

UNIVERSITY OF GHANA

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH

**‘THE EFFECTS OF VARIETAL SHIFTS IN DEMAND FOR PINEAPPLE:
A STUDY OF SMALLHOLDER FARMERS ADOPTION OF MD2 IN
NSAWAM-ADOAGYIRI MUNICIPAL ASSEMBLY’**

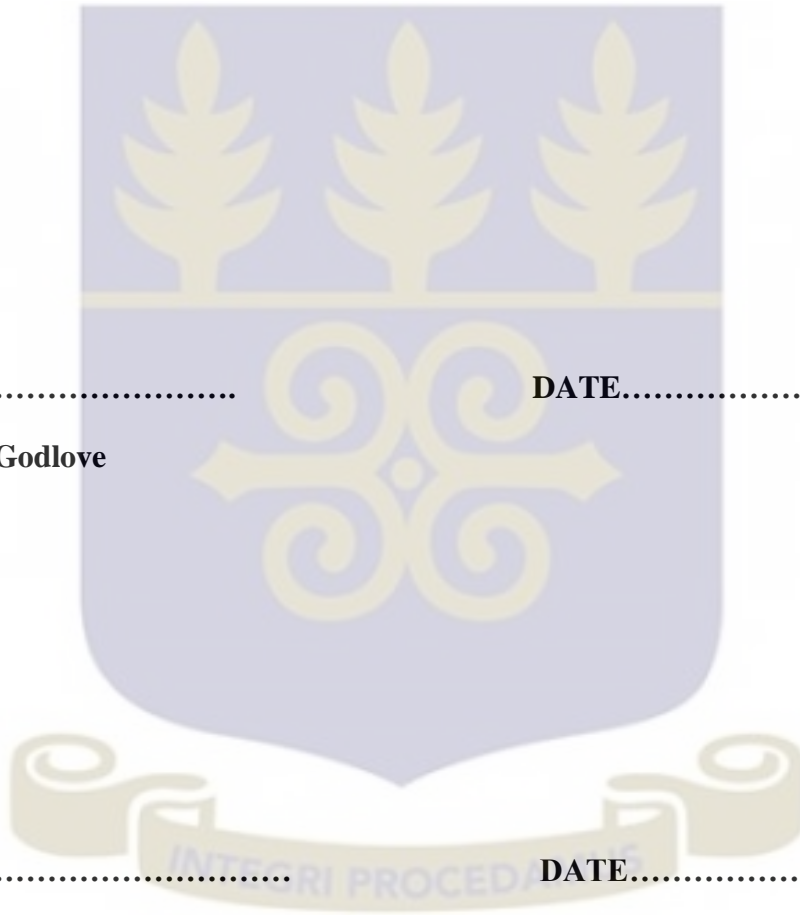
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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF
GHANA, LEGON IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR THE AWARD OF MASTER OF ARTS IN
DEVELOPMENT STUDIES**

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DECLARATION

I, do hereby, declare that apart from the references to other people’s work which have been duly acknowledged, this thesis is the result of my own research carried out at the Institute of Statistical Social and Economic Research, University of Ghana, under the supervision of Dr. Martha A. Awo.



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DEDICATION

I dedicate this work to my parents, Mr. & Mrs. Kpare and younger siblings, Joel, Anna and Jude for their prayers and support in diverse ways throughout the course of the program.



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My foremost thanks go to the Almighty God who has been my helper, strength and provider throughout the course.

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May the Good Lord Bless You all Abundantly.

ABSTRACT

Over the years, the pineapple export sector has been Ghana's best option for integrating her smallholders into the global economy. This was one of the primary objectives for the promotion of NTAEs under the SAPs. The sector guaranteed higher incomes for participating farmers and more foreign exchange for the national economy (Danielou & Ravry, 2005; Gatune et al, 2013). Over the years, however, participation of Ghanaian smallholders has been weakened, leading to dwindling fortunes for the national purse. This is mainly due to the acceptance and subsequent overthrow of the Smooth Cayenne in the European market by the MD2, which was Del Monte's strategy to outwit competitors through product and marketing innovations.

The study sought to determine the current level of adoption of the MD2 variety by smallholders. Another objective of the study was to understand the constraint factors to adoption and production of MD2 by smallholders. The study employed a mixed research design technique to achieve its objectives. The study focused on smallholder pineapple farmers in the Nsawam Adoagyiri Municipal Assembly..

Results showed that there is a low rate of adoption of the MD2. However, those in the late adopter category formed the majority, and points to the possibility of restoring Ghana's position in the pineapple export sector if underlying constraints to adoption are addressed. Lack of access to finance, high cost of production and non-availability of plantlets were found to be the major constraints to adoption.

The study recommends the provision of plantlets as well as cheap and flexible credit to smallholders to enhance adoption of the MD2.



Table of Contents

Title Page	i
Declaration	ii
Dedication	iii
Acknowledgement.....	iv
Abstract.....	v
List of Tables.....	x
List of Figures.....	xi
List of Abbreviations	xii
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Statement	6
1.3 Research Questions	8
1.4 Objectives.....	8
1.5 Significance of the Study	8
CHAPTER TWO	10
LITERATURE REVIEW	10
2.0 Introduction	10
2.1 Promotion of Horticulture under Structural Adjustment	10
2.2 Smallholders in Horticulture Export Sector	11
2.3 Global Pineapple Trade.....	16
2.4 Structure of Pineapple Industry in Ghana	16
2.4.1 Pineapple Producers.....	18
2.4.2 The Farmapine Model –An Effective Cooperative Now Defunct.....	19
2.4.3 Pineapple Varieties Grown in Ghana.....	21
2.4.4 Smallholders Adoption of Improved Varieties: Welfare and Constraint Issues	22
2.5 Conceptual Framework	24
CHAPTER THREE	28

METHODOLOGY.....	28
3.0 Introduction	28
3.1.1 Target Population.....	28
3.1.2 Methods of Data Collection	28
3.1.3 Sample Size and Sampling Technique.....	29
3.1.4 Research Design	30
3.1.5 Methods of Data Analysis and Reporting Framework	31
Profile of the Study area – Nsawam-Adoagyiri Municipal Assembly	31
3.2 Introduction	31
3.3 Physical and Natural Environment	32
3.3.1 Location and Size.....	32
3.3.2 Climate and Vegetation.....	32
3.3.3 Topography and Drainage.....	33
3.3.4 Geology and Soils.....	34
3.3.5 Spatial Analysis	34
3.3.6 Demographic and Ethnic Characteristics	35
3.3.7 Education and Health.....	36
3.3.8 Water and Sanitation.....	36
3.3.9 Transportation and Telecommunications.....	37
3.3.10 Economic Composition.....	37
3.3.11 Agriculture.....	38
3.3.12 Industrial Activities.....	39
3.3.13 Financial Services.....	40
3.3.14 Tourism	40
CHAPTER FOUR.....	41
DATA ANALYSIS AND DISCUSSION	41
4.0 Introduction	41
4.1 Demographic Characteristics of Respondents	41
4.1.1 Some Demographic Characteristics of Pineapple Farming Households	41
4.1.2 Gender Distribution of Respondents.....	42
4.1.3 Age of Respondents	43

