ORGANIC SPICES FARMING IN WEST DISTRICTS, ZANZIBAR: ITS CONTRIBUTION TO LIVELIHOOD OUTCOMES OF SMALLHOLDER FARMERS

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ABSTRACT

In recent years, organic agriculture has been gaining considerable importance. Many farmers today show interest all over the world in organic farming. Several of them have begun switching to this traditional method of cultivation as a means to produce safe foodstuffs and preserve the environment. The concept of organic farming is not new, but it has been scantly studied. An organic spice farming is a part of the organic farming which requires to be studied widely. Spice production is a popular economic activity in Zanzibar. The purpose of this study was to assess the contribution of organic spice farming to livelihood outcomes of the smallholder farmers. The study adopted a cross-sectional research design. A random sampling procedure was used to obtain 120 households. The households were categorized from three clusters namely: merely organic, certified organic and inorganic spice farming farmers. Data were collected using a household questionnaire survey, focus group discussion and key informant interview. Both quantitative and qualitative data were analyzed. Among the three types of spice farming, inorganic spice farming could an averagely produce 174.3 kg/household, followed by merely organic (86.3 kg/household) and certified organic (70.2 kg/household). However, certified spice farming households earned in average 565 900 TAS higher than others ((merely organic (361 170 TAS) and inorganic (350 500 TAS)). Further, certified spices contributed to 26.2% of the total household's income, followed by merely organic (23.1%) and inorganic (19.0%) spices. The farmers who certified their spices had been food secured for about 43%, followed by merely organic spices (35%) and merely organic spices (30%). Generally, all the three types of spice farming led to the farmers affording to meet social services at above 70%. The study concludes that spice farming enhanced livelihood outcomes among households. There is, therefore, a need of putting more effort in spice

farming improvement, particularly certified organic spice farming as it gives high earnings to the households.

DECLARATION

I, Foum Ali Garu, do hereby declare to the senate of Sokoine University of Agriculture that this dissertation is my original work done within the period of registration and that is neither been submitted nor being concurrently submitted for degree award in any other institution.

_____ _____

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The above declaration is confirmed by;

_____ _____

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(Supervisor)

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DEDICATION

I dedicate this valuable work to my mother Bi. Mossi Foum Shariff, my wives Bi Mtumwa, and Bi Shumbana, my children Khadija, Rahma, Issa, Mgeni and Hussein.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CAGR	Compound Annual Growth Rate
DFID	Department for International Development
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organization
FGDs	Focus Group Discussions
GOMA	Global Organic Market Access
IFAD	International Fund for Agriculture Development
IFOAM	International Federation of Organic Agriculture Movements
ITC	International Trade Center
JAS	Japan’s Agricultural Standards
MKUKUTA (NSGRP)	Mkatakti wa Kukuza Uchumi na Kuondoa Umasikini Tanzania (National Strategy for Growth and Reduction of Poverty)
MKUZA (ZSGRP)	Mkakati wa Kukuza Uchumi na Kupunguza Umasikini Zanzibar (Zanzibar Strategy for Growth and Reduction of Poverty)
MOFGA	Maine Organic Farmers and Gardeners Association
NGO	Non-governmental organization
NOP	National Organic Program
NPOP	National Programme for Organic Production
OCGS	Office of the Government Statistician

OES	Office of Evaluation and Studies
OFPA	Ontario Food Protection Association
OFPA	Organic Foods Production Act
P_i	Probability term
RGoZ	Revolutionary Government of Zanzibar
RGZ	Revolutionary Government of Zanzibar
SPSS	Statistical Package for Social Science
TAS	Tanzania Assistance Strategy
UN	United Nations
URT	United Republic of Tanzania
USA	United States of America
USDA	United States Department of Agriculture
ZOSG	Zanzibar Organic Spices Growers
ZSTC	Zanzibar State Trading Corporation
β	Beta values
ε	Error term

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Spice production is a part of horticultural industry which has a significant contribution to livelihood of smallholder farmers in Asia, Latin America and Africa (IFAD, 2008) whereby about 86 types of spices are grown (Panda, 2010). Spices such as dried seed, natural product, root, bark, and vegetable substance are used in flavouring or seasoning of different foodstuffs, confectionery products, and beverage industry worldwide. Moreover, almost all spices have medicinal value either to be directly or indirectly used in pharmaceutical industries as raw materials for various medicines, and in cosmetic industries. Furthermore spice production improves livelihood of smallholder farmers through income generated from spice (ITC, 2007).

Spice farming can be categorised into three types, the certified organic spice farming, merely organic/organic by default and inorganic spice farming. Certification of organic spice came after the registration and adhering to basic organic principles as stipulated by responsible certification body (Firmino, 2010). Spice farmers can practise merely organic/organic by default spice farming but if they are not certified it cannot be considered as organic. The difference between certified and organic by default is only lack of certification to the default organic farming; however this difference can have a big impact on export market. The organic by default farming system is also known as uncertified organic spice farming (Maurya, 2014). Inorganic spice farming refers to those which use industrial chemicals including fertilizers and pesticides.

According to Research and Markets (2016), increasing demand for organic spices and marketing campaigns are expected to give a major boost to the growth of the global

market in the near future. Organic segment accounts for about 10% share of the total spices market and it is expected to grow in the next few years as the preference for organic spice as healthy products have been increasing more than inorganic products in the world market (Panda, 2010). In fact, globalization, varying demographics, and medicinal benefits of spices are among the factors, driving the growth of the global spices market; the analysts forecast the spices market in the United States (US) to grow at a compound annual growth rate (CAGR) of 6.72% during the period 2016-2020 (Research and Markets, 2016).

Spices play a significant role in the national economies of several spices producing, exporting, and importing countries, hence, the preferences of organic spices promise a fortune in terms of good prices for organic spice farmers than their counterparts. The growing organic market in Europe and US has stimulated organic produce all over the world and the development of international trade for organic spices (Panda, 2010). Many organisations and development partners have designed and supported projects and programmes aiming for increased farmers' incomes by tapping into the opportunities that these strong growing organic markets offer (Bennett and Franzel, 2009).

Organic spice farming has been remarked to bring improvement to livelihood of grass-root producers in various regions of the world such as Asia, Africa and Latin America (ITC, 2007). In Zanzibar, most farmers practise the traditional form of spice farming, which to certain extent, resembles organic practices that lead the farming to be classified as 'organic by default'. Moreover, many of these 'organic by default' famers do not practise important organic principles as defined by organic farming organizations partially due to lack of knowledge on economic gain of certified organic spice farming (Mikidadi, 2011). Nevertheless, these farmers are in a position to step up production of organic spices as per

European Commission (EC) organic food standards and fetch a premium price in the international market of up to 20-50% and in some cases 100% (Panda, 2010; Sri Lanka Spice Cluster, 2002) and fill the gap for international market if they can access adequate scientific support for production and quality improvement (Sri Lanka Spice Cluster, 2002). Currently, the demand for organic products is steadily increasing in the western market at 20-25% every year and that of organic spices at about 2% (Acharya *et al.,* 2015).

Effort to promote non-traditional export crops has focused on spices as a major crop in Zanzibar (Dadzie *et al*., 2009). The international market prefers certified organic spices than other types of spice; smallholder farmers who certified their organic spice seemed to have premium prices for their produce. However there is also little empirical evidence on the contribution of spice farming to their livelihood outcomes. Nevertheless, in order to capture the market of organic spices internationally, farmers, recently have gone further calling for certification for their spices produced (ProFound and Mugenyi, 2012), and to some extent this has proved to increase prices of spices (Post and Schahczenski, 2012). Certification of organic spice farms has been recently introduced; however, benefits of this process have not been quantified. Due to scarcity of information regarding the contribution of the certified organic spice product in Zanzibar, this study opted to analyze the importance of organic spice farming to livelihood outcomes of smallholder farmers in Zanzibar.

1.2 Problem Statement

In recent years, organic agriculture has been gaining considerable importance. Many farmers today show interest all over the world in organic farming. Several of them have begun switching to this traditional method of cultivation as a means to produce safe foodstuffs and preserve the environment (Rosinger, 2014). The concept of organic farming

is not new, but it has been scantly studied. The world demand for organic products is growing rapidly in developed countries like Europe, USA, Japan and Australia. The current estimated share of organic foods in these countries is approximately 1 to 1.5 per cent (FAO, 2011). Worldwide, food trends are changing with a marked health orientation. Since organic foods are free from chemical contaminants, the demands for these products are steadily increasing.

Worldwide, fertilizers, pesticides, and growth regulators are widely used because of the increasing demand for food quantity, rather than quality, from a limited land area (FAO, 2011; Herrmann, 2011). Recently, however, interested individuals have developed organic farming units. These have been established from accumulated knowledge on the benefits of organic farming, and because of increasing demand for export of organically-grown products. Exports of organically-grown agricultural products to the western world are increasing. Vegetables, fruits, and spices grown without fertilizers and pesticides bring premium prices, thereby enhancing the economic viability of these production units. Nevertheless, the lack of research and extension programs on organic farming is the principal constraint to the development of productive and profitable organic farming (MKUZA, 2009).

