horticulture unit, (2005) fruits such as Baobab, Mango, Papaya, Guava, Grapes were found in Dodoma region.

Table 4.4: Potential Crops in the Area (N=118)

	village of respondent				Total
Crops	Mpunguzi A	Mpunguzi B	Mpunguzi	Matumbulu	
Ground nuts	22 (6.8%)	14 (4.3%)	16 (4.9%)	10 (3.1%)	62 (19.1%)
Maize	1 (0.3%)	25 (7.7%)	14 (4.3%)	9 (2.8%)	49 (15.1%)
Sunflower		7 (2.2%)	15 (4.6%)	1 (0.3%)	23 (7.1%)
Grape	31 (9.6%)	33 (10.2%)	21 (6.5%)	26 (8.0%)	111 (34.3%)
Potato		12 (3.7%)		3 (0.9%)	15 (4.6%)
Tomato	29 (9.0%)	6 (1.9%)	1 (0.3%)	18 (5.6%)	54 (16.7%)
Sesame	1 (0.3%)				1 (0.3%)
Millet			1 (0.3%)		1 (0.3%)
Bambara Nuts	0 9 (0.0%)	1 (0.3%)	7 (2.2%)		8 (2.5%)
Total	84 (25.9%)	98 (30.2%)	75 (23.1%)	67 (20.7%)	324 (100.0%)

Source: Field Data (2020).

According to this study in (Table 4.4) crops like Ground nuts, Maize, Sunflower, Bambara nuts, Millet, Sesame, Tomato were found in different study area. Grape production is the most leading crop in the village studied followed by groundnuts, Tomato and Maize. Sunflower and other crops are produced in low level.

4.4. Testing for Validity and Reliability Analysis

A pilot study practice was conducted to validate the questionnaire using a small-scale group of respondents. Piloting the questionnaire is conducted with the aim to determine questionnaire reliability, validity and error testing (Teijlingen and Hundley, 2001). Therefore, to enhance the reliability and validity of the questionnaire, a pilot study was conducted. The total of 17 responses was received in this pilot study. For this purpose, the number of the respondents can vary between 10 to 30 (Hill, 1998). In addition, for group analysis, the samples ranging in size from 10 to 40 group would be sufficient in providing estimates to meet a variety of possible aims (Hertzog, 2008). The data gathered from pilot study was analysed in SPSS version 22.0 and validity test.Table 4.5 shows the statistical analysis test for reliability and validity used in the pilot study criterion decision.

Table 4.5: Assessment Criteria Decision for Reliability and Validity Test

Analysis	Test	Criteria	Sources
	Cronbach's Alpha	< 0.6 Poor >0.6 Acceptable	(Nunnally and Bernstein, 1994; Sekaran and Bougie, 2010)
	Composite Reliability	> 0.6 Acceptable > 0.7 Satisfactory	(Hair *et al.*, 2014a)
Validity	Average Variance Extracted (AVE	> 0.5 Desirable	(Bagozzi and Yi, 1988; Hair *et al.*, 2014a)
	Factor Outer Loadings	> 0.7 Acceptable	(Hair *et al.*, 2014a)
	Discriminant Validity,	The square root of the AVE (√AVE) should be greater than the correlation with another Construct.	(Fornell and Larcker, 1981; Hair *et al.*, 2014a)

Source: Field Data (2020).

4.4.1. Validity Results

Validity measures the extent to which the instruments used during the study measure the issues intended to measure (Kothari, 2006). To ensure validity of the instruments

used for the study, the instruments were developed by reviewing other related literatures and study objectives.

4.4.2. Reliability Results

Kothari (2009) defines reliability of the instrument as the degree to which said instrument for the study consistently measures whatever it is measuring. For the case of this study Test-Retest Reliability consistency among different populations with the same characteristics has been used. The reliability of the data collected is determined by the accuracy of the methodology used. The methodology used by this study was consistent with the case study research design. For instance, in this study the source of data was mainly smallholder rice farmers.

The study applied coefficient alpha (Cronbach's alpha) technique to test internal consistency and stability of questionnaires hence, SPSS software version 22.0 was used and the criterion decision on Reliability consistency test was acceptable due to a value of at least 0.6 Cronbach's Alpha value. The Chronbach's alpha co-efficient computed section by section as per the research variables using the SPSS programme and once the reliability index 0.888 was enough to guarantee reliability.