4.1.4: Level of Education.....	44
4.2 Pineapple Production, Varieties and Adoption.....	46
4.2.1 Main Variety of Pineapple Farmed.....	46
4.2.2 Adoption of MD2 Pineapple Variety.....	47
4.2.3 Early and Late Adopters.....	48
4.2.4: Variety Preference and Adoption.....	49
4.2.5 Land Size and Proportion of Land for Varieties.....	51
4.3 Constraints to MD2 cultivation.....	53
4.4 Cooperative Membership.....	55
CHAPTER FIVE.....	57
CONCLUSIONS AND RECOMMENDATIONS.....	57
5.0 Introduction.....	57
5.1 Conclusions;.....	57
5.2 Recommendations.....	58
REFERENCES.....	61
APPENDICES	
APPENDIX A.....	65
APPENDIX B.....	71
APPENDIX C.....	75



LIST OF TABLES

Table 3.1: Soil Types and Suitable Crops.....	34
Table 4.1: Some Demographic Characteristics of Pineapple Farming Households	41
Table 4.2: Gender of Respondents.....	42
Table 4.3: Age of Respondents.....	43
Table 4.4: Level of Education.....	44
Table 4.5a: Adoption and Variety of Pineapple Preferred.....	49
Table 4.5b: Preference and MD2 Adoption	50
Table 4.6a: Average Land Size for Pineapple Varieties	51
Table 4.6b: Ease of Land Acquisition.....	51
Table 4.6c: Gender and Ease of Land Acquisition	52
Table 4.7: Constraints to MD2 Production.....	53



LIST OF FIGURES

Figure 2.1: Conceptual Framework:	26
Figure 4.1: Main Variety of Pineapple Farmed	46
Figure 4.2: Adoption of MD2	47
Figure 4.3: Early and Late Adopters	48
Figure 4.4: Cooperative membership	55

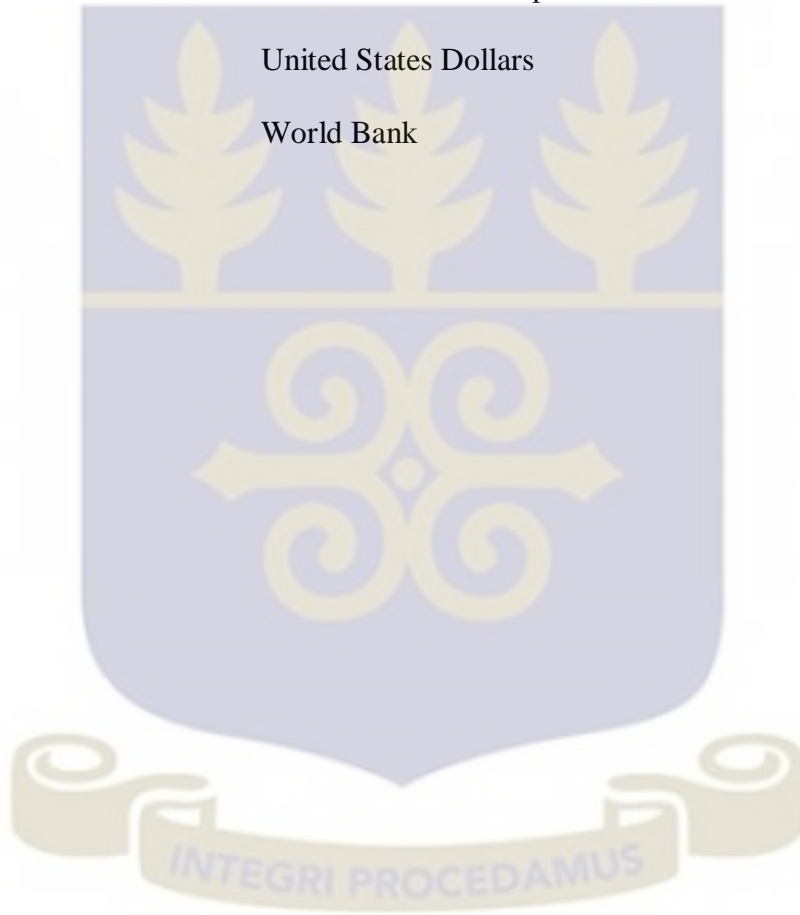


LIST OF ABBREVIATIONS



AgSSIP	Agricultural Services Sub-Sector Investment Program
AVC	Agriculture Value Chains
ERP	Economic Recovery Programme
EUREPGAP	European Good Agricultural Practices
FAO	Food and Agriculture Organisation
FBOs	Farmer Based Organisations
FOM	Farmer Ownership Model
GLOBALGAP	Global Good Agricultural Practices
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GEPA	Ghana Export Promotion Authority
GOG	Government of Ghana
GPRS	Ghana Poverty Reduction Strategy
GSGDA	Ghana Shared Growth Development Agenda
HEII	Horticulture Export Industry Initiative
IMF	International Monetary Fund
ISI	Import Substitution Industrialization
NAMA	Nsawam Adoagyiri Municipal Assembly
MD2	Del Monte Honey Gold
MiDA	Millennium Development Authority
MoFA	Ministry of Food and Agriculture

NGO	Non-Governmental Organisation
NTAE	Non Traditional Agricultural Exports
NTEs	Non Traditional Exports
SAPs	Structural Adjustment Programmes
SPEG	Sea-Freight Pineapple Exporters of Ghana
R&D	Research and Development
USD	United States Dollars
WB	World Bank



CHAPTER ONE

INTRODUCTION

1.1 Background

The over reliance of less developed countries on a few specialised raw materials for their foreign exchange has been a major cause for concern by development partners. This is due to the volatile and generally sliding trend in the prices of such traditional exports which often proves to be unsustainable as well as risky economically and politically. The eventual crisis that befell most developing countries in the late 1970s and early 1980s is largely attributed to this state of affairs (Duncan & Howell, 1992). The World Bank (WB) and International Monetary Fund (IMF), therefore had to introduce Structural Adjustment Programmes (SAPs) with deliberate policy reforms to promote Non-Traditional Exports (NTEs) in order to broaden their export base. Non Traditional Agricultural Exports (NTAEs) and their horticultural sub-sector were a major priority, given the comparative advantage of most of these countries in agriculture.

Many developing countries, therefore adopted horticultural crop production as a viable option for diversification from traditional export crops. Accordingly, Barrett et al, (1999) have noted that trade in horticultural produce became increasingly global, by the mid-1990s, with the contribution of developing countries reaching a third of the value of trade in horticultural exports. An increasing number of African countries entered the trade within the same period. This was made possible due to the generally, liberalizing international and national regulatory framework that was created through the implementation of SAPs. Since then, trade in horticultural crops has been further expedited by considerable improvements in transportation,

communications and packaging technologies coupled with increased demand due to population growth and increased awareness of nutritional values of horticultural crops.

Horticultural crops usually encompass fruits and vegetables but the specific basket of horticulture exports varies from country to country. A sub-category of importance among horticulture crops is the “tropical fruits” category, described by the Food and Agriculture Organisation (FAO) to include mangoes, avocados, pineapples and papayas. Asia remains the largest producer of tropical fruits followed by Latin America, the Caribbean, Africa and Oceania. Chang et al, (2014; 1) in a recent study for the Trade and Markets Division of FAO, conclude that there is “indisputable evidence of the importance of tropical fruits to producing countries from both a nutritional and commercial perspective”. The total values of tropical fruits produced reached an estimated USD 50.8 billion in 2010 out of which 12.8 billion was traded (Chang et al, 2014). Among this category, pineapples deserve special focus due to a number of factors.