It is unlikely that organic agriculture will play a very significant role in meeting the food production requirements of development programs. This is because of the ever increasing demand for greater quantities of food, and expressed doubts that strictly organic methods of agriculture can meet this demand (ZSGRP, 2007).

Nevertheless, the concept of exporting quality foods grown under hygienic conditions without the use of agrichemicals, especially pesticides, and at premium prices, has

attracted attention. Some production units have already been established with considerable success, and there appears to be an opportunity for their expansion to meet export demand. These units could also be developed under the self-employment schemes pursued by the state to solve unemployment problems (Mahmoud, 2013).

A major constraint to the expansion of organic agriculture is the lack of research on the viability and sustainability of organic farming under local conditions. The primary use of organic farming methods is seen in home gardening and some smallholder farming operations. However, with sufficient emphasis on research at the initial stages, followed by a well-developed extension program, government awareness can be directed toward organic agriculture (RGoZ, 2015). This can become a productive and profitable venture, especially as a specialized export-oriented enterprise that will generate much needed foreign exchange.

Spices as part of agriculture which attracts attention of many users in the word require also to be under organic farming. Although it is well known that spices have potential to improve the livelihoods of the smallholder farmers worldwide (Acharya *et al.,* 2015; Panda, 2010), the contribution of organically produced spices to livelihood outcomes have not been well known in Tanzania, specifically Zanzibar.

Tanzania is the third spice producer in Africa after Uganda and Ethiopia and the fifth in the world (ProFound, 2012). Zanzibar produces spices from three types of spice farming namely merely organic, certified organic and non-organic. Although international spice market demand certified organic spices, smallholder farmers have low responses on adopting certification of organic spices (Bakewell-Stone, 2006). This among others may be due to lack of knowledge on economic significance of certified organic spices.

Therefore, there is a need to study the contribution of certified organic farming to improvement of livelihood outcomes of smallholder farmers

1.3 Justification of the Study

Zanzibar is among the major spices producing areas in the United Republic of Tanzania (Juma, 2010). Despite the long history of Zanzibar in spice production there is inadequate information on the importance of the certified organic spices farming to smallholder spice farmers' livelihoods outcomes. Thus the findings of this study will be useful to smallholder farmers who practice merely organic and inorganic spice farming. The study is also in line with the Sustainable Development Goals – goal 1 which aims at ending poverty, 2 - which aims at ending hunger and achieving food security, as well as goal 3 which aims at maintaining good health (UN, 2015). When farmers are encouraged to certify their spice production they will increase their income through premium price selling and thus having more money for food, health services and other social services (MKUKUTA, 2005). Therefore, the information obtained in this study will be useful in ensuring that smallholder spice farmers benefit socially and economically as well as local authorities in production areas. Hence, from this basis, it was worth to carry out this study.

1.4 Objectives

1.4.1 Overall objectives

The overall objective of the study was to assess the contribution of spice farming to livelihood outcomes of smallholder farmers.

1.4.2 Specific objectives

i. To examine practices of spice farming among smallholder farmers

ii. To assess the farmers knowledge on the practice of organic spice farming

iii. To determine merely organic, certified and non-organic spice production and productivity

iv. To examine the contribution of merely organic spices; certified organic spices; and inorganic spices farming to livelihood outcomes of the farmers.

1.4.3 Research questions

i. What are spices farming types being practised by smallholder farmers in the research areas?

ii. What is the spice farmers' understanding of organic spice farming types?

iii. What is the level of production and productivity of spice farming types per unit area?

iv. What is the contribution of organic and inorganic –spices farming to the income of smallholder farmers?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

The government of Zanzibar has prioritised the spice production subsector to be central for its economic development and poverty reduction strategy. Organic farming development is based on export oriented products (Maurya, 2014); thus producers should seek to offer products that have organic (and when feasible also fair trade) certification (ITC, 2006). Organic certification is one of the innovations which can help farmers to get premium prices when adopted. This study adopted the theory of adoption popularized by Rogers in 1962. Rogers proposes that four main elements influence the spread of a new idea: the innovation itself, communication channels, time, and a social system.

Adoption usually starts with the recognition that a need exists and moves to searching for solutions, then to the initial decision to attempt the adoption of a solution and finally to the actual decision to attempt to proceed with the implementation of the solution (Wisdom *et al.*, 2014). Different factors determine the adoption of different agricultural innovations and practices (Akudugu *et al.,* 2012). Certification of organic spices is among innovations which farmers need to adopt and benefit from the premium prices. According to Weldegiorges (2014) and Bareja (2011), adoption and expansion of any agricultural activity mostly depend upon the profitability and cost of the technology. Certification of organic spices is among profitable innovation since farmers sell at premium prices.

2.2 Organic Spices Farming

Organic farming refers to means of farming that does not involve the use of chemicals such as chemical fertilizers and chemical pesticides. Numerous small holder farmers

practice organic farming; however, since they are unaware of the market opportunities, they are not able to reap the benefits of organic farming.

Organic farming has various benefits to smallholder farmers all over the world. Among these benefits include a high premium, low capital investment, the ability to achieve higher premiums in the market, and the ability to use traditional knowledge. According to research conducted by the Office of Evaluation and Studies (OES), at the International Fund for Agriculture (IFAD), smallholder farmers benefit dramatically from organic farming and help in alleviating poverty (ITC, 2006).

Spices and condiments are defined as vegetable products or mixtures, free from extraneous matter, used for flavouring, seasoning, preservation or imparting aroma in foods (FAO, 2005). Spices may be derived from many parts of the plant: bark, buds, flowers, fruits, leaves, rhizomes, roots, seeds, stigmas and styles or the entire plant tops.

Organic agriculture uses holistic production management systems which promote and enhance agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity (ITC, 2006). Organic production systems are based on specific and precise standards of production which aimed at achieving optimal agro-ecosystems which are socially, ecologically and economically sustainable. According to ITC (2006) the requirements for organically produced foods are an essential part of the identification and labelling of, and claim for, such products.

According to Singer and Manson (2016), organic farming has a different philosophy. It sees farmers as stewards of the land, harvesting its fruits while they care for it so that they can leave it to future generations in a condition as good as, or better than, it was when they

started farming. So organic farmers maintain and enrich the soil by adding organic matter. That increases the number of worms and micro-organisms. Soil rich in organic matter needs less irrigation because the soil holds moisture better. It is also less likely to blow away in the wind, or wash off with every storm. The philosophy tells that organic farming provides several benefits ranging from nature and socio-economic aspects.

2.2.1 World spice farming

Globally, Asia specifically India is the leading spice producer and exporter of spices meets nearly half of the global demand for spices. However, other countries which are producing spice in the world are China, Indonesia, Vietnam, Madagascar, Brazil, Guatemala and Sri Lanka (Vidyashankar, 2014). In Africa, Tanzania is the third largest spice producer after Uganda and Ethiopia (Panda, 2010).

2.2.2 Organic certification

Certification is a procedure for verifying that a product conforms to certain production and processing standards body (ITC, 2006). For the case of organic spices production, certification gives consumers a formal assurance that organic spices production standards have been met. A producer and/or exporter must have certification that meets the requirements of the target market, including legal regulations and standards in the importing country body (ITC, 2006). In developed countries market, the labelling of goods as organic requires formal certification in accordance with legislation. Import regulations for organic produce whereby the importer must be both certified by an accredited certification body and also registered with the national organisation responsible for organic legislation (ITC, 2006).

International milestones were emphasized much since 1990 when the Organic Foods Production Act (OFPA) was passed, while 1991, the National Organic Program (NOP) was initiated. Sometimes latter, in 1991, there was an EU organic regulation passing and implemented in 1993. In April 2001, all plant based organic products and materials exported to Japan must be compliant with Japan's Agricultural Standards (JAS). Sometimes, latter May 2001, the NPOP was published in India. March 2006, the USDA recognizes India's NPOP as sufficient to meet the standards of the US; June 2006: European Commission has approved India's organic standards for equivalence (inclusion in third country list) June 2009: Canada and the US recognize each other's organic standards and laws (very first "organic equivalency arrangement"). July 2011: Canada and the EU recognize each other's organic standards and laws in 2012: Equivalence between US and EU (IFOAM, 2012).

Today about 75 countries have passed and implemented a regulation on organic food and farming Another 25 countries are working on adopting a regulation. IFOAM plays a decisive role in developing mechanisms for international harmonization through harmonization of organic systems – GOMA (MOFGA, 2017).