Table 4.6: Reliability Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.888	17

Source: Researcher Data, (2020).

4.5. Testing for Data Accuracy and Descriptive Analysis

4.5.1. Testing for normality Assumption

Refers to the dots lie to the diagonal line, the closer to normal the residuals are

distributed. In this case, our data points hardly touch the line at all, indicating that assumption may be violated. This will need to be flagged when writing up the results of the analysis, to let the reader know that they should be interpreted with caution.

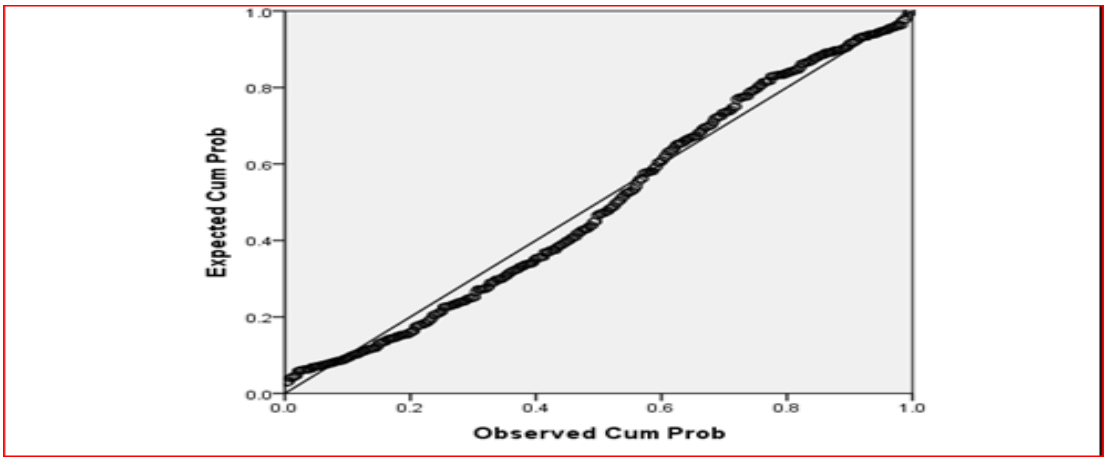

Figure 4.1: Normal P-P plot of Regression Standardized Residual
Source: Researcher Data, (2020).

The Variance of the Residuals is Constant

This graph plots the standardized values our model would predict, against the standardized residuals obtained. As the predicted values increase (along the X-axis) the variation in the residuals should be roughly similar. If everything is ok, this should look like a random array of dots. If the graph looks like a funnel shape, then it is likely that this assumption has been violated. In the graph below (figure 4.2) in case be observed that as we only have a small number of data points in this graph but as it generally appears more random than funneled, this assumption is probably ok.

4.5.2. Testing for Multicollinearity Assumption

Table 4.7: Guidelines to Interpret the VIF for Multicollinearity

VIF	Status of Predictor
VIF = 1	Not correlated
1 < VIF < 5	Moderately correlated
VIF > 5 to 10	Highly correlated

Source: Researcher Data, (2020).

The researchers interpret values of regression coefficient in assessing the impact of independent variables on the dependent variable when their Collinearity is small (Keith, 2006). In order to test Collinearity among independent variables, VIF (variance inflation factors) and Tolerance Rate proposed by Osborne and Waters (2002) have been used. Variance inflation factors (VIF) measures how much the variance of the estimated regression coefficients is inflated as compared to when the predictor variables are not linearly related.

Table 4.8: Multicollinearity Test

Model	Collinearity Statistics	
	Tolerance	VIF
Cost of hire land/acre,	.450	2.221
Labour cost/ acre,	.625	1.599
Grape seeds cost/kg,	.591	1.691
Fertilizer cost/kg,	.714	1.400
Pesticide (cost/botle)	.682	1.467
Age (years),	.614	1.628
Access to extension services,	.413	2.419
Level of education	.398	2.515
Access to credit	.419	2.387
Subsidies	.761	1.313

Source: Research Data (2020).

According to Table 4.8, the results indicated that coefficients no evidence of presence of Multicollinearity, this evidenced by factors such as market information, farm size, education level, capital, transportation, extension services, Marketing norms adopted, distance market, paddy price and firm size with VIF < 5 so there is moderate correlated and access to credit and farm size VIF = 1 not correlated. Therefore, no Multicollinearity among factors.