Vagneron et al, (2009; 437), has described the pineapple as a “ star in the international fruit sector”, partly because the rate of growth in its production has been unparalleled by any fruit. Between 1960 and 2005, pineapple production grew from 4 to 16 million tons (Vagneron et al, 2009). Pineapples are exported either in fresh or processed form. Leading actors in pineapple export come from Latin America (Costa Rica, Honduras, Ecuador) and Sub Saharan Africa (Cote d’Ivoire and Ghana). Cote d’Ivoire was the leading exporter of pineapples in 1970s but has now relinquished that position to Costa Rica.

Apart from broadening their export base to reduce vulnerability of their economies to shocks, producing and internationally trading in horticulture products provides livelihood alternatives,

improves food security, reduces malnutrition and leads to poverty reduction among citizens (Chang et al, 2014). It especially, helps spread the benefits of development to marginalised groups, especially smallholders who mostly dwell in rural areas, where poverty levels are highest in developing countries (Afari-Sefa, 2007). Studies have shown that smallholders' participation in the horticultural export market enables them to break “out of the semi-subsistence poverty trap that appears to ensnare much of rural Africa” (Barrett C. B., 2008;1)

A number of factors tend to constrain smallholder participation in production and trade in horticultural crops. These include; weak institutions, inadequate infrastructure, restricted access to markets and credit, barriers to trade and low technology and innovation adoption (Salami et al, 2010). Empirical studies have shown an emerging trend in which smallholders in developing countries risk losing out of this important sector due to the increased dynamics in global food supply chains (Schipmann & Qaim, 2010; Chang et al, 2014). Empirical studies conclude that as chains develop, they tend to leave out smallholder participants due to stringent food safety standards and certification requirements as well as product innovations.

One such threats to smallholder participation, hit the pineapple sector over a decade ago when a new variety from Costa Rica, the Del Monte Honey Gold (MD2) took over the European market from Smooth Cayenne. According to Whitfield, (2010), Del Mont used a strategy described as largely one of innovation and creating barriers to entry. Del Monte is a multinational company which succeeded in raising the standards in the market with an innovative product that had better price-quality ratio and also met export market deficiencies which were associated with Smooth Cayenne (Whitfield, 2010).

The MD2 succeeded in giving its creators sole control of the pineapple export market in Europe, leaving out countries like Cote d'Ivoire and Ghana. Its introduction caused fresh pineapple exports from Costa Rica to grow from 330,000 metric tons in the late 1990s to over 900,000 metric tons by 2005 (Takane, 2004). Conversely, whilst pineapple exports increased steadily in Ghana and Cote d'Ivoire, they declined sharply in 2005 as the MD2 began consolidating its position in European market (Kleemann, 2011; Whitfield, 2010; Achaw, 2010). This occurrence has been the subject of many studies on the impact of changing global food supply chains on economies of participating developing countries and especially, their producing smallholder citizens (Chang et al, 2014; Zottorgloh, 2014; Gatune et al, 2013; Kleemann, 2011; Whitfield, 2010). Afari-Sefa, 2007). This is particularly, relevant to Ghana given importance of pineapples to the economy and smallholder farmers.

Ghana's Horticultural Crops: The Pineapple Sector

Ghana's economy remains largely agro-based, although, the service and industry sectors have overtaken agriculture as highest contributors to Gross Domestic Product (GDP). The agricultural sector remains very relevant to the growth of the economy due to its significant contributions to foreign exchange earning, employment, food security and poverty reduction especially among the rural poor. The sector has been and remains the largest employer of the active labour force, employing in 2010 up to 42 percent (Ghana Statistical Service, 2012). In terms of foreign exchange earning, the agriculture sector contributed about 40 percent of export revenues between 1997 -2011 (Dzanku & Aidam, 2013).

One of the key strategies for promoting an export-led growth in Ghana has been the diversification into horticultural crops. Due to unstable world market prices, earnings from traditional exports namely timber, cocoa, gold and other minerals including diamond, manganese and bauxite have often been woefully inadequate and raised the need to diversify into NTAEs (Buatsi, 2002). The promotion of horticultural crop exports has been on the agenda of successive development plans such as the abortive Vision 2020, Ghana's 25 year development plan which was drawn for the period 1995 to 2020 and its successor plans, the Ghana Poverty Reduction Strategy (GPRS I & II) and Ghana Shared Growth and Development Agenda (GSGDA I & II).

Pineapples serve as Ghana's entry point into the international horticulture market (Danielou & Ravry, 2005). It has been one of the best performing horticultural crops in terms of foreign exchange earnings for the Ghanaian economy. Exports were initiated by Ghanaian entrepreneurs in the late 1980s. Their efforts were complemented by policies to diversify exports in the second phase of the Economic Recovery Programme (ERP) as the cocoa sector continued to perform below expectation after implementation of ERP I (Duncan & Howell, 1992; Takane, 2004). Since then, pineapple has "become a crop of great importance" (Trienekens et al, 2004;4) and the biggest performer in the horticultural sub-sector constituting about 60 per cent of earnings (Zottorgloh, 2014). Within the space of a decade, between 1994 and 2004, pineapple exports grew at a cumulative annual rate of 172%, increasing its market share of fresh pineapples in Europe from 7-8% in 1999 to 10% by 2004 (Gatune et al, 2013). Available data from the Ghana Export Promotion Authority (GEPA) shows that between 1990 and 2013, pineapples have cumulatively contributed, over USD 283, 000,000.00 in foreign exchange to the Ghanaian economy (GEPA, 2015, see Appendix C).

Smallholder farmers have been instrumental to the development of the Ghanaian pineapple industry. This is contrary to what has pertained in other economies where large firms and multinationals have played a dominant role in developing their horticulture export sectors (Danielou & Ravry, 2005). As key actors in the industry, smallholders have been major beneficiaries as well. Starting from the early 1990s, they enjoyed a growing demand for the Smooth Cayenne (SC) variety in the export market. According to Gatune et al, (2013) about 1,600 smallholders earned 3.8 million USD from exporters based on their contribution of half of the over 72,000 tons of pineapples exported in 2004 (GEPA, 2015. See Appendix C).

In 2005, however, the industry started experiencing some negative effects of the introduction of MD2 by Del Monte resulting in declining fortunes at both the macro and micro levels. This study is conducted to understand the effects of the shift on the industry, especially in relation to smallholder adoption of the new export variety.

1.2 Problem Statement

The export volumes in 2004 have been the highest in the history of pineapple exports in Ghana's. This is primarily because in 2005, "the European market made a definitive shift to the MD2 variety and demand for Smooth Cayenne evaporated" (Whitfield, 2010; 10). The main varieties of pineapple grown in Ghana prior to MD2 were Smooth Cayenne (the main export variety), Sugar Loaf and Queen Victoria. The introduction of MD2 is a major varietal shift in demand and has been the source of dwindling fortunes of the Ghanaian pineapple sector. This is both in terms of export earnings and its effect on smallholder farmers who previously formed the biggest suppliers to the export market (Zottorgloh, 2014). The change led to a reduction in export

volumes from peak a of 72,000 tons in 2004 to 47,000 tons in 2005 causing export earnings to fall from \$22,068 million to \$12,784 million, respectively (Gatune et al, 2013).

Although, major actors in the pineapple industry were warned of the advent of MD2, as far back as 1998, inadequate preparations were made to ensure its adoption by producers (Whitfield, 2010). According to Gatune et al, (2013) before the introduction of the MD2, smallholders contributed over fifty (50) percent of export volumes of pineapples. Since, its introduction, however, their contribution reduced drastically, allowing the large scale producer-exporters to dominate the pineapple export sector because of their advantages of scale (Takane, 2004). Evidence from several studies show that, of the three main groups of pineapple producers' namely smallholders, medium scale farmers and large scale producer-exporters, smallholders have been the slowest to respond to this shift in varietal demand by meeting supply requirements (Gatune et al, 2013; Afari-Sefa, 2007). About 80 percent of them went bankrupt and exited the international supply chain whilst the few that remain struggle to keep up with major challenges.