2.2.3 Spice production in Tanzania

Agriculture is a dominant sector in Tanzanian economy providing livelihood, income and employment to over 80% of the population, and accounts for 27% of GDP and 30% of export earnings as well as 65% of raw material for domestic industries (Tumbo *et al.*, 2010).

According to International Trade Centre (2014), it is estimated that Tanzania's share in the global spice trade has dropped to lower than 0.07 % (ITC, 2014) than before 2000 where it

was 0.36%. Despite of that fall spices are still grown in Tanzania. Clove, pepper, cardamom and cinnamon are mainly produced in Tanga and Morogoro regions as well as in Zanzibar and Pemba islands. Zanzibar and Pemba are the main areas for the production of clove, other regions producing cloves are Tanga and Morogoro (ITC, 2014).

2.2.4 Opportunities for organic spice farming

The world market trend for organic spices is increasing contradicting the local market which is not conscious about organically produced spices. Consumers in European countries, America and Asia have a strongly interest in a healthy lifestyle, thus they are willing to pay high price for organically produced farm produce than for inorganically produced (ITC, 2006). However, the price offered depends on whether the product meets the criteria for organic product.

2.3 Spice Production in Zanzibar

Agriculture sector has an economic potential to livelihoods of Zanzibar people. Cloves production contributes 50% to foreign exchange earnings of Zanzibar (Mahmoud, 2013). Moreover, the sector generates employment to over 70% of the rural farm households in Zanzibar (OCGS, 2002) cited by Mahmoud (2013). In addition, agriculture also contributes to the development of tourism sector through ‘spice tours’ whereby about 100 000 foreign visitors arriving in Zanzibar annually visited spice farms (RGZ, 2013) cited by Mahmoud (2013).

Over 70% of the smallholder farmers derive their livelihoods from subsistence agriculture by growing cash and food crops; and spice being one of the major cash crops (Mahmoud, 2013). Spices harvested in off-season coincide with high market demand and increased prices.

According to Mahmoud (2013) farmers who produce certified organic spice are registered through private sector spice companies like TAZOP; which ensures better quality of spices to allow an external certification body to delegate the periodic inspection of individual group members to an identified body or unit within the certified operator (IFOAM, 2013). For those farmers qualifying for the US and EU organic standards their spice are sold at premium prices (Akyoo and Lazaro, 2007). Nevertheless, some farmers growing organic spice sell their produce through middlemen and/or spice tours and other market opportunities. Most farmers under this category belong to the Zanzibar Organic Spice Growers (ZOSG) as local NGO. In the case of cloves, the farmers were required to sell their cloves to ZSTC (government owned company) and have no right to sell to any other outlet market (Mahmoud, 2013).

2.4 Conceptual Framework

According to DFID (2000), livelihood comprises the capabilities, assets and activities required for a means of living. Livelihood is considered to be sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. The conceptual framework (Fig. 1) shows how spice farming could have influence on individual livelihood outcomes. The background information (education, age, sex land size and other sources of income) could determine whether a farmer went for which type of farming (i.e. merely organic, certified or inorganic farming) and the type of spice grown (independent variable). Farmers' education, farm size and sources of income can have influence on decision on what type of farming to go about (merely organic, inorganic or certified organic spice farming) (Olutokunbo and Ibikunle, 2011).

The type of farming (merely organic, inorganic and certified organic) and type of the crop to be grown have an influence to the livelihood of the household (dependent variable) since the market price can be determined by the type of spice farming. Organic has sound potential for improving livelihoods of smallholders in Africa (Crucefix, 1998; Sanchez, 2002). The rising demand and high prices for certified organic products in developed countries could help farmers increase their incomes (Greene *et al*., 2009 and Oberholtzer *et al*., 2005) cited in Bennett and Franzel (2013); thus having more money to buy food and increased ability to pay for social services such as health, education, water and electricity. However, those who are not certified cannot sell at premium prices; hence they are likely to earn less income and thus become food insecure, as well as decreased ability to meet the cost of social services, resulting to unimproved livelihood.

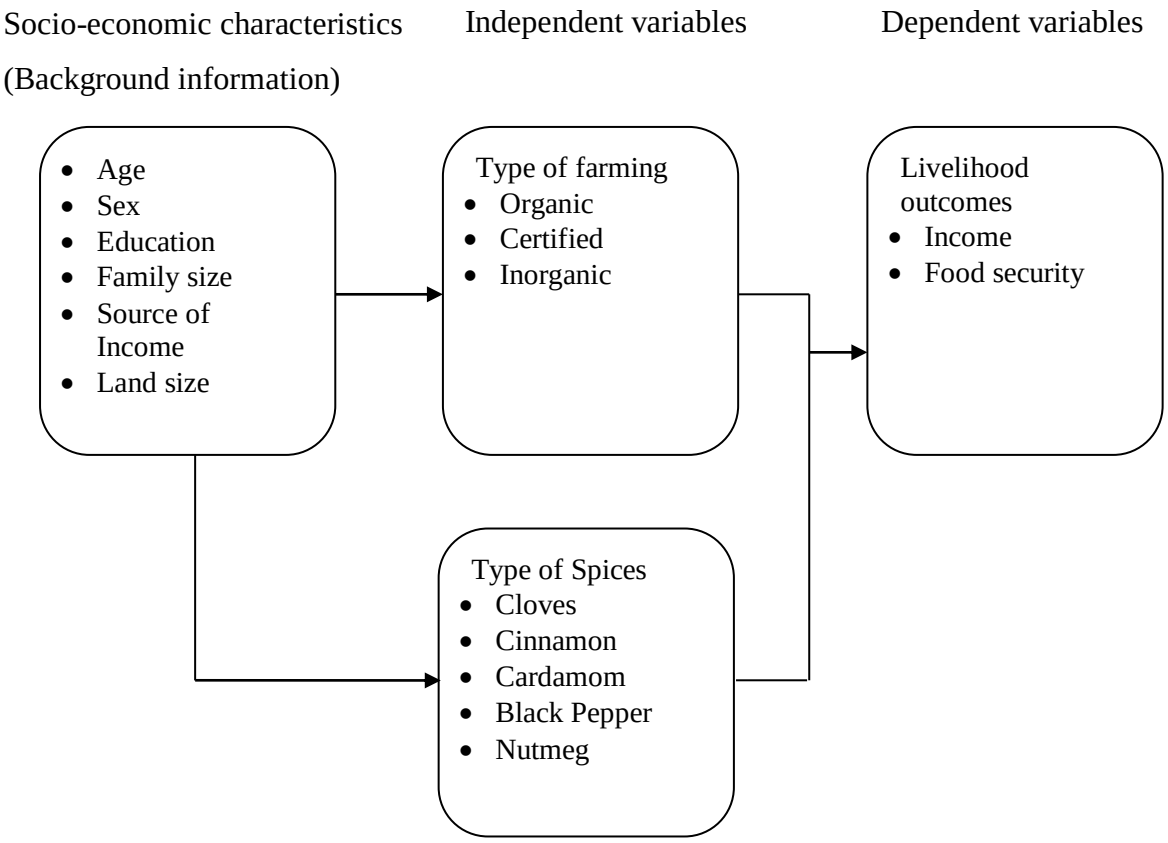

Figure 1: Conceptual framework

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of Study Area

The study was conducted in two districts of Zanzibar, the West and Central districts. The West District lies between 6^0.13'57" latitude and 39^0.36'21" longitudes at the elevation of 27.37 metres above the sea level and has an area of 208 km^2. Central District which lies between 6^0.20'37" latitude and 39^0.36'21" longitudes at 23.2 metres above the sea level has a total area 453 km^2. These districts have tropical climate, receiving an average annual rainfall of 1700mm. The majority of smallholder spice farmers are found in the two districts, due to their favourable climatic condition for agriculture and good soil fertility.

The study districts were selected because they practice certified organic, merely organic and inorganic spice farming in a great extent compared to other districts in Unguja Island. Among other activities conducted in the districts include cultivation of crops such as maize, rice, cassava and coconuts. Various businesses are conducted in the districts. Among the businesses conducted in the districts include shops, hotels, tourism and small industries to mention a few. Main sources of income come from crop farming, spice farming, livestock, fishing, businesses, salary and remittances.

3.2 Research Design

This study adopted a cross–sectional research design in collection of data from farmers practising different spice farming practices. Data was collected at once in each farm (Kothari, 2014). The study compared between farming practices and income generated. The purpose of selecting the design was to obtain information related with the study

objectives quickly. Furthermore, the design allows collection of data at once in a single point in time (Barley, 1995; Pickvance, 2005).

3.3 Sampling Procedure and Sample Size

A total of five (5) *shehia*[1] were randomly selected in each district. A total of 120 respondents were randomly selected. Out of 120 respondents/ households selected, 40 households were practising merely organic spice farming, while 40 households practiced certified organic spice farming and 40 did not practice the two, but they were practising inorganic spice farming. Three focus group discussions (FGDs) were held in each district. Participants for the FGDs were randomly selected from the three categories of spice farming. The FGDs comprised of 7-12 participants. The key informants such as leaders of organic spice groups, organic spice certification organization and extension officers were purposively selected (Mundfrom *et al.*, 2005).