4.5.3. Testing for Autocorrelation Assumption

Autocorrelation occurs when there is independence of errors, the test assumes that errors in the variables to be separate from one another and it further suggests that the

subject should be reacting independently (Keith, 2006). This is basically the same as saying that we need our observations (or individual data points) to be independent from one another (or uncorrelated). The result of assumption using the Durbin-Watson statistics is 1.147.

Table 4.9: Autocorrelation

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.803[a]	.645	.625	.09498	.645	31.697	11	192	.000	1.147

a. Dependent Variable: Grape production

b. Predictors: (Constant), Cost of hire land/acre, Labour cost/ acre, Grape seeds cost/kg, Fertilizer cost/kg, Pesticide (cost/botle), Age (years), Access to extension services, Level of education, Access to credit, Subsidies, Off farm income (Tsh), Farm size

Source: Researcher Data, (2020).

Therefore, the model summary shows that The Durbin-Watson statistics have a value between 0 and 4. A value of 2.0 indicates that there is no autocorrelation detected in the sample. Values from 0 to less than 2 indicate positive autocorrelation and values from 2 to 4 indicate negative autocorrelation. A **rule of thumb** is that test statistic values in the range of 1.5 to 2.5 are relatively normal.

4.6. Factor Influencing Grape Production

4.6.1. Production Factors Costs on Gape Production

Partial elasticity generated from stochastic production frontier shows that area (0.193), fertilizer (-0.221), pesticide (0.447), Labour (0.169) all coefficient shows positive which explain that if these input increased by ten times will increase output by 1.9, 4.4, and 1.7% for input area, pesticide and labour respectively, while input fertilizer show negative sign therefore, once this input increase will decrease output by 2.2% this can be due to high fertilizer/ FYM usage during grape production which make land to be saturated with this input. findings is consistent with of Bachewe, *et*

al., (2011) who find fertilizer to have a negative effect in yield, advanced by argue that rate of fertilizer application must accompanied with the right and sufficient use of complimentary inputs such as water and improved seeds to achieve the desired results which are not practiced by many farmers in Dodoma region.

For the variable which determine source of inefficiency, variable price (-0.765), extension (-0.122) and experience (-0.351) have positive relationship with output or influence technical efficiency. Once ten percent increase these variables will increase output by 7.66, 1.22 and 3.51% respectively. Variable price has much influence compared to all variable used in this study this is due to fact that most farmers use to adjust themselves according to their expectations of price change. According to Table 4.5 coefficient function of MLE estimation is 0.588 which explain that the stochastic production frontier function has the characteristic of decrease return to scale. It means that the increasing use of inputs proportionally will decrease the output production to achieve the maximum profit.

The value of γ is 0.99 and significant at the level of 1%. This value shows that 99% of the random error varies are mostly influence by and inefficient factor, nor the stochastic variables which is not considered in the model. Therefore, production frontier is possible to achieve through the improving on farming system management. The value of γ which approaching 1 also remain one side error, where *Ui* dominated the symmetry error distribution from *Vi*. The explanations of one side error also strengthen by the value of likelihood ratio. According to the table 6 we can see that the value of observe LR is 19.94 which is greater than the given LR ($\chi 1^{2}$ = 3.841). Since the observe LR are greater than the given LR, we can conclude that the

assumption that all of the rice farming system which held by farmers in Dodoma Region 100% efficient.

4.6.2. Determinant of Production Efficiency

Grape industries depend on many variable which is used during production, but among all variable there are five influential variable which all grape sector which depend for, for efficiency model variable, these variable are price pesticide (0.445), and area (0.193) and for ineffiency model variable grape sector determined by agricultural extension work price (-0.764), (-0.123) and experience of the farmers (-0.351). The base of grape production observed on price elasticity, if price per kg of grape change positively also grape output will change more than 76 percent. In order grape sector to keep growing these five variables should be well observed but variable like fertilizer (FYM) seems to have influence negative production these can be caused by much amount of fertilizer applied by other farmers than recommended rate of FYM application.