It is expected in the case of agricultural goods that when demand changes, farmers use one or two seasons to adjust. However, in this instance, almost a decade has passed since the shift happened, that is from 2005 to 2015. According to the Director of the GEPA, recent estimates show that smallholders now contribute less than 30% of export volumes from the previous 50 percent to 70 percent.

It is against this background that the study seeks to determine the current level of adoption of the MD2 among smallholders and to understand the factors that have contributed to the prolonged inability of smallholders to adjust to the shift in demand. The study will also identify some of the

socio-economic effects of the shift on the livelihoods of smallholders and make recommendations for improving the rate of adoption.

1.3 Research Questions

1. What is the current level of participation of smallholders in MD2 production?
2. What factors are responsible for the inability and or slowness of smallholders in adopting the MD2?
3. In what ways did the shift affect livelihoods of smallholders socio-economically?
4. What measures can be put in place to motivate smallholders' adoption of MD2?

1.4 Objectives

The objectives of the study are as follows;

1. To determine the current level of adoption of the MD2 variety by smallholders,
2. To understand the constraint factors to adoption and production of MD2 by smallholders,
3. To explore some socio-economic effects of the shift on livelihoods of smallholders. and,
4. To make suggestions/recommendations to enhance adoption by smallholders of the MD2.

1.5 Significance of the Study

This study is significant for a number of reasons. First of all it will add to the growing body of literature on the challenges smallholders, in developing countries like Ghana face from participating in fast changing global food supply chains. Most importantly, it addresses the specific issue of the varietal shift in demand from Smooth Cayenne and MD2, in terms of the

adoption of new high earning varieties and the factors that constrain adoption by smallholders. This is important because in order to effectively design and implement intervention programs, there is the need to understand how smallholders respond to these often unexpected changes in demand in order to develop policies that will restore and enhance their role in the pineapple export value chain.

The study hypothesises that the low adoption of MD2 is associated with a non-preference for it. In other words, it is expected that if the MD2 is the most preferred, it will be the most adopted. On the other hand if it is the least preferred, then it will be the least adopted. Preference is operationalized by asking respondents which of the varieties of pineapples they will prefer to cultivate, *ceteris paribus*.

The study is organized into five chapters as follows:

Chapter one presents the general introduction of the study, consisting of the background, problem statement, objectives, research questions, hypothesis and significance of the study.

Chapter two entails a review of the relevant literature on the topic.

Chapter three consists of the methodological approach of the study and the profile of the study area. Chapter four will focus on analysis of the data and presentation.

Finally, chapter five is made up of a summary of the main findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents relevant studies undertaken on the subject and includes key concepts and theoretical underpinnings. The concepts are discussed within the context of the study's focused areas.

2.1 Promotion of Horticulture under Structural Adjustment

Singh, (2002) defines NTAE crops as those “crops that are not part of the customary diet of the local population and grown primarily for their high cash values and export potentials”. They are mainly fruits and vegetables but also include plants such as flowers. Examples of fruits are mango, avocado, pineapple and passion fruit, and vegetables such as baby carrots, baby corn, broccoli asparagus, snow peas, fine beans, round beans, and chilies.

Most developing countries owe the initiation and growth of their horticultural export sector to policies of structural adjustment. The case of Ghana is particularly relevant and instructive in this context. Growth of the Ghanaian economy has largely been reliant on agriculture. Some promotion of the horticulture crop sector began in 1984 when Ghana implemented Economic Recovery Programme (ERP) I, the first phase of the implementation of SAPs (Afari-Sefa, 2007; Duncan & Howell, 1992). This phase, however mainly focused on the cocoa sector. The agricultural sector in Ghana had been experiencing persistent decline in performance during the crisis period from the early 1970s up to 1983.

Whereas a number of factors account for the crisis, Duncan & Howell, (1992) have mainly, blamed it on the implementation of import-substitution-industrialisation (ISI). The ISI however, caused a dwindling in export earnings from agriculture as the policy led to a heavy tax on the cocoa sector. As such cocoa production fell, causing earnings from its taxation to reduce greatly. This was coupled with a general decline in the production of major exports. Output of commodities such as gold, diamonds, other minerals fell by 55% and timber by 57% within the period between 1975 to 1983 (Duncan & Howell, 1992).

The second phase of SAPs captioned ERP II that began in 1986 concentrated on diversification of export earning potential to ameliorate the situation caused by declining cocoa prices as most analysts predicted a not so good outlook in the short-to-medium term. The diversification was also expected to increase foreign exchange earnings and create employment for marginalised groups. The drastic measures implemented adversely impacted most marginalised groups especially smallholders and women who are the poorest of the poor.

Government made considerable investments in infrastructure, especially roads as part of efforts to create an enabling environment for the development of the horticulture sector. A competitive horticulture sector requires the availability of market infrastructure, roads, availability of financing mechanisms and favourable land policies. Since then, horticulture has become a major component of agriculture exports but needs to be developed further to contribute to its highest potential.

2.2 Smallholders in Horticulture Export Sector

The term smallholder has no universally accepted definition. According to Barrett et al, (2010; 1) they are “farmers who operate a modest amount – typically less than two hectares – of cultivable

land, relying heavily on family labor, and who have limited access to other productive resources”. Asuming-Brempong et al, (2013; 607,608), while alluding to the use of certain parameters such as wealth and vulnerability to risk in defining smallholders, agrees that landholding is perhaps the most direct and easily introduced indicator of who smallholders are”. In other literature, they are referred to as peasants, small- scale farmers or small farmers (Asante et al, 2011; Afari-Sefa, 2007;). Salami et al, (2010;9) liken “smallholder farming” to “family farming, subsistence farming and low-income farming”.

Agriculture in most developing countries is mainly smallholder led. Especially, in Africa, smallholders continue to play a key role in agriculture. For example, in East African countries such as Kenya, Ethiopia, Uganda and Tanzania described as agriculture-based economies “smallholder farming accounts for about 75 percent of agricultural production and over 75 percent of employment” (Salami et al, 2010;4). Most West African countries have similar profiles. Ghana is a good example with an agriculture sector predominated by smallholders who constitute about 90% of the total population of farmers (Asuming-Brempong et al, 2013; AgSSIP, 2005 cited in Asante et al, 2011).

Due to the huge number of smallholders in farming in most developing countries, agricultural growth is regarded as a primary source of employment and poverty reduction in especially, agriculture-based economies. A lot of proposals for poverty reduction have had to focus on rural households (Markelova et al, 2009). It is believed that “the expansion of smallholder farming can lead to a faster rate of poverty alleviation, by raising the incomes of rural cultivators and reducing food expenditure, and thus reduce income inequality” (Salami et al, 2010;14). It is also the most important means by which rural economies are expected to grow (Barrett et al, 2010).

The general expectation in terms of welfare improvement, is much higher, for smallholders who participate in international supply chains of horticultural produce. Afari-Sefa, (2007) has shown through empirical econometric analysis that export horticulture has positive effect on wellbeing of majority of households. Barrett et al, (2010; 32) in similar studies, acknowledge that “the estimated impacts on welfare of participation in agriculture value chains (AVCs) in those studies are not entirely reliable”, because most suggest that “participating farm households enjoy higher levels of welfare”. This is because the high-value of horticulture exports ensures greater returns to the factors of production engaged in their supply to the market.