3.4 Data Collection

Both quantitative data and qualitative data were collected. The quantitative data were collected using a household questionnaire survey. The questionnaire was formulated of open- and closed- ended questions as shown in Appendix 1. In-depth approach was used to administer the questionnaire to the selected respondents. The data collected through the household questionnaire survey included practices of spice farming, types of spices, production of spices, and income from both non spice farming and other activities. Status of food security and affordability of households in meeting the social services were also collected using the household questionnaire survey.

The qualitative data were collected using Key informant interview, Focus group discussions and field observation methods. In collecting the qualitative data using these

[1] *shehia means ward in this context*

methods, check lists were used in guiding the exercises. These methods were applied in order to triangulate what was collected during the household questionnaire survey.

3.5 Data Analysis 3

Both quantitative and qualitative data were analyzed. The quantitative data were analyzed using IBM SPSS computer software version 20. Both descriptive and inferential statistics were applied in the analyses. The descriptive statics were used to determine distribution of individual variables in terms of frequencies and percentages. In addition, the statistics were used to compute means, standard deviations and summations of the variables. The inferential statistics were used to for determining determinants of various factors to spice production, income, social services and food security among households. In addition, ANOVA was used to compare the production and contribution of the three types of spice farming.

Moreover, in qualitative data, content analysis was used to analyze information collected from the field through FGDs, key informant interview and field observation. The information was analyzed through summarizing into different meaningful themes based on the specific objective of the study.

In determining predictors of various dependent variables used in this study, A multiple linear regression model was used. The model was in the following form:

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots\ldots + \beta_k X_k + \varepsilon_i$……..(1)

Where by:

Y_i = dependent variable

β_0 = Equation Interception

β_1- β_k = Coefficient of regression

$X_{1-}X_k$ = Independent variables

ε - Error terms

Also, Binary logistic regression was used to analyse factors affecting food security, affordability to social services by the spice farmers.

$$Logit(p_i) = \log(p_i / 1 - p_i) = b_0 + b_1 x_1 + b_2 + x_2 + ... + b_k x_k \text{ ………………………..……..(2)}$$

Whereby

Logit p_i = In odd (event) that is the natural log of an event occurring

$P_{i =}$ Prob (event) that is the possibility that the event occurred, in this research people being food secured and ability to pay for electricity services, accommodation, water, health, clothing and education bills.

1-p_i = prob (non-event) the probability that an event did not occur

b_0 = constant of the equation

b_1-b_i = coefficient of the independent (predictor, response) variables

k = number of independent variables

x_1-x_k = independent variables entered in a model

A Liker scale analysis was done as follows: in the assessment of attitude of the spice farmers, seven statements were used. The scores were as follows: 5 = strongly agree, 4 = agree, 3 = undecided/neutral, 2 = disagree and 1 = strongly agree. These statements were part of the questions formed the questionnaire. In the analysis, several assumptions were made. In the assumptions, it was said that if all the respondents were to score 5 in each statement the total score would have been 35 (5 x 7); if they were to score 3, the total score would have been 21 (3x7) and otherwise all were to score 1 in each statement, the total score would have been 7 (1x7). Half of maximum score was 35/2 = 16.5. From the

above assumptions the three levels were made as: 1 – 16 = low attitude; 17 – 21 = moderate; 22 – 35 = High.

3.6 Limitation of the Study

During the data collection, there was challenge of getting respondents especially in Central district where certified organic spice farmers were few compared with the West district. Moreover, many respondents were busy during data collection as it was a harvesting period for cinnamon. However, the study managed to collect data by visiting them in their fields/farms and visiting in their homesteads in the evening.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Household Socio-demographic Characteristics

4.1.1 Household age and spice farming

The findings presented in Table 1 show that age of respondents in the study area ranged from 18-71 years. Majority of respondents belonged to the age group of 36-53 years, followed by the age group of 18-35 years. This shows that the majority engaged in spice production were in an active working group and their engagement in spice farming started at youth age (18+ years); this engagement grows as age increase, but when they reach a certain age group (54-71), their engagement in spice farming starts declining as age increases. Thus the study believes that the active age groups are expected to be very active in spice farming and adoption of spice certification processes.

In addition, the study results show that the active age group (18-53 years) gave a high proportion in certification process than the 54-71 years age group. The findings explain that 35.8% of household heads aged 36-53 years certified spices, followed by 34.5% (18-35 years) and the household heads aged 54-71 years which accounted for 25% certified their spices. This study is in line with the study on modernization of agriculture done by Akudungu *et al*. (2012) who identified age as an important factor to consider in modernization of agriculture.

Table 1: Socio-economic characteristics vs. Category of Spice Farming (n =120)

		Category of Spice Farming			
		Inorganic	**Merely Organic**	**Certified Organic**	**Total**
Sex of the	Female	8	6	6	20
Household Head	Male	32	34	34	100
Total		**40**	**40**	**40**	**120**
Marital Status	Single	4	0	1	5
	Separated	2	0	2	4
	Widow/Widower	0	5	2	7
	Married	34	35	35	104
Total		**40**	**40**	**40**	**120**
Main Occupation	Employed	1	1	3	5
of the Household	Business	1	1	4	6
Head	Spice Farming	38	38	33	109
Total		**40**	**40**	**40**	**120**
Farm size (ha)	Below 1	6	3	1	10
Category	1-4	34	37	33	104
	4.1-7	0	0	6	6
Total		**40**	**40**	**40**	**120**
Education Level	None	1	0	0	1
of the Household	Primary Education	11	7	10	28
Head	Secondary Education	25	29	25	79
	Tertiary/College	3	4	5	12
Total		**40**	**40**	**40**	**120**
Age category HH	18-35	12	7	10(34.5)	29
Head	36-53	19	24	24(35.8)	67
	54-71	9	9	6(25)	24
Total		**40**	**40**	**40**	**120**

4.1.2 Household head sex and organic spice farming

The distribution of household head's sex is shown in Table 1. Generally, men headed households were the majority in all types of spice farming. Thus the study found that in the area the spice farming was mainly done by men headed households. "*These findings do not mean women are not involved in spice farming; rather they are doing a great job on irrigation, harvesting, weeding and drying on behalf of their husbands in the households; they are mainly considered as helper and supplier of labour in light farm operation during spice farming season*". This was said by one of the respondents in West District. This result matches with Adebisi-Adelani *et al.* (2012) in North Central state of Nigeria which showed that 83% of spice farmers were males.

4.1.3 Household head marital status and spice farming

Marital status has a strong implication on involvement in spice farming and agricultural activities in general. The significance of marital status in agricultural activities can be explained in terms of family labour supply. The findings in Table 1 show that the majority in each category of spice farming were married household heads.

Generally the findings show that; among the households certified their spices; married household heads were 87.5%. This might be due to the fact that the married couple can have more time to go for certification process without interfering other activities as one person can attend certification processes or meeting while the other perform other house chores. Findings of this study match with Bullock *et al*. (2014) who found that marital status had significant influence on adoption of organic inputs. This is probably, married couple sometimes share ideas of incoming subject matters.

4.1.4 Household education level and organic spice farming

Globally, education is recognised as the crucial aspect in adoption of technology and improved decision making. The study shows that people with secondary education

constituted 62.5% of all farmers certified their spices. People with education level higher than secondary education certified their spices constituted of only 12.5%. The low proportion of people with higher education level in certification of organic spice was a result of minimal participation of highly educated people in agriculture in developing countries specifically Tanzania. Moreover education might have negative impact with participation in agriculture as more educated people switch occupation to be better compensated for their work (Singh *et al*., 2015).

4.2 Smallholder Farmers' Practices on Spice Farming

4.2.1 Types of spices

The findings show that farmers in the study area were growing 10 types of spices (Table 2). Clove was grown by many farmers (65%), followed by black pepper (47.5%), vanilla (45%) and cinnamon (42.5%). The domination of cloves in types of spice cultivated in Zanzibar has a long history since during colonialism. Despite of Vanilla being cultivated by many farmers, its production was found to be low comparing to other types of spices. Spice farmers grow vanilla only for tourist purposes; the study found that majority of spice farmers grew at least one vanilla plant. Table 2 shows that among the least spice produce in Zanzibar; this is due to its cumbersome nature in growing as it needs hands pollination, good moisture supply mulching. According to findings in Table 2, clove was found leading in terms of annual production (394 kg/household) followed by cinnamon (346 kg/household) and black pepper (251 kg/household).