Table 4.10: Production Factors Costs Efficiency (N=118)

Variables	Coefficient	Standard error	t-ratio
Efficiency model			
β_0	3.7984918	0.12286504	30.915968
$\beta_{1\ (Area)}$	0.19278569	0.12476581	1.5451804**
$\beta_{2\ (Fertilizer)}$	-0.22081819	0.30056219	-0.73468388**
$\beta_{3\ (pesticide)}$	0.44662340	0.10521648	4.2448047***
$\beta_{4\ (Labour)}$	0.16897572	0.14840781	1.1385905*
Inefficiency model			
$z_{1\ (price)}$	-0.76452720	0.22038531	-0.34690479**
$z_{2(Education)}$	0.31464961	0.43382102	0.72529821**
$z_{3\ (Extension)}$	-0.12180490	0.17884876	-0.68104970*
$z_{4\ (Age)}$	0.53681801	0.35412952	1.5158804
$z_{5\ (Experience)}$	-0.35106772	0.27713321	-1.2667833***
$z_{6\ (Irrigation)}$	0.12970412	0.20183063	0.64263841
sigma-squared	0.20346865	0.62482762	0.32563965
Gamma	0.99999999	0.40046495	0.24970974
log likelihood function	-0.34789606E+02		
LR test of the one-sided error	19.941618E+02		

*= significant at 5%; **= significant at 10% and ***=significant at 1%.
Note: A negative sign of the inefficiency parameter function means the associated variable has a positive effect on technical efficiency and vice versa.

4.6.3. Farmers Efficiency Specific Score

According to Table 4.11, the Average technical efficiency of stochastic production frontier model is 0.57 with minimum value of 0.21 and maximum value of 0.99, the minimum value show the most inefficient farmers and maximum value shows most efficient farmers. Average efficiency of 0.57 signifies that all farmers has the room to increase TE by 0.43 percent while for inefficiency farmer they have a chance to increase efficiency production by 0.79 percent and maximum efficiency farmers has a chance to increase by only 1 percent.

Table 4.11: Technical Efficiency Distribution of Rice Farming (N=118)

Efficiency range	Frequency	Frequency %	Cum Fre %
0.20-0.39	28	23.73	23.73
0.40-0.59	38	32.20	55.93
0.60-0.79	37	31.36	87.29
0.80-1.00	15	12.71	100
Total	118	100	

Source: Field Data 2020

4.7. Gross margin of Grapes Farmers

Majority of grape producer in Dodoma region is produced by smallholders farmers and produced in their own farm, majority own land average 1.9 acres with average production of 1280 kg per acre.

Table 4.12: Cost Analysis of Grape Production (N=118)

Income				
Production: 1280.7 kg x1170				**1,498,419.00**
COST				
Variable	**Cost**	**Labour**	**Cost**	
Land preparation		Both (Family & hired)	750000	
Cultivation		Both (Family & hired)	130000	
FYM	145000	Both (Family & hired)	20000	
Planting		Both (Family & hired)	180000	
Pesticide	50,000	Family	25000	
Weeding		Both (Family & hired)	128,000	
Harvesting		Family	78000	
Total cost	**195,000**		**636,000**	**1,498,419.00**
Gross Margin				**667,419.00**

Source: Field Data (2020).

Table 4.12 show household cost incurred during grape production per acre/year. Stallholder's farmers incur different cost starting from land preparation up to harvesting which they use different labour forces like family, hire or both hired and family labour. In average grape industries use both variable and fixed input like land and FYM among many inputs, results reveal that grape industry earn profit of 667,419.00 Tzs per acre which expend the production cost of 831,000.00 Tzs.

4.8. Institutional Factors on Grape Production of Grape Production

Institutional factors on grape production and major challenges faced farmers in during 2017/2018 grape production were inadequate capital, insufficient market, crop diseases, lack of storage facilities, transportation problems, high cost of input, low selling price, lack of knowledge, lack of credit, poor government support, lack of extension services in the area and climate change in the area. These challenges contributed to low yield for grape farmers and lead them to earn low income. From the challenges analyzed (Table 4.9) in this study, each village had its unique challenges compared to the other. Unreliable market was leading by 41.9 percent from all villages followed by inadequate capital 35.9 percent, crop disease 35.9 percent, low selling price by 23.9 percent.

Mpunguzi A village was leading in lacking capital, followed by Matumbulu while unreliable market was highly reported in Mpunguzi village. The challenge of diseases also was highly reported in Mpunguz A, while lack of improved variety was highly reported in Matumbulu. Other challenges are shown in Table 8, for the number of respondent interviewed and their percentages contributions in the village. In order to improve and make grape production sustainable the challenges identified

must be considered by the government so that farmers could improve their earning and life standard as well.