Indeed, this was the dominant expectation under SAP. For instance Barrett C. B., (2008;300) notes that “smallholder participation in markets will enable them break “out of the semi-subsistence poverty trap that appears to ensnare much of rural Africa”.

Smallholders face a number of constraints that directly affects their productivity and participation in markets (Barrett et al, 2010; Markelova et al, 2009). These productivity constraints mainly have to do with their lack of access to land, credit and knowledge about cultivation techniques such as timing and frequency of chemical use. The lack of adequate input supply causes low yields and variations in yield quality.

In terms of market participation, smallholders’ face constraints that have to do mainly with their compliance with certification standards such as EUREPGAP/GLOBALGAP and fair trade. “The EUREPGAP (GLOBALGAP) certification embodies a set of voluntary pre-farm-gate standards for Good Agricultural Practices (GAP)” (Achaw, 2010;5) which producers must adhere to in order to maintain their access to the international market”. These certifications are export tools that enable their holders to gain access to foreign markets. In addition, smallholders need to

know the health and safety requirements in the importing countries that specify which and what quantities of chemicals are permitted.

These requirements tend to tilt advantages in export horticulture in favour of large-scale exporter producers. Takane, (2004) examines the question, whether smallholders have any advantage over large scale producers? His conclusions show that because importers need to ensure that certain minimum standards of quality are met, they often favour large commercial farmers who are perceived to be better able to enforce GAP and handling standards on the farms.

In addition, sourcing produce from many smallholders is particularly disadvantageous and less attractive to exporters because there are variations in crop quality due to non-uniform agronomic practices Singh, 2002 corroborates this fact. According to her, exporters tend to decrease their demand from smallholders, preferring to source from a few large scale producers due to convenience in dealing with few as against many. This is so because there are many coordination problems associated with sourcing from many farmers (Markelova et al, 2009).

The challenges, smallholders experience are better appreciated when contextualised in specific horticulture crop sectors. For instance, in the pineapple sector in Ghana, Takane, (2004) notes that procurement from smallholders is a last resort when dealing with large quantities. This is because over time, many exporters became producers themselves and got vertically integrated into the production and exportation of pineapples. Therefore they often procure from other producer/ exporters as well as large scale commercial farmers (Suzuki et al, 2011; Takane, 2004).

The above points notwithstanding, smallholders do have a number of advantages over large scale producers. One is the cost advantage due to the use of family labour. Another is the fact that they possess indigenous skills in farming (Markelova et al, 2009). Moreover, Suzuki et al (2011) make the point that large-scale exporter producers tend to face much bigger marketing risks, which smallholders are better able to contain. They show “empirically that exporters’ average rejection rate of export-quality fruit is high and varies in response to unanticipated fluctuations in European demand (Suzuki et al (2011; 1611).

One recommendation for smallholders to ameliorate their numerous disadvantages, by the experts, is the formation of cooperatives or Farmer Based Organisations (FBOs). This is regarded as the best institutional approach towards resolving most of the difficulties of smallholders because it is a means of mobilizing collective action to solve shared problems in marketing, production and technology adoption. (Markelova et al, 2009; Takane, 2004).

FBOs are formed and justified by the fact that they help to mitigate the effect of the risks smallholders face and also facilitate smallholders’ access to contracts with exporters (Barrett & et al, 2010). According to Asante et al, (2011;2273) FBOs are “one of the keys to more rapid diffusion and cost effective extension delivery to farmers” as it facilitates their “easy access to market information, credit and inputs for their production, processing and marketing activities. Experience has shown that a farmer’s decision to join FBOs depends on access to credit, access to machinery, access to markets and other services. Where these are not guaranteed, FBOs become less useful and quite irrelevant to farmers. Markelova et al, (2009;6) however, hints that a “healthy dose of realism is needed when considering the applicability and effectiveness of collective marketing”.

2.3 Global Pineapple Trade

According to Danielou & Ravry, (2005;10) “the world pineapple market is massively geared towards export” with over a third of production exported annually. Pineapples are exported mainly in two forms; processed and fresh. Processed pineapples constitute the highest category followed by fresh pineapple with a proportion of 80 to 20 percent respectively. Sub-Saharan Africa and Latin America dominate the fresh pineapple export sector (Danielou & Ravry, 2005).

2.4 Structure of Pineapple Industry in Ghana

Ghana’s pineapple industry has been described as “a new agro-industry” (Whitfield, 2010;1). The history of pineapple production in Ghana shows that its export began by Ghanaian entrepreneurs who used to travel to Europe in the mid-1980s in pursuit of other business interests outside agriculture (Whitfield, 2010). These individuals often needed foreign exchange to purchase equipment and other goods relevant to their business endeavours. Their efforts were further given impetus by policies under adjustment as most of these entrepreneurs took advantage of developments in the private sector due to liberalisation and increased globalisation (Whitfield, 2010; Danielou & Ravry, 2005).

Danielou & Ravry, in their 2005 World Bank publication in the Africa Region Working Paper Series, a paper based on World Bank Ghana Horticultural Sector Development Study painted a glowing picture of the Ghanaian pineapple industry describing it as “ a champion” and a “potential world leader in horticulture production” (Danielou & Ravry, 2005; 2). According to the publication, the industry mainly depended on success in supplying to the low-end, discount segment of the Northern European market through a low-cost approach. Using air-freight, in the

late 80s, which was the cheapest in the region and subsequent formation of SPEG enhanced volumes.

The industry was developed and sustained initially by smallholders as well as small and medium-sized enterprises (Achaw, 2010; Danielou & Ravry, 2005). Over the years however, the industry has been dominated by more mature producer-exporters. The first multi-national- Compagnie Fruitière- arrived and registered as Golden Exotics introducing into the industry state-of-art practices and logistics (Danielou & Ravry, 2005; Achaw, 2010). Expectations are high regarding the gradual increase in competitiveness of the industry as many more multi-nationals enter in the near future.

As a NTAE crop, pineapple production in Ghana has been mainly oriented towards meeting demands from the European market even though there is “a sizable domestic market” (Takane, 2004; 4) made up of a good number of processing companies and open market through hawkers and green grocers. The local market plays a crucial role in absorbing excess supply that does not meet the European quality requirements (Barrientos et al, 2009).

The problems of the pineapple industry have been captured succinctly by Gatune et al, (2013; vi) that the “problems faced by industry are not access to markets, but rather challenges to production, productivity, and response to market shifts, and transitioning to new varieties of the product”. Addressing these challenges will provide a platform for many more smallholders to participate in the chain and most importantly, strengthen the supply chain for the existing processing firms established within the horticultural enclave in Ghana.

2.4.1 Pineapple Producers

Pineapple producers in Ghana are identified in the literature under three main groups with some variations in the description by various authors. This is evidenced in studies by (Achaw, 2010; Takane, 2004; Yeboah, 2005; Barrett et al, 2010;). For instance, Barrett et al, (2010) categorizes pineapple producers into “large, medium, and small-scale. Takane, (2004) on the other hand identifies the three categories of producers as “smallholders, nonresident commercial farmers, and large-scale producer-exporters.

Large scale producers

Barrett et al, (2010) define the large-scale producers as those with more than 100 acres of pineapple under active cultivation. Takane (2004) calls them producer-exporters who mainly began as exporters and eventually got vertically integrated into the pineapple value chain

Medium scale producers

Medium-scale producers have 50–100 acres under cultivation (Barrett et al, 2010).