Table 2: Types of spice grown and production (n = 120)

Type of spice	NO	Yes	Average Yield (kg/household)
Black Pepper	52.5	47.5	251
Nutmeg	70.0	30.0	230
Cardamom	66.7	33.3	21
Lemon grass	61.7	38.3	28
Cinnamon	57.5	42.5	346
Cloves	35.0	65.0	394
Vanilla	55.0	45.0	16
Turmeric	94.2	5.8	54
Ginger	95.8	4.2	61
Hot Chilly	79.2	20.8	36

4.2.2 Technologies adopted in spice farming

The findings in Table 3 show that majority of farmers in the study (70%) adopted intercropping, while 68.3% adopted the use of organic fertilizer (68.3%) and 80% used mulching regardless of their engagement in certification processes. This made majority of spice farmers to practice organic spice by default. Only few farmers were using inorganic products such as fertilizers, pesticides and herbicides; these were mainly used in nursery stages of spice farming. These findings match with the study done by Gills *et al*. (2013) which showed that majority of farmers adopted conservation measure such as mulching and intercropping spice farming during the early stage of growth.

Table 3: Technologies adopted in spice farming in percentage (n = 120)

Practices	Not Adopted	Adopted
Improved Seeds	91.7	8.3
Organic Fertilizer	31.7	68.3
Organic Pesticides	67.5	32.5
Inorganic Fertilizer	76.7	23.3
Inorganic Pesticides	83.3	16.7
Inorganic Herbicides	97.5	2.5
Crop Rotation	53.3	46.7
Intercropping	30.0	70.0
Terrace	98.3	1.7
Mulching	20.0	80.0

Majority of participants of focus group discussions indicated that in relation to certification of organic spice, but not all crops were certified. They further indicated that only few with market potential spices were certified. The mentioned black pepper, cinnamon, nutmeg, vanilla, cardamom and lemongrass were certified. The participants of the FGDs, pointed out that there was only one buyer in Unguja who bought certified organic spices named *Ecoland* herbs and spices of Germany, even though there was only one buyer of certified spices but its demand had not been fully supplied (Melanie and Michae, 2011).

Table 4 presents a support farmers received from various institutions. Majority of the farmers (38.3%) were not receiving any support from the institutions. This could be interpreted that the spice farmers in the study were doing farming traditionally. That it meant that the practice of spice farming is being done followed by the introduction of the farming since colonial era. This is likely to show that probability of organic farming particularly certified specific spice farming could be very low. This is further could be interpreted that those who got support from various institutions have an opportunity of practicing organic spice farming.

Table 4: Organic farming support (n = 120)

Supporters	Frequency	Percentage
Organic farming organization	23	19.2
Private company	12	10.0
Government	23	19.2
Individuals	16	13.3
I don't have any	46	38.3
Total	**120**	**100**

From various studies, it shows that in order for farmers to adopt new practices requires interventions (e.g. Overfield and Fleming, 2001; Kinyangi, 2014; Miyashita, 2015).

4.3 Farmers' Knowledge on the Ppractice of Organic Spice Farming

From Table 5, the statement of "Use of manure, cultural diseases/infection control and soil conservation is the basis for organic farming" was strongly agreed by 40%, while those who strongly disagreed on of chemical fertilizers and industrial chemicals", while very few farmers (2.5%) strongly disagreed the state accounted for only 2.5% of the farmers. This provides an impression that majority of the farmers have understanding that organic spice farming does not require and artificial chemicals. Majority of the farmers (34.2%) agreed on the statement that "An advantage of organic farming is the reduced use on the statement. This shows that many farmers have the knowledge of spice organic farming.

Table 5, further, shows that majority of the farmers (26.7%) were not in a position of agreeing or disagreeing on whether organic farming improves soil fertility or not. However, majority of the farmers strongly disagreed that "Economic income gains when practicing integrated farming are not convincing". This could be interpreted that many farmers have understanding that organic farming leads to high income gains compared to

inorganic spice farming. This argument is reported by various studies (e.g. Miyashita, 2015) that organic spice farming improves household income.

About 32% of the farmers strongly disagreed on the statement that the farm income may decrease when practicing organic farming as opposed by only 8.3% of the farmers who strongly disagreed on the statement. This shows that very few farmers have acknowledged the gains of the organic farming. Probably, these farmers had not practice organic farming. Table 5, further, shows that majority of the farmers (32.5%) had an opinion that farm income might decrease when practicing organic farming. Organic spice farming improve household income and export market favor more organic spices than inorganic ones were placed as strongly disagree by 33.3% and 33.5% of the farmers respectively.

Table 5: Attitudes of farmers towards organic spice farming (n = 120)

Statements	5=Strongly Agree	4=Agree	3=Neutral	2=Disagree	1=Strongly disagree
Use of manure, cultural diseases/infection control and soil conservation is the basis for organic farming	48[1] (40.0)[2]	31(25.8)	26(21.7)	12(10.0)	3(2.5)
An advantage of organic farming is the reduced use of chemical fertilizers and industrial chemicals	36 (30.0)	41(34.2)	31(25.8)	9(7.5)	3(2.5)
Organic farmers improve soil fertility sustainably	26 (21.7)	29(24.2)	32(26.7)	28(23.3)	5(4.2)
Economic income gains when practicing integrated farming are not convincing	13(10.8)	20(16.7)	15(12.5)	34(28.3)	38(31.7)
Farm income may decrease when practicing organic farming	10(8.3)	16(13.3)	20(16.7)	35(29.2)	39(32.5)
Organic spice farming improve household income	13(10.8)	18(15.0)	19(15.8)	30(25.0)	40(33.3)
Export market favor more organic spices than inorganic	13(10.8)	19(15.8)	13(10.8)	36 (30.0)	39(32.5)

[1]frequency [2]percentage

In assessing farmers' knowledge on the practice, seven questions of awareness about organic spice farming were developed and given a scale ranging from 1 to 5 scores. This means the one who scored 35 was considered to have the highest knowledge on certification of organic spice while the one who scored 7 was considered to have the least knowledge of organic spice. The scores were categorised in three category, those total score from 7-16 considered to have low knowledge level on organic spices, while those who scored 17-21 were considered to have normal/average knowledge level and those who scored 22-35 were considered to have high level of knowledge on organic spices.

The findings in Table 6 show that majority of the farmers (46.7%) had low knowledge about organic spices, while only 33.3% had moderate knowledge on of organic spices and 20% of the farmers had the lowest knowledge. This results means that even some of the farmers who had their spices did not have knowledge on organic spices. The situation of majority having low knowledge about organic spices means that spice farmers did not realize the premium benefit accrued from organic spices. Further, it can be due to certification of crops in Tanzania has been recently introduced.

Table 6: Summary of levels of knowledge of the spice farming among farmers (n = 120)

Scores	Frequency	Percentage	Levels
22-35	47	33.3	High
17 – 21	20	20	Moderate
7 – 16	33	46.7	Low

4.4 Organic, Certified and Non-organic Spice Production in Kg/Household Per Annual

4.4.1 Spice production in yield

The study tried to determine production of spices based on the three types of farming namely merely organic, certified organic and non-organic spice farming. The results in

Table 7 show that non organic spice farming had high production with an average of 174.3kg/household compared to others merely organic and certified organic spice farming types, which had the average of 86.3 kg/household and 70.2 kg/household respectively.

Table 7: Spice production in kg/household per annual

Type of spice	Merely organic	Certified organic	Non-organic	Mean
Black Pepper	128	80	250	152.7
Nutmeg	180	105	268	184.3
Cardamom	10	36	23	23.0
Lemon grass	12	18	36	22.0
Cinnamon	167	150	345	220.7
Cloves	156	123	467	248.7
Vanilla	18	12	18	16.0
Turmeric	68	49	102	73.0
Ginger	78	103	156	112.3
Hot Chilly	46	26	78	50.0
Overall	**86.3**	**70.2**	**174.3**	**110.3**

The production according to the types of the spice farming may be interpreted that inorganic type of farming still dominates and provides high yield among the farmers. A plausible reason may be the use of inorganic fertilisers and herbicides respond quickly to the spice farming as opposed to merely organic and certified organic spice farming. In addition, merely organic farming requires intensive labour, which if, a household relies on family, could probably not afford to supply such labour (Overfield and Fleming, 2001). On the other hand, the certified organic spice farming has been recently introduced in Zanzibar and Tanzania in generally (MKUZA, 2009; Miyashita, 2015), which is likely to be practiced by few farmers. These famers practising the certified farming might also be having difficulties in handling the practice. However, RGoZ (2009) gave prediction yield of the spices in Zanzibar, not quite different from the ones presented in this study. The

only exception is that this study used yield per household, while RGoZ (2009) predicted in terms of yield in acreage.

In assessing variances production of types of spice farming a one way ANOVA were used whereby three objects (merely organic, certified organic and inorganic spice farming) was assessed; data collected were standardized by $\log_n$ to meet the model demand on normality. There was a significant difference among then three types of the spice farming at $p<0.05$ (Table 8). The score of three groups accounted for $F=7.43$; $p=0.007$. The actual differences in mean score between merely organic and certified organic spice farming show that there were quite minimum, but there were significant differences between the two types and inorganic spice farming.