Table 4.13: Institutional Factors on Grape Production Grape Farmers (N= 118)

Variables	village of respondent				Total
	Mpunguzi A	Mpunguzi B	Mpunguzi	Matumbulu	
Lack Of Capital	26 (22.2%)	5 (4.3%)		11 (9.4%)	42 (35.9%)
Unreliable Market	16 (13.7%)	9 (7.7%)	17 (14.5%)	7 (6.0%)	49 (41.9%)
Disease	25 (21.4%)	1 (0.9%)	15 (12.8%)	1 (0.9%)	42 (35.9%)
Storage Facilities		3 (2.6%)		1 (0.9%)	4 (3.4%)
Transportation Problem		11 (9.4%)	2 (1.7%)		13 (11.1%)
High Cost Of Inputs		9 (7.7%)	2 (1.7%)	2 (1.7%)	13 (11.1%)
Low Selling Price		6 (5.1%)	5 (4.3%)	1 (0.9%)	28 (23.9%)
Lack Of Knowledge		6 (5.1%)	4 (3.4%)	1 (0.9%)	11 (9.4%)
Shortage Of Rainfall		4 (3.4%)	4 (3.4%)		8 (6.8%)
Lack Of Credit	1 (0.9%)	3 (2.6%)	0 (0.0%)		4 (3.4%)
Poor Support		1 (0.9%)	1 (0.9%)		2 (1.7%)
Lack Of Improved Variety		3 (2.6%)	1 (0.9%)	24 (20.5%)	12 (10.9%)
Lack Of Processing Unit		1 (0.9%)			1 (0.9%)
Price Fluctuation	3 (2.6%)			1 (0.9%)	4 (3.4%)
Poor Accessibility Of Inputs	1 (0.9%)			1 (0.9%)	2 (1.7%)
TOTAL					117 (100.0%)

Source: Field Data (2020)

4.9 Discussion of Results

This study assessed the economic analysis of grape production in Tanzania a case of Dodoma municipal council and the obtained findings shows from table 4.1, that respondent means age for female lies in 15 to 35 age group and for males lies in 36 to 55 age group. This shows the importance of grape production in the area, since majority of participants lies in the low and middle ages and most of them are capable farmers and still energetic in involving in grape production. Mulashani (2016), declared the importance of age as the factor that can explain the level of production and efficiency, and it is thought for young population to be more productive than older population. Furthermore findings indicated that only few people above 56

years of ages engaged in grape farming activities among the selected sample.

Based on gender most female participating in production aged from 15 to 55 were 41.5 percent while male ranged 15 to 55 were 44.4 percent this gives a clear picture that males are highly involved in grape production than female, these findings relate with the study held by Natalia Kalimang`asi, Robert Majula and Nathaniel Naftali (2014) who found that males produce more than females do. Also the findings shows that males at the age of 36 to 55 depend on grape production at 26.3 percent than female who engages more in 15 to 35 of ages taking 22 percent .

The obtained findings also indicated that number of male headed is greater than female headed table 4.2, In the area 63.6 percent were male headed engaged in grape production while female were 36.4 percent; this means most of grape farmers are male headed households implying that most of resource controller and decision makers in the family are men. Also this shows that for the male headed family grape production is given priorities than female headed. According to table 3 educated farmers are expected to have more produces compared to uneducated farmers. This is basing on the fact that new technology and techniques in production are easily adopted by farmers with education.

From the descriptive statistics of the study there are total of 11 percent farmers uneducated, 60.2 percent with primary level, 25.4 percent with secondary level, 3.4 percent with university level. Table 4.3 shows that farmers with primary education and secondary education involved in grape production followed by uneducated farmers while farmers with university education were very few. In the study two

villages of Mpunguzi B and Matumbulu were found with grape farmers with university level. Thus the result show that grape production was practiced mostly with low education farmers and farmers with higher education were not effectively engaged in grape production (Table 3). This portray that the higher education level the lower involvement in agricultural activities.