According to Takane, (2004) medium scale producers known as the nonresident commercial producer is a category of producers who have their residence in town but lease land in pineapple growing rural areas. Their landholdings range between an average of 20 hectares to 150 hectares and pineapple farms are taken care of by hired managers.

Small scale producers

Whereas some authors such as Yeboah, (2005) generally refer to smallholders in the pineapple sector as out-growers, others make a distinction between them. Small-scale producers are often divided into two main groups –out-growers and smallholders have less than 50 acres under cultivation (Barrett et al, 2010). Danielou & Ravry, (2005;17) however, put the total land under cultivation for both smallholders and out-growers between “one and twenty acres”. They distinguish between the two by the fact that out-growers tend to have relatively more formal relationships with exporters. Export pineapple production by smallholders is predominant “in the area between Akwapim hills and Nsawam (Takane, 2004; 32)

2.4.2 The Farmapine Model –An Effective Cooperative Now Defunct

A most lauded cooperative which had existed for the benefit of smallholder pineapple farmers has been the Farmapine. It was formed mainly to assist smallholders with the production and marketing of their produce as most farmers were unsatisfied with the disappointing arrangements with exporters.

In 1999, the WB in collaboration with the Government of Ghana (GOG), through its agricultural diversification program, provided funding for the formation of Farmapine Ghana Limited (FGL). Pineapple was adopted in the WB agricultural diversification program for three main reasons; it being an export crop with a ready market, a short gestation period and the existence of strong farmer cooperatives based on which FGL could be founded easily. The cooperative commenced operations in September 1999 as an export company. The bank provided a loan of 1.4 million USD to be repaid within 10 years at 7% interest (Yeboah, 2005).

Although the FGL has now collapsed, it is important to mention that its formation was an attestation to the relevance of strong cooperatives in horticultural export sector. The FGL was fashioned after, the WBs, Farmer Ownership Model (FOM) where individual farmers own a company through the acquisition of shares. Five smallholder cooperatives acquired 80% of the shares in FGL with a total of 178 members and an aggregate acreage of 150 hectares (Yeboah, 2005; Danielou & Ravry, 2005).

Among other things the FGL served as a buyer of produce from its members, thereby guaranteeing the market in terms of production support. It provided agricultural inputs such as agrochemicals, credit, and technical assistance through agronomists who were employed. One important benefit of the cooperative was that it enhanced uniformity of farming practices among members and helped to avoid variability in pineapple quality.

Yeboah, (2005) has noted that when it existed, on the average cooperative members cultivated about 5 acres and earned about \$5,000.00 annually, an income level he found to be significantly higher than that of non-cooperative members. Additionally, according to Danielou & Ravry (2005;17) the company contributed the second largest volume of pineapple export among “five big companies who contributed 72 percent of earnings in 2000. The companies and their respective shares are as follows; Jei River Farm (6431 tons), Farmapine (4766 tons), Milani (4503 tons), Prudent Farms (3820 tons) and Georgefields (2890 tons)

2.4.3 Pineapple Varieties Grown in Ghana

There are over one hundred varieties of pineapples, however, six are known and traded internationally, these include; MD2, Smooth Cayenne, Sugar Loaf (Pan de Azucar), Red Spanish, Queen Victoria and Abacaxi. The rest are known regionally (Achaw, 2010; Danielou & Ravry, 2005). A history of pineapple varieties illustrates that the SC had been the dominant variety from the 1950 followed by MD2 1990s (Vagneron et al, 2009)

Four of the six internationally traded varieties are grown in Ghana; the Sugar Loaf, Smooth Cayenne, Queen Victoria and more recently, the MD2.

The Smooth Cayenne originally from Cayenne in (French Guyana) was discovered in 1820 (Achaw, 2010) and has the following distinguishing features; it is almost free from spines except for the needle at the leaf tip. It weighs between 1.8- 4.5 kg, has a cylindrical shape, shallow eyes, orange rind, yellow flesh, and low fiber. It is juicy and has a rich mildly acid flavor and suitable for canning. In spite of its susceptibility to diseases and problems of shipment, it was the most important and widely marketed variety in the world until 1996. It was also the main export variety produced in Ghana until 2008 (Achaw, 2010).

The Sugar Loaf variety is popular in Central and South America, including countries such as Puerto Rico, Cuba and the Philippines. Regarding its physical characteristics, it is almost conical in shape, has a near white or yellowish colour and is very sweet and juicy. Its leaves and crown easily pull out, and it weighs between 0.68-1.36 kg. Compared to the Smooth Cayenne, it is greener and longer. It is drought resistant and thrives well in heavier soils. In Ghana, it was mainly grown in the Central Region (for which reason the local farmers call it, “Mfante”), outside the main pineapple belt until the advent of the MD2. It is produced for the local market

and was not exported until quite recently, partly because the fruit is tender and difficult to export (Fold & Gough, 2008).

The MD2 is sold in the EU under various brand names usually including words or phrases such as ‘golden’, ‘super sweet’ and ‘ultra sweet’. Whitfield, (2010;309) describes it as a “shipping pineapple” because its relatively longer shelf-life makes it the most suitable variety for shipping across long distances. The MD-2 is particularly rich in vitamin C and does not contain much acid (Danielou & Ravry, 2005).

2.4.4 Smallholders Adoption of Improved Varieties: Welfare and Constraint Issues

Historically, the need to develop improved varieties of crops dates as far back as the 1960s when developed countries responsible for development shifted thinking about the rate of population growth after World War II. The primary objective in developing improved varieties was to increase food supply so as to reduce price and make food cheaper and easily accessible by all. The development of improved varieties began with what has been referred to as the “Green Revolution” when improved varieties for Rice and Wheat were first developed. The term “Green Revolution” was generally associated with the rapid rate of adoption of high yielding varieties of these crops in Asia and Latin America from late 1960s to early 1980s (Evenson & Gollin, 2003).

However, recent improvements in technology have made it possible for Plant Research Scientists to churn out new varieties faster. Private firms have different motives. It has been noted that Improvements lead to reduction in food prices but often occur with high costs to producers.

There is overwhelming evidence in the literature regarding the impact of improved varieties on welfare of adopters. Kassie et al, (2011;1784) in their study of the ex post impact of improved groundnut varieties in rural Uganda find “ a positive and significant impact on crop income” of smallholders. Their study justifies broader investment in Research and Development in agriculture. The authors recommendations for scaling the barriers to adoption of improved variety is a call for “policy support for improving extension efforts, access to seeds and market outlets that simulate adoption”.

A more recent contribution to the adoption discourse which is specific to smallholders in the pineapple industry in Ghana is a study by Kleemann et al 2014 titled “*Certification and Access to Export Markets: Adoption and Return on Investment of Organic-Certified Pineapple Farming in Ghana*”. The study samples “386 Ghanaian small-scale pineapple farmers” and finds mainly “that both organic and GlobalGAP certification achieve a positive ROI (Kleemann et al, 2014;79).



2.5 Conceptual Framework

The study employs two main theoretical frameworks in the analysis of smallholder participation in MD2 production and trade within the study area. The Diffusion of Innovations (DI) theory and Supply Chain Management Approach (SCMA). The SCMA has been used extensively to analyse the pineapple and other horticultural supply chains globally, including studies by Trienekens et al, (2004), on Ghana's pineapple industry. The DI theory is suitable for analysing the extent of adoption of innovative ideas, products etc across a broad spectrum of fields (Rogers, 2007; Sahin, 2006). Innovation is defined here as a new product – the MD2 – and diffusion is the process by which the innovation is spread and adopted along the supply chain.