Table 8: Production variance for types of spice farming in kg/household (n =120)

Types of spice farming	Mean	F-value	P=value
Merely organic	112.3 ± 39.83		
Certified organic	119.3 ± 16.16		
In-organic	174.3± 56.04		
Overall	110.0 ± 65.53	7.43	0.007

The effect size calculated using the eta squared was 0.03129. Post-hoc comparison using the Turkey test indicated that the mean score for group 1 (merely organic farming) (M=5.94, SD 1.74) and group 2 (certified organic farming) (M=5.86, SD=1.3) was significantly differed from group 3 (M=6.55, SD=2.08). However there is no significance difference between group 1 and 2. The increased production by those certified their spices might be a result of close extension services from NGOs/certification companies as it was reported by Negera (2015) that producers who get extension contact increase amount of spice supplied to the market. Since certified organic spice farmers in Zanzibar are getting

close supervision from various NGOs and Companies dealing with certified organic spices are likely to get more production than those who do not get extension services or those with minimal extension services.

4.4.2 Factors influencing organic spice farming

A multiple regression was done to assess factors influencing level of knowledge on certification of organic spices (Table 9). Nine variables entered in a model, these include farm size, government extension workers visits, district name, occasional training from spice farming supporters, household age, spice farming support, NGOs/company visit/advice on spice farming. The model shows three variables to be significant to certification of spice farming, these variables are district name, NGOs/company visit/ advice of spice farming and farm size ($p<0.05$). organizations as determinant of certification organic spice farming probably due to the fact that majority of the organizations for organic spice farming are working in West District of Zanzibar since it is in town and easily accessible. Farmers who work with these NGOs/companies are likely to get trainings of certification of organic spice farming.

These findings are in line with those reported by Oluwatusin and Adesakin (2017) that there is positive significant relationship between extension services and adoption of technology. However, other studies indicate that adoption of technologies by farmers is being influenced by availability of land, premium market price of the products and labour (Kinyangi, 2014; Miyashita, 2015).

Table 9: Factors influencing organic spices production

Variables	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	95.0% Confidence Interval for B Lower Bound	95.0% Confidence Interval for B Upper Bound
(Constant)	21.780	4.125		5.280	.000	13.606	29.954
District Name	**-3.277**	**1.410**	**-.174**	**-2.325**	**.022**	**-6.070**	**-.483**
Age of Household Head	.037	.071	.044	.519	.604	-.103	.177
Sex of the Household Head	1.211	1.953	.048	.620	.536	-2.659	5.080
Household size	.027	.516	.004	.052	.958	-.995	1.049
Spice Farming Support	-1.042	2.158	-.041	-.483	.630	-5.317	3.234
Occasional Training From Supporters	1.763	1.629	.092	1.083	.281	-1.464	4.991
Extension Workers Visit in 2015/2016 Cropping Season	1.547	1.925	.061	.804	.423	-2.267	5.362
Organizations' advice about Spice Farming	**7.320**	**2.304**	**.284**	**3.177**	**.002**	**2.754**	**11.886**
Farm Size	**3.171**	**.723**	**.383**	**4.384**	**.000**	**1.738**	**4.605**

R=0.448 and R squire= 0.403

4.5 Contribution of Spice Farming to Livelihood Outcomes of the Farmers

4.5.1 Contribution to household's income

The study analysed the contribution of spice farming to household's income. Table 10, Table 11 and Table 12 present the income accrued by the farmers from spice production in the three types of the spice farming, income from other sources and contribution of the spice farming to household's income in percentage respectively.

Table 10: Average of household's income (TAS) received from spice farming per annum (n = 120)

Type of spice	Merely organic	Certified organic	Non-organic	Mean
Black Pepper	680 000	800 000	700 000	726 666.67
Nutmeg	480 000	500 000	360 000	446 666.67
Cardamom	36 700	460 000	250 000	248 900.00
Lemon grass	55 000	80000	40 000	58 333.33
Cinnamon	850 000	1 300 000	650 000	933 333.33
Cloves	1 200 000	1 600 000	900 000	1 233 333.33
Vanilla	60 000	120 000	60 000	80 000.00
Turmeric	80 000	150 000	70 000	100 000.00
Ginger	130 000	600 000	450 000	393 333.33
Hot Chilly	40 000	49 000	25 000	38 000.00
Overall	**361 170**	**565 900**	**350 500**	**425 856.67**

On average, spice farmers in the study gained about 425 856 TAS from spice farming. Out of which 361 170 TAS, 565 900 TAS and 350 500 TAS gained from merely organic, certified organic and inorganic spice farming respectively. Table 11 indicates that spice farmers in the study gained about 1 200 000 TAS, 1 592 666 TAS and 1 491 666 TAS in the categories of merely organic, certified organic and non-organic spice farming respectively. Table 11, furthers shows that the overall income received by the spice farmers from other sources was 1 427 777 TAS.

Table 11: Average household income (TAS) received from other main sources (n = 120)

Main source	Merely organic	Certified organic	Non-organic	Overall
Crop sales	450 000	750 000	800 000	666 667
Salaried	1 500 000	2 500 000	3 500 000	2 500 000
Business	4 000 000	5 000 000	3 500 000	4 166 667
Remittances	350 000	600 000	500 000	483 333
Livestock sales	300 000	400 000	250 000	316 667
Pension	600 000	300 000	400 000	433 333
Overall	**1 200 000**	**1 591 667**	**1 491 667**	**1 427 778**

In general, spice farming contributed to about 23%, 26% and 19% of the overall income of the households of the farmers under the respective categories of merely organic, certified organic and non-organic spice farming (Table 12). Table 12, further shows that the overall contribution of spice farming to household's income accounted for 23%.

Table 12: Percentage of contribution of spice farming to household's income

Type of spice farming	Percentage contributed to total income
Merely organic	23.1
Certified organic	26.2
Non – organic	19.0
Overall	**23.0**

In assessing variances on contribution of each type of spice farming to household income a one way ANOVA was used whereby three objects' (merely organic, certified spice organic and inorganic) annual income was assessed; data collected were standardized by $\log_n$ to meet the model demand on normality. There was a significance difference at $p<0.05$ in a score of three groups ($F=6.72$, $p=0.002$). Despite reaching statistical difference

in mean score between groups was quite small. The actual differences in mean score among groups show that they were relatively minor. The effect size calculated using the eta squared was 0.18. Post-hoc comparison using the Turkey test indicated that the mean score for group 1 (merely organic) (M=15.82, SD 1.3977) and group 2 (certified organic) (M=16.05, SD=0.4189) did not significantly differ; however there was a significant different between group 3 (inorganic) (M=16.295, SD=1.041) and other groups 1 and 2 (merely organic and certified) (Table 13).

The variation in income generated from the types of spice farming was minimal because during the holy month of Ramadhan season, the price of spice at local market becomes much high to reach the premium price of certified organic spices. But generally certified organic spice receive premium price at whole time. This study matches with that one conducted by Ayuya *et al*. (2015) in Kenya which found that certified producers were less likely to be multidimensional poor compared to their counterfactual case of not participating in organic certification schemes. The similar results were obtained by Parvathi and Waibel (2016) in their study conducted to black pepper smallholder certified farmers in India. Their findings show that certification systems have a significant impact on income compared to conventional black pepper farming.

Table 13: ANOVA for contribution of types of spice to household income (n = 120)

Types	Mean	Std. Deviation	Std. Error	F-value	P-value
Merely Organic	23.3	0.42	0.09		
Cert Organic	26.2	0.94	0.19		
Inorganic	19.0	1.39	0.34		
Total	**23.0**	**1.04**	**0.13**	**6.72**	**0.002**

4.5.2 Contribution of spice farming to food security at household level

Food security in this study was assessed using availability of food seasonality based on own harvest and purchasing power. Availability of food in number of months was mainly used. Year round, 9 months, 6 months, 3 months and one month were main periods used to assess the availability of food among spice farmers (Table 14). Table 14 shows that about 36% of the households had enough food for 9 months. Out of which 42.5%, 35.0% and 30.0% were in the categories of certified organic, non-organic and merely spice farming respectively. This can be interpreted that certified spice farming has high earning compared to other types.