Furthermore, the study area is found in the central plateau zone which is famous in production of fruits. According to Ministry of agriculture and food security-Horticulture unit, (2005) fruits such as Baobab, Mango, Papaya, Guava, Grapes were found in Dodoma region. According to this study in (Table 4.4) crops like Ground nuts, Maize, Sunflower, Bambara nuts, Millet, Sesame, Tomato were found in different study area. Grape production is the most leading crop in the village studied followed by groundnuts, Tomato and Maize. Sunflower and other crops are produced in low level.

So far according to table 4.6, The Average technical efficiency of stochastic production frontier model is 0.57 with minimum value of 0.21 and maximum value of 0.99, the minimum value show the most inefficient farmers and maximum value shows most efficient farmers. Average efficiency of 0.57 signifies that all farmers has the room to increase TE by 0.43 percent while for inefficiency farmer they have a chance to increase efficiency production by 0.79 percent and maximum efficiency farmers has a chance to increase by only 1 percent.

Table 4.7 shows household cost incurred during grape production per acre/year. Stallholders farmers incur different cost starting from land preparation up to

harvesting which they use different labour forces like family, hire or both hired and family labour. In average grape industries use both variable and fixed input like land and FYM among many inputs, results reveal that grape industry earn profit of 667,419.00 Tzs per acre which expend the production cost of 831,000.00 Tzs.

Major challenges faced farmers in during 2017/2018 grape production were inadequate capital, insufficient market, crop diseases, lack of storage facilities, transportation problems, high cost of input, low selling price, lack of knowledge, lack of credit, poor government support, lack of extension services in the area and climate change in the area. These challenges contributed to low yield for grape farmers and lead them to earn low income. From the challenges analyzed (Table 8) in this study, each village had its unique challenges compared to the other. Unreliable market was leading by 41.9 percent from all villages followed by inadequate capital 35.9 percent, crop disease 35.9 percent, low selling price by 23.9 percent.

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CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Chapter Overview

This chapter summarizes the entire dissertation and concludes the objective findings of the study, its explaining recommendations for action and recommendation for the further study which the current study does not cover or discover it is important during the process of research.

5.2 Conclusion

In view of the foregoing findings, the researcher made a number of conclusions observed during the study. Proper information should be supplies to young people on the importance and profit obtained on grape farming. Emerge generate as on other crops does not prefer grape farming as it shown in this study people with 36 to 55 years are most engage in grape production. As well educated people are not much engaged on grape farming as per results, 60.2 percent of all farmers are primary educated.

Grape production face large competition from other crops in term of land and other input resource like labour, thirty four percent of all one hundred and twenty grape farmers interviewed produce grape while other crop like ground nuts 19.1 percent, Tomato 16.7 percent and maize 15 percent. Various ways made to increase grape farming output or profit. Factors which lead to production efficiency are several contact with agriculture extension officer in order to acquire more knowledge concern production husbandry, increase productivity, follow by uses of pesticide like insecticide, and other chemical increase profit and uses of mix labour (family and

hired labour) increase efficiency then output which end up with high profit. In this study price extension and experience increase production output, while area used for grape production decrease production output. This means that grape production depend much on experience of farmers, extension and price of output. Other factors like age, area/ land and education are not significant for grape production.

Finding reveals that price are main character which determin production efficiency. Farmers will be able to re allocate resources like time, money and labour forces if they predict price increase. Therefore, study on market integration and market transmission should be much considered as a factor to improve production efficiency, therefore farmer they are not technical efficient in grape production even though they earn low profit by using indigenous knowledge while they have the room to increase profit.

Grape farmers incur large cost of production which reduce profit from grape farming, if farmer will be efficiently will have the opportunity to increase production by average of 47% . Grape farmer use Tzs. 831000 as a production cost to produce 1280 kg per acre. Farmer earn 667 819 Tzs from one acre of grape farm. Farmers might increase profit up to 981 693.93 Tzs per acre. Increase in profit by grape farmers depend much with the level of increase efficiency like the use of fertilizer, pesticide and mechanization in general.

5.3 Recommendations

5.3.1 Recommendations of the Study

According to the findings, it is recommended that several strategies should be

initiated as key factors to booster grape productions, strategy reduce cost of input to increase purchase power of farmers which will rise production efficiency by increase the use of improved technologies like fertilizer and pesticide, agriculture extension officer should be provided to every village because is the key factor to disseminate improved technologies also formation of group or cooperative in order to solve the problem of lack of capital and market problem, agriculture expertise should establish close relationship with farmers for the purpose of eliminate emergence problem like disease and input problem and lastly, simple storage facilities should be provided to solve post harvest loss of grape these strategy should be initiated in collaboration with different partners like individuals, private sector and government.