The SCMA aiming at “Chain Reversal,” is relevant because it shows how market demand leads the structure and operations of a supply chain (Folkerts-Koehorst 1997; Thorpe-Bennet, 2004 cited in Trienekens & Willems, 2007). The demand for a new product sends signals that adopting it will guarantee profitability and therefore calls for a “renewal and integration of business systems to improve supply chain planning in order to balance supply and demand across the supply chain” (Trienekens et al, 2004). The theory gives attention to innovative information as a backbone of integrated chains (Lancioni et al., 2000; Porter, 2001 cited in Trienekens & Willems, 2007)

The DI theory is being used here to investigate smallholders as units of adoption of the MD2, an innovative variety of pineapples. The MD2 is the result of concerted Research and Development (R&D) efforts by the Del Monte Company of Costa Rica. The four main elements in the diffusion of new ideas/products are; the innovation, communication channel, time and social system. The rate of adoption of an innovation depends on the following characteristics,

including; relative advantage, compatibility, complexity, triability and observability to those people within the social system (Rogers, 2007; Sahin, 2006).

The following concepts are relevant in the analysis of the diffusion process of the MD2 among smallholders; time, social system and critical mass.

Two concepts of time within the DI theory are relevant for understanding the nature of diffusion of an innovation. The first is “innovativeness”, which is the degree to which a unit of analysis is relatively earlier in adopting a new product or idea than other members of a social system. Five adopter categories and their respective percentages are identified in this regard, namely;

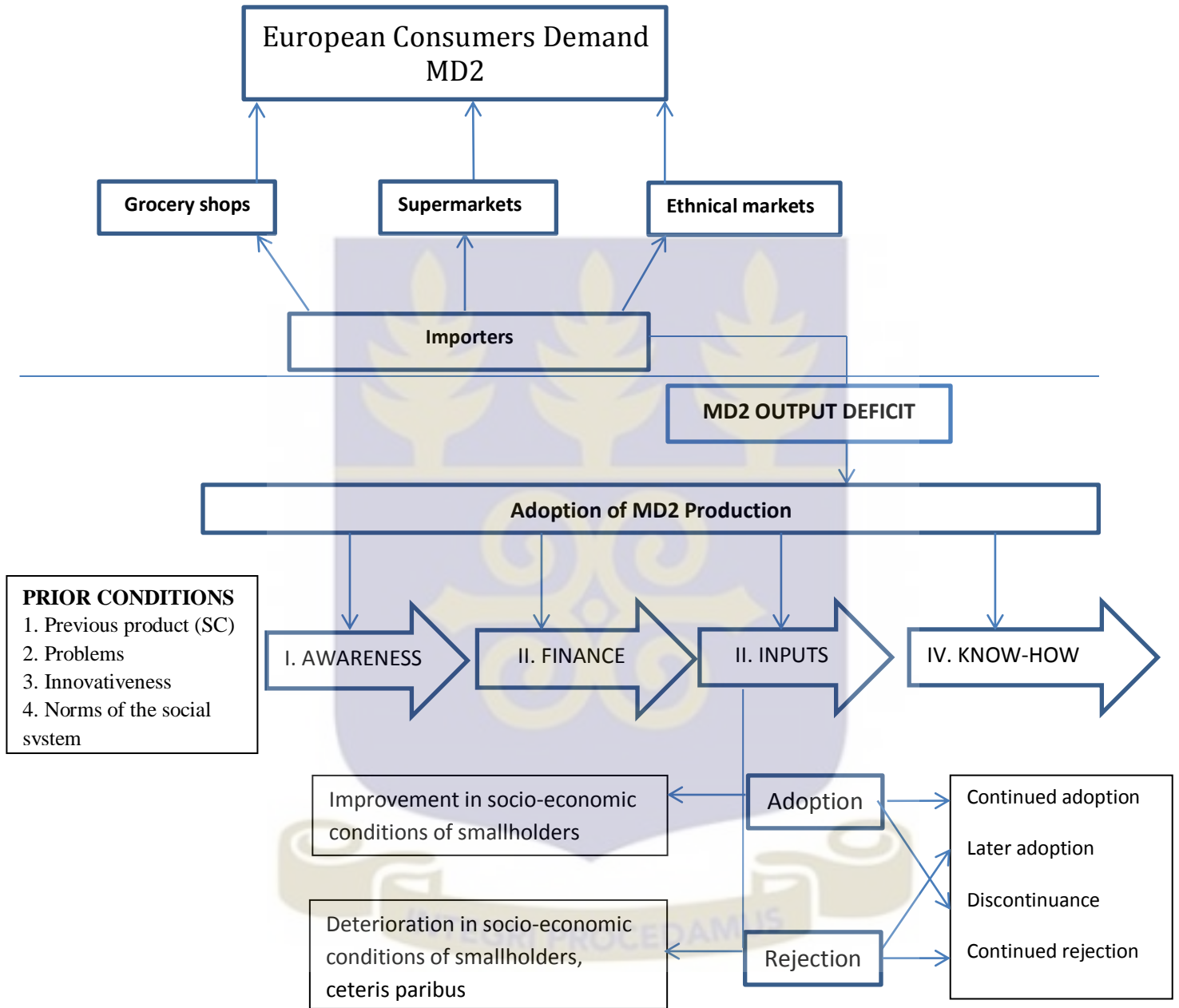
Innovators (2.5%), Early adopters (13.5%), Early majority (34%), Late majority (34%) and Laggards (16%) (Rogers, 2007). For the purpose of this study, smallholder farmers are divided into two main adopter categories, namely; early adopters and late adopters

The role of time in diffusion is also seen in a second concept - the rate of adoption. This is the relative speed with which an innovation is adopted by members of a social system. It is measured as the number of members of the system that adopt the innovation in a given time period.

With regard to the social system which is explained “as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal” (Rogers, 2007; 2). The study assumes the existence of cooperatives as a unit of the social system. Norms will include the farming systems and practices within the study area.

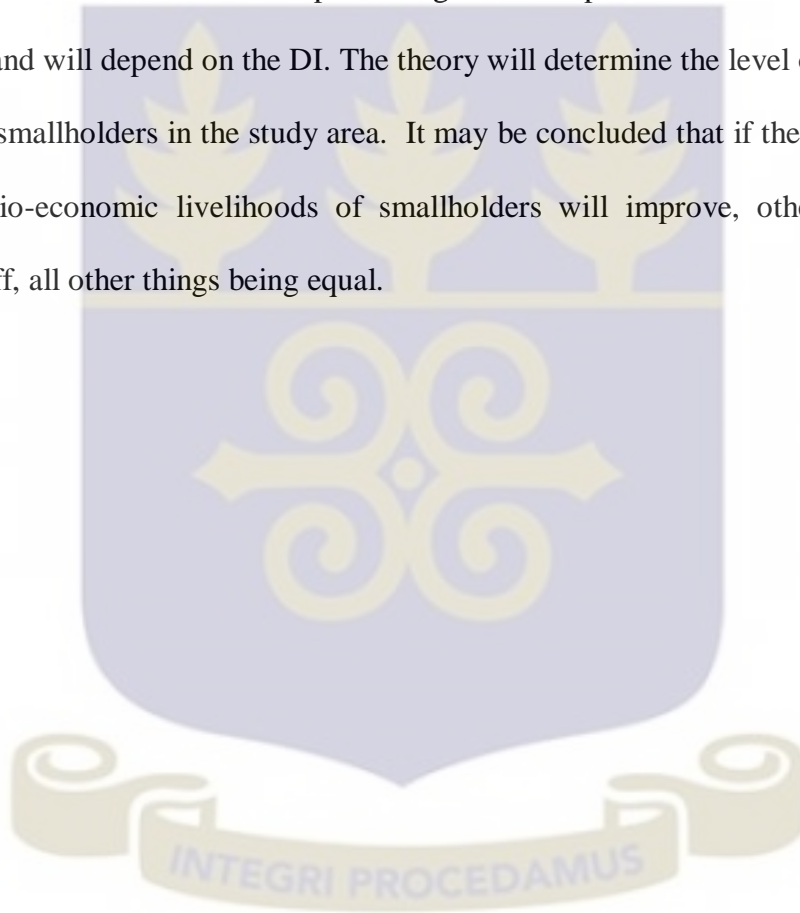
Finally, the concept of the critical mass implies that outreach activities should be concentrated on getting the use of the innovation to the point of the critical mass. The critical mass occurs at the point at which enough individuals have adopted an innovation so that the innovations further rate of adoption becomes self-sustaining.