Table 14: Availability of food among spice farming households (n = 120)

	Merely organic		**Certified organic**		**Non-organic**		**Overall**	
Period	**freq**	**%**	**freq**	**%**	**freq**	**%**	**freq**	**%**
Year round	7	17.5	5	12.5	12	30.0	24	20.0
9 months	12	30.0	17	42.5	14	35.0	43	35.8
6 months	9	22.5	6	15.0	8	20.0	23	19.2
3 months	9	22.5	8	20.0	4	10.0	21	17.5
one month	3	7.5	4	10.0	2	5.0	9	7.5
Total	**40**	**100.0**	**40**	**100.0**	**40**	**100.0**	**120**	**100.0**

The findings, further, show that there were very few households (7.5%) experiencing severe shortage of food in a year. From the experience, as also, articulated by FGDs participants, majority of the households facing severe shortage of food during the period of December and January. In Zanzibar these months represent dry season and experiencing long periods of sun rays; thus farmers who depend on irrigation specifically vegetable growers not get enough water for agricultural activities; thus shortage of food and money to buy food. The similar findings were reported by Makame *et al*. (2015) on their research

in food security in Zanzibar; the findings show that December to March many people experience food short; and even fish availability reduced due to change of winds. During March to April is a rainy season. Poultry die for diseases due to abrupt change of weather from dry spell to rain season the initial stages of rainfall; those diseases led to death of chicken and winds hamper vessel which are common for fishing at the sea and thus the price for fish also increase (Makame *et al*., 2015).

The findings in Table 14 can also be interpreted that the households that practised certified organic spice farming were having adequate food in a year compared with the farmers coming other categories. However, it is not very clear if food availability among the farming households has been influenced by the types of spice farming. This is following the households sometimes obtain food from own harvests, remittances and fishing. This calls for another study, which can exactly isolate food availability and merely source of income from spice farming.

Following this argument, the study looked at factors influencing food security at household level. Binary logistic regression results for the factors influencing food security are shown in Table 15. The model R^2 was 0.332 (Cox & Snell R^2), and 0.448 (Nagelkerke R^2). Therefore based on the Nagelkerke R^2 of 0.448, this means that the independent variables entered in the model explained by 44.8% of the variance in the dependent variables. Among the 11 independent variables regressed against food security only three (sex of the household head, certified organic and merely organic spice sales) were positively and significant ($p \leq 0.05$) associated with household's food security. This implies that households headed by males and those selling their spices as certified ones were more likely to be food secured than the others. Further, Table 15 shows that merely organic spice farming had significant influence on availability of food among spice farming

households. This might be attributed to the fact that Zanzibar is a tourist centre, is likely most of the hotels in the area prefer to have organic products so as to attract their customers. The results may be supported by the contribution of organic spices to households' income was high as opposed by non-organic spices (Table 12).

Generally, the above observation seems to suggest that households that practice certified and merely organic spice farming are likely to be more food secured than those who do not. During the FGDs, the participants said that certified organic farmers were trained on agricultural practices and selling at premium prices, more than all. They also received income from spice tour visitors and thus got more income to afford food expenses. The observation made in this study is in line with Panneerselvam *et al*. (2015) who showed that organic farmers are likely to be food secured in long run than conversional farmers due to profitability of the organic farming.

Table 15: Binary Logistic regression for factors influencing food security

							95% C.I. for EXP(B)	
Variables	**B**	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**	**Lower**	**Upper**
District	-.365	.722	.256	1	.613	.694	.169	2.857
Sex	**3.930**	**2.015**	**3.806**	**1**	**.051**	**50.926**	**.982**	**2640.561**
Age	-.032	.033	.992	1	.319	.968	.908	1.032
Household size	.184	.242	.577	1	.447	1.202	.748	1.930
Certified organic products Sale	**4.612**	**1.755**	**6.907**	**1**	**.009**	**100.648**	**3.229**	**3136.770**
Merely organic product sales	**0.345**	**0.027**	**0.887**	**1**	**0.001**	**60.783**	**0.756**	**2341.065**
Inorganic product sales	-1.006	1.468	1.456	1	0.057	0.897	0.1567	1.227
Farm size	1.919	1.350	2.020	1	.155	6.816	.483	96.171
Tourism	-1.092	.980	1.241	1	.265	.336	.049	2.291
Spice Support	-1.031	1.700	.368	1	.544	.357	.013	9.982
Spice income	.000	.000	2.348	1	.125	1.000	1.000	1.000

(Nagelkerke R Square 0.448, Cox & Snell R Square 0.332)

4.5.3 Affordability to social services

The results in Table 16 show that majority of the spice farmers afforded to meet required basic needs (social services), but from interpreting Table 16, it can be observed that very few households failed to afford some social services. However, there are many factors when trying to examine the contribution of spice farming to social services affordability among households in the study. This is following in the country, there are a number of initiatives which are for improving social services for the people (MKUZA, 2009). However, there could be some factors which influenced few households not to afford some social services. Generally, spice farming pays to households (Panneerselvam *et al*., 2015). Moreover, it was revealed in the study, during FGDs that people of West District had more possibility of affording electricity cost than those living at Central District. They pointed out that this might be facilitated by the presence of few certified organic farmers as stated before; in addition to that central district is more peripheral than the West District.

Table 16: Spice farming households affording to meet to social services (n =120)

	Merely organic (n = 40)		**Certified organic (n=40)**		**Non-organic (n = 40)**		**Overall (n =120)**	
Social services	**freq**	**%**	**freq**	**%**	**freq**	**%**	**freq**	**%**
Education	30	75.0	29	72.5	36	90.0	95	79.2
Health	29	72.5	30	75.0	37	69.8	96	80.0
Water	30	75.0	29	72.5	39	73.6	98	81.7
Electricity	23	57.5	24	60.0	23	43.4	70	58.3
Clothes	36	90.0	31	77.5	40	75.5	107	89.2
Overall	**148**	**74.0**	**143**	**71.5**	**175**	**70.5**	**466**	**77.7**

From Table 16, 77.7% of the spice farming households were able to minimal meet the social services. Majority were households from the categories of merely organic (74.0%)

and certified organic (71.5%) spice farming. However, from the observation, these households coming from organic categories did not differ much from non organic practising spice farming households as they managed to meet the basic social services at about 71%. Small differences in meeting the basic needs among the households could be probably explained by existence of various government development initiatives such as health policies, education policies, development programmes, etc. (MKUZA, 2009).

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

The general objective of the study was to determine the contribution of organic spice farming to livelihood outcomes of smallholder spice farming households in West and Central Districts of Zanzibar. The focus was on understanding the contribution made by each spice farming category (merely organic, inorganic and certified organic spice farming. The study had the following four specific objectives: (i) examining practices of spice farming among smallholder farmers; (ii) assessing farmers' knowledge on the practice of organic spice farming; (iii) determining merely organic, certified and non-organic spice production and productivity; and (iv) determining the contribution of merely organic spices, certified organic spices, and inorganic spices farming to livelihood outcomes of the farmers.

5.1 Conclusions

From the study findings, it can be concluded that many farmers grew Clove, Black peppers and Cinnamon, despite the fact that more various types of spices were grown in the study. Based on the same order, yield was declining accordingly. The spice farmers were also adopting various technologies on spice farming. However, small numbers of spice farmers were observed receiving supports from various institutions, although many farmers did not receive any support.

The study, also, concludes that the many spice farming farmers had very little knowledge of certified spice farming. The farmers had low knowledge on the market of the certified spices and how organic spice farming may improve soil fertility, increase yield and sustainable production.

According to the findings of the study, inorganic spice farming gave high yields as compared to others. The certified organic spice farming gave very low yield. This is providing an indication that the certified organic spice farming is being practiced in small areas. This requires much emphasis to be put in promoting the certified spice farming among the farmers in the study area as well as other areas in the country including main land.

In the study it has been also found that, despite the certified organic spices were at low yield, it gave high income contribution to households. Many households practising merely organic spice farming were in a high position of affording various social services compared to others. However, they did not show very much variation.

5.2 Recommendations

From this conclusion, the study recommends;

i) Government and its agencies should put more efforts on strengthening extension services to be more efficient and available in rural areas that in order to improve all three types of spice farming (merely organic, certified and inorganic).

ii) More sensitization by local government, central government and other agricultural institution is required in order to raise farmers' awareness on knowledge of the farmers on certified organic spice farming as a whole, there is a need of increasing sensitization programmes of the practices, marketing, and general importance of the farming so as to improve yields and wellbeing of the farmers.

iii) This requires much emphasis to be put in promoting the certified spice farming among the farmers in the study area as well as other areas in the country including main land.

iv) Based on the importance of the certified spices giving high contribution to household's income, there is a need of up scaling the practice through increasing sensitisation programmes.

v) The government and credits, loans and other relevant financial institutions should provide loans and credit facilities targeting rural farmers practicing certified organic farming by facilitating establishment and village financial groups.

vi) Government in collaboration with land development partners and other stakeholders should ensure that small holder farmers are entitled to adequate land in order to improve production and productivity of certified organic spice farming.

vii) Rural farmers should be encouraged by the extension agency to establish and belong to farmers' groups such as cooperatives so as to increase their access to extension services, this will also enable them enjoy other benefits accruable from groups such as starting up savings, obtaining loans/credits and getting agricultural services at subsidized prices.