5.3.2 Recommendation for Further Studies

The researcher recommends the study for input use elasticity for the purpose of decrease cost of production and increase profit gain, this is due to some of important variable like fertilizer shows to influence production negatively which is uncommon. Secondly study based on market integration and price transmission should be carried out to observe the production with price relation based on different location.

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APPENDICES

Appendices 1: Survey Questionnaire

Survey questionnaire for grape farmers in Dodoma region administered to sample households.

You have been selected to provide some information on grape production, these information will be specifically for completion of my studies. I will appreciate if you will cooperate with me for your experience by answering the following question freely and honestly. Your answer to these questions will remain strictly confidential.

Questionnaire No …….. ……

Respondent Name…….……Name of household head…….....

Region…….….District……

Ward/Division …….…...Village…….

Name of Enumerator…….....Date……..

Part A; Basic Information and Social Characteristics of the Respondent

1. Status of household head……

   1= Male headed, 0=Female headed

2. Age of respondent…… (Year)

3. Sex of respondent……

   1= Male 0= Female

4. Marital status……

   1= Married 2=Single 3=Widow 4=Divorced

5. Education level……..

   1=No formal education, 2=Primary 3=Secondary, 4=Tertiary, 5= University

6. How many members of this household are living here now……

7. **Composition of the member of the household**

	Number of household members ≤6 years	
	Number of household members 7-16 years	
	Number of household members 17-59 years	
	Number of household members ≥60 years	

8. What is your first main occupation …

   1=Agriculture, 2=Livestock 3=Agriculture and Livestock 4=Business 5=Employment

9. What is your second main occupation …….

   1= Agriculture, 2= Livestock 3= Agriculture and Livestock

   4= Business 5= Employment

   10. What are the three potential crop did you grow in 2018 season?

      1,……..... 2,…… 3, ……

11. What is total area used for agriculture (acre)…… ……., area owned used for agriculture …….Hired used for agriculture…… (acre)

12. Did you grow grapes in your farm in 2018/19?

    1= yes 0 = No ( )

13. If yes; in (11).

    (a) How many acres of land used for grapes production (acre)……

    (b) Area owned used for growing grapes……

    (c) Area hired used for grapes growing …… (acre)

14. What is the reason for hiring land used for grapes production ……

15. If yes (in q11) for how long have you grown grapes …….. yrs

16. Which type of grapes did you grow?

1= i*mproved,* 2= Local varieties ( )

17. What types of grape varieties do you grow

S/No	Local varieties	Improved varieties
1		
2		
3		
4		

18. How many kilogram of grape did you produce from your fields……

19. What cost did you incur in hiring area for growing grapes…… (Tzs)

20. Who motivated you to cultivate grapes?

1. Neighbor farmer's 2.extension officer

3. Relatives 4. Politician 5.others (specify)…… ( )

21. What are the pulling factors for undertaking grapes production?

1. Increase income 2. Maintain status

3. Political pleasure 4. High profit 5= other (specify) …….. ( )

PART B. Production Processes

22. Do you use irrigation farming method

0= No, 1= Yes ( )

23. What types of equipment used during farm cultivation? ……. ( )

24. What types of labour did you use in farming activities?

1. Family 2. Hired 3.Both ( )

25. How many times did you weed your grape farm per season ……

26. What types of input did you use during 2018 season?

Types of input	Quantities/acre	#application	Area applied (acre)	Price@input	Distance Km (were obtained to the farm	Transport cost-Tzs	Means of transport
FYM							
Fertilizer							
Pesticide							

PART C: FARM OPERATION AND ECONOMIC SERVICES

INFORMATION

27. what was the farms operation inputs used in season 2018/2019

Activities	Cost	Types of labour=1. Family 2. Hired 3. Both	Mechanization e.g. Tractor
Farm preparation			
Planting			
Weeding			
Irrigation			
Chemical application			
Harvesting			