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APPENDIX

Appendix 1: Questionnaire for household interview

DISTRICT:	
DIVISION:	
WARD:	
VILLAGE/STREET:	
NAME OF HHH:	
MARITAL STATUS: 1. Married, 2. Never married, 3. Single, 4. Divorced, 5. Separate, 6. Widow, 7. Widower	
SEX	1. Male…… 2. Female…….
NAME OF RESPONDENT	
RESPONDENT/HH PHONE NUMBER	

1. NAME OF INTERVIEWER: ……..

2. DATE OF INTERVIEW:

SECTION A: HOUSEHOLD DEMOGRAPHICS

3. Household size…….

Person ID	Name	Sex: 1=M, 2=F	Age (in complete years)	Relationship with the HH (1=Head, 2=Spouse, 3=Son/Daughter, 4=Grandchild, 5=Servant, 6=Others-specify)	Highest grade of school (0=None, 1=Primary ed, 2=Secondary ed, 3=Tertiary ed. 4= Others	Main occupation of the HH member 0= child not schooling 1=Student/pupil 2= Housewife / HH chores 3= Civil servant 4=Private sector

					(specify)	employee 5= Spice farmer 6=Business 7= Casual labor 8= Others (specify)
01						
02						
03						
04						
05						
06						
07						

SECTION B. Agricultural Environment

1. Which type of farming do you conduct?

1 = Organic farming

2 = Certified farming

3 = Inorganic farming

2. What is your farm size you cultivate? …… acres (…….. ha)
3. What is the distance from home to the spice farm? ……
4. Years of practicing organic farming …… years
5. Existence of paid labourers (last year Jan – Dec)

Types of labourers	Hiring period	Number	Total wage
Seasonal labourers 1			
Seasonal labourers 2			
Seasonal labourers 3			
Permanent labourers			

6. Total wage of labourers …… TZS

7. Cultivation equipment (circle everything you use)

Write specific number in a box

1 = Hand hoe, 2 = Plough, 3 = [ ] Oxen, 4 = Tractor, 5 = Manual sprinkler, 6 = Plastic container, 7 = Automatic/Power sprinkler, 8 = Machete, 9 = Rake 10 = Hose pipe

11 = others (mention ……)

SECTION C. Organic farming

8. Information for last season spice farming

	Spice name	Farming type	Farm size	Farm yield	Amount sold	Price/Unit
1						
2						
3						
4						
5						
6						

9. Which farming practices you use for Organic spice?

Practices	Adopted (1)	Not adopted (2)	If adopted, for which type f spice? Mention names of seeds, fertilizer, pesticides and herbicides.
Improved seeds			
Livestock manure fertilizers			
Organic fertilizers			
Organic pesticides			
Organic herbicides			
Crop rotation			
Intercropping			
Terrace			
Mulching			
Cover crops			

Which farming practice you use for certified organic spice?

Practices	Adopted (1)	Not adopted (2)	If adopted, for which type of spice? Mention names of seeds, fertilizer, pesticides and herbicides.
Improved seeds			
Livestock manure fertilizers			
Organic fertilizers			
Organic pesticides			
Organic herbicides			
Crop rotation			
Intercropping			
Terrace			
Mulching			
Cover crops			

10. Which farming practice you use for inorganic spice?

Practices	Adopted (1)	Not adopted (2)	If adopted, for which type of spice? Mention names of seeds, fertilizer, pesticides and herbicides.
Improved seeds			
Livestock manure fertilizers			
Artificial pesticides			
Organic fertilizers			
Organic pesticides			
Organic herbicides			
Crop rotation			
Intercropping			
Terrace			
Mulching			
Cover crops			

SECTION D. Organic farming support

11. Do you have spice farming supporters?

1 = Organic farming organization (mention …….)

2 = Private company (mention …….)

3 = Government (……..…….)

4 = Individual farming trainer (mention ……..)

5 = others (mention……)

6 = I don't have any

12. Do you have occasional training from your supporters?

1 = Yes (how often ……) 2 = No …….

SECTION E. FARMERS' KNOWLEDGE ON THE ORGANIC SPICE FARMING

13. Do you know the difference between the organic and inorganic spice farming? (if YES, What are they

……

……

……

14. Do you think that the practice of organic spice farming is more beneficial to inorganic spice farming?

1=Yes, 2= No, 3=Do not know

If YES/NO explain why/how?

……

……

……

15. Who are the majority in your area?

Those practicing organic spice farming? [ ]

Those practicing organic spice farming? [ ]

16. Do you know how organic farming is being practiced? YES [ ] NO [ ]

If YES, What are the principles for organic farming?

……

……

……

……

17. Did you have training on organic spice farming? YES [ ] NO [ ]

18. If YES, who offered the training?

……

19. Perception towards organic spice farming

Statements	**5=Strongly Agree**	**4=Agree**	**3=Neutral**	**2=Disagree**	**1=Strongly disagree**
Use of manure, cultural diseases/infection control and soil conservation is the basis for organic farming					
An advantage of organic farming is the reduced use of chemical fertilizers and industrial chemicals					
Organic farmers improve soil fertility sustainably					
Economic income gains when practicing integrated farming are not convincing					
Farm income may decrease when practicing organic farming					
Organic spice farming improve household income					
Export market favor more organic spices than inorganic					

SECTION F: EXTENSION SERVICES

20. Access to extension services.

A. Does a government extension worker visit your HH farm during the last cropping season 2014/2015?	1= Yes 2= No	
B. How many times did the government extension worker visit to provide advice about farming?	Number of visits	
D. What topics were discussed during the visit?	1= seeds 2 = fertilizer 3=Manure 4= pests and diseases 4 = pesticide use 5=Cultural pest control 5 = cropping practices	6 = soil type 7 = compost 8 = irrigation 9 = other (specify)
E. Did anyone from an NGO/company visit your HH farm during the last cropping season 2015?	1= Yes 2= No	
F. If YES specify which NGO or company?		
F. How many times did the person from the NGO/Company visit to provide advice about farming?	Number of visits	
H. What topics were discussed during these visits?	1= seeds 2=fertilizer 3= pests and diseases 4= pesticides use	5 = soil type 6 = compost 7 = irrigation 8= Cropping practices 9= other (specify)

G. Market Condition

21. Where is the Market of your spice product (Put spice name in respective category)

Merely Organic spice market	**Certified organic market**	**Inorganic spice market**

Affordability to acquire society service for organic spice (tick where appropriate)

Society service	**Highly Affordable**	**Affordable**	**Not affordable**
Education (School bills)			
Health			
Water			
Electricity			
Clothes			
Food			

22. Affordability to acquire society service for certified spice (tick where appropriate)

Society service	**Highly Affordable**	**Affordable**	**Not affordable**
Education (School bills)			
Health			
Water			
Electricity			
Clothes			
Food			

23. Affordability to acquire society service for In organic (tick where appropriate)

Society service	**Highly Affordable**	**Affordable**	**Not affordable**
Education (School bills)			
Health			
Water			
Electricity			
Clothes			
Food			

24. Status of food security for organic spice producers

i. Number of meals taken per day [ ]

ii. Is there any time you experience shortage of food in your household? [ ]

iii. If the answer is Yes above how often it occur and at which month

iv. What if your main source of income for food?

25. Status of food security for certified spice producers

i. Number of meals taken per day [ ]

ii. Is there any time you experience shortage of food in your household? [ ]

iii. If the answer is Yes above how often it occur and at which month

iv. What if your main source of income for food?

26. Status of food security for inorganic spice producers

v. Number of meals taken per day [ ]

vi. Is there any time you experience shortage of food in your household? [ ]

vii. If the answer is Yes above how often it occur and at which month

viii. What if your main source of income for food?

27. Assets owned after involving in spice farming (Put owned asset in respective column)

Organic spice	**Certified spice**	**In organic spice**

28. Do you have a constant market where you sell your crop products?

1 = Yes [ ] (how often ……) 2 = No [ ]

ix. Who is that buyer? ……

29. Do you have a contract with a certain trader/buyer?

1 = Yes (mention … …….……) 2 = No

30. Do you have occasional customers whom you take your crops to or who come to buy your crops?

1 = Yes (how often ……) 2 = No [ ]

31. Are your crop products sold as Organic?

1 = Yes [ ] 2 = No [ ]

32. Do you get premium price due to organic crops?

1 = Yes [ ] 2 = No [ ]

What is the price per kilogram of spice?

S/No	**Spice name**	**Price per KG**
1	Black pepper	
2	Cloves	
3	Cinnamon	
4	Lemon grass	
5	Ginger	
6	Turmeric	
7	Nutmeg	

33. Are you satisfied with the price of selling your produce? YES [ ] NO [ ]
Give explanation why

……

……

……

34. What challenges do you face in spice farming?

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……

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35. What is your opinion/suggestion if any?

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Thank you very much for your cooperation. This information is only used for my research at SUA.