28. What can you say about accessibility of input in your area?

1. Easily accessible 2. Not easily accessible ( )

29. If Not in (25) what are the reasons

1. Not available on time 2. Too expensive

3. Lack of knowledge 4. I don't know ( )

30. How do you consider involvement of different institution in grape production?

1. More important 2. Important 3. Not important 4. I don't know ( )

31. Did you get any information concerning improving grape production?

1. Yes 0. No ( )

32. If yes in (33) what was the main source of information?

1. Government extension agent 2. Research centre, 3. Newspaper,

4. Seed traders/Agro–dealer, 5.Other private shops 6. Radio / TV,

7. Neighbors /other farmers. 8. NGO's 9. Farmer groups /associations.

10. Other; specify ……. ( )

33. What types of information do you receive?

1)……2)…….…… 3) ……

34. Are you satisfied with the information you received from the sources above?

1. Yes 2. No. If No explain…… ( )

PART D: Extension Services and Credit Accessibility in Grape Production

35. Do obtain Agriculture extension services

0= No, 1= Yes ( )

36. How do you access extension services when needed?

1. Very easy. 2. Fairly easy. 3. Not easy 4. Not at all ( )

37. What can you say on the importance of agricultural extension services and information on grape production?

1. Very important 2. Fairy important

3. Not important 4. I don't know ( )

38. Have you received any advice on grapes production from extension agents?

1. Yes 2.No ( )

39. If yes in (q38) what was the advice about?

1. How to use inputs 2. Improved agronomic

3. Grape marketing 4. Others (specify) …… ( )

40. Is there any association/farm group for any grape production in this area?

1. Yes 0.No ( )

41. If yes (40) what the importance of the association or farm group ……..

42. Information about credit

Loan accessibility 1. Available 2. Not available	Asked for loan 1. Yes 0. No	Have loan 1. Yes 0. No	Loan satisfies 1.yes 0.No	Source of loan	Purpose for loan.

43. Apart from credit do you have other sources of income for grape production?

1.Yes 2. No ( )

44. If yes in (43) what are the sources from?

1. Selling other crops 2. Borrowing from others

3. Local government 4. Providing labour ( )

PART E: Choice on grapes production strategies/income activities during 2018 cropping season

45. What factors do you consider when deciding to produce grapes?

46. Price offered 2. Maintain status 3. Household cash need 4. Others …… ( )

47. How many kilograms did you harvest in the cropping season……

48. Does the market for grape available?

1. Yes 2. No ( )

49. What is price of grape per kg?.....

50. What are the sources of market for grapes harvested? ……

51. What are the challenges facing grape production

……

……

52. Comments or what is your suggestion to improve grapes production

……

……

Appendix B: Research Clearance

THE OPEN UNIVERSITY OF TANZANIA

DIRECTORATE OF POSTGRADUATE STUDIES

P.O.BOX 23409
DAR ES SALAAM, Tanzania
http://23409www.openuniv

Tel: 255-22-2668992/2668445
Ext.2101
Fax:255-22-2668759
E-mail: dpgs@out.ac.tz

REF: PG201400121

02th January 2020

DIRECTOR,
P.O.BOX
DODOMA CITY COUNCIL.

The Open University of Tanzania was established by an act of Parliament no. 17 of 1992. The act became operational on the 1st March 1993 by public notes No. 55 in the official Gazette. Act number 7 of 1992 has now been replaced by the Open University of Tanzania charter which is in line the university act of 2005. The charter became operational on 1st January 2007. One of the mission objectives of the university is to generate and apply knowledge through research. For this reason, staff and students undertake research activities from time to time.

To facilitate the research function, the vice chancellor of the Open University of Tanzania was empowered to issue a research clearance to both staff and students of the university on behalf of the government of Tanzania and the Tanzania Commission of Science and Technology.

The purpose of this letter is to introduce to you **Mr. Aristides Abdalllah Nalyoto, PG 201400121** who is a Master student at the Open University of Tanzania. By this letter, **Mr. Aristides Abdalllah Nalyoto** has been granted clearance to conduct research in the country. The title of his research is "**Economic Analysis of Grape Production in Tanzania : A case study of Dodoma Region.**

The period which this permission has been granted is from 08/Jan/ 2020 to 10/Feb/2020.
In case you need any further information, please contact:
The Deputy Vice Chancellor (Academic); The Open University of Tanzania; P.O. Box 23409; Dar Es Salaam. Tel:
022-2-2668820
We thank you in advance for your cooperation and facilitation of this research activity.
Yours sincerely,

Prof Hossea Rwegoshora

For: VICE CHANCELLOR