Figure 2.1: CONCEPTUAL FRAMEWORK: ADOPTION OF MD2 BY SMALLHOLDER FARMERS



Source: Adapted from Trienekens & Willems (2007) and Rogers (2007)

Figure 2.1 above illustrates the use of the dual theories of SCMA and DI in analyzing the adoption of MD2 pineapple variety by smallholder farmers. The SCMA theory explains the upper part of the framework, where demand leads the chain due to acceptance of the MD2 by the European market for pineapples. It shows how consumers demand for MD2 sends signals along the chain to importers who in turn demand the innovative product from smallholder farmers on the supply side of the chain. The lower part of figure 2.1 explains how the supply of MD2 in response to demand will depend on the DI. The theory will determine the level of adoption of the MD2 variety by smallholders in the study area. It may be concluded that if the level of adoption is high, the socio-economic livelihoods of smallholders will improve, otherwise, they will become worse-off, all other things being equal.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter focuses on the approach adopted to address the objectives of the study. It describes and justifies the methods and processes that were used to collect data in answering the research questions. This is achieved by providing information on the research design, target population, sampling techniques, modes of data collection and tools for data analysis. The limitations of the study are also discussed. The chapter ends with a brief background of the study area – Nsawam Municipality.

3.1.1 Target Population

The Fotobi and Pokrom communities of the Nsawam Adoagyiri Municipal Assembly, identified as the major pineapple growing communities (NAMA, Medium Term Development Plan, 2014) were chosen as the case study areas. The target population for the study included all pineapple farmers within these communities as well as major stakeholders in the pineapple production and export sector including officials of the Ministry of Food and Agriculture (MOFA), Ghana Export Promotion Authority and Sea-Freight Pineapple Exporters of Ghana (SPEG).

3.1.2 Methods of Data Collection

Data for the study was obtained from both primary and secondary sources. Primary data was taken from both qualitative and quantitative research techniques. The quantitative data was obtained through face- to –face interviews, while in-depth interviews were used to acquire qualitative data. The face-to-face interviews were conducted with the use of a questionnaire. In-

depth interviews were conducted in the form of discussions with the aid of an interview and FGD discussion guides.

Secondary data was obtained from such sources as journals, magazines, public and institutional documents, radio interviews, articles, bulletins, reports presented at seminars and conferences, monitoring and evaluation reports and unpublished works relating to smallholder. This was meant to obtain a wide range of literature on the topic under study.

3.1.3 Sample Size and Sampling Technique

The researcher used the snowball sampling technique¹ to obtain a sample size of 79 respondents for the quantitative data. For purposes of gathering quantitative data, snowball sampling was used for the main reasons that there is a lack of available data on the number of pineapple farmers in the municipality. The lack of a sampling frame to use for random sampling necessitated that I resorted to the smallholder pineapple farmers who know each other and can make accurate referrals to facilitate their identification.

In terms of the qualitative aspects of the study, one Focus Group Discussion (FGD) was held. There were thirteen (13) farmers in all involving male and female. This tool was used to collect information from respondents concerning issues of adoption of MD2. Probing questions were posed in the meeting to enable participants to engage in a succinct dialogue. Information provided at the meeting was immediately verified by other participants and additions were made as and when necessary. Additional qualitative data was gathered from key informants - officials

¹ A technique for finding research subjects. One subject gives the researcher the name of another subject, who in turn provides the name of a third, and so on (Vogt, 2005)

of relevant institutions in the pineapple production, marketing and exports sector through interviews. This was necessary to elicit information from their profound wealth of knowledge and experience about the variables under study and of the performance of the farmers to which they serve as value chain actors.

3.1.4 Research Design

The research employed a mixed design but with more emphasis on the survey design technique. The research design is a plan that outlines how the rate of adoption of the MD2 variety by smallholders in the study area as well as constraints to adjustment by smallholders will be observed and analysed.

The study employs a combination of quantitative and qualitative methods in the collection and analysis of primary data. The choice of approach was informed by the fact that the study sought not only to determine the level of adoption of the MD2 but also to understand the constraints to adjustment by smallholder farmers to the shift in demand of export variety of pineapple from SC to MD2. The qualitative research will give valuable insights which might be missed by the quantitative method. It allows the researcher to delve deeper into structural and subjective issues that surround the difficulties smallholder export oriented pineapple farmers face in their efforts to adopt the new variety. The study however, employs quantitative methods to get an idea of the patterns in order to be able to contextualize the in-depth information obtained from the qualitative method. The quantitative method will be used to obtain statistics on the smallholder farmers and their farming activities.

3.1.5 Methods of Data Analysis and Reporting Framework

Data collected from both primary and secondary and from the quantitative and qualitative sources were collated, synthesized and analysed using both qualitative and quantitative analytical techniques. The quantitative data collected through the structured parts of the questionnaire was processed for analysis with Statistical Package for the Social Sciences (SPSS) software. The data was analysed utilizing mean, percentages, frequency distribution and cross-tabulations. The qualitative data obtained from the in-depth interview was transcribed from a tape recorder and used during data analysis.

With respect to the qualitative data, references are made to some respondents, some of whom are quoted to buttress the point described in the analysis of data. The findings and recommendations of the analysis are deduced from the discussions

Profile of the Study area – Nsawam-Adoagyiri Municipal Assembly

3.2 Introduction

This section gives a general description of the Nsawam-Adoagyiri Municipal Assembly (NAMA) and an indication of the developmental situation as at 2015. The study was carried out in NAMA with a focus on agriculture – specifically pineapple farming. The narration covers the physical characteristics social characteristics and economic composition

The Nsawam Adoagyiri Municipal Assembly (NAMA) was established under Legislative Instrument (LI 2047) in 2012 as a result of the split of the former Akuapim South Municipal Assembly, into two.

3.3 Physical and Natural Environment

3.3.1 Location and Size

The municipality is located in the South Eastern part of the Eastern Region and lies between latitude 5.45'N and 5.58'N and longitude 0.07'W and 0° 27'W. It is approximately 23km from the national capital, Accra and covers a land area of about 175 square kilometers. In terms of spatial interaction, the municipality is bordered to the South by the Ga West and Ga East municipal assemblies in the Greater Accra Region and to the North by the Akuapim South District. It shares its North-West and South West boundaries with Ayensuano and Upper West Akim Districts, respectively.

Nsawam, the capital of NAMA is a well-known gap town² along the main highway, linking the Coastal and Northern parts of the country. River Densu, an important water body in Ghana, passes through the Municipality separating the Nsawam and Adoagyiri townships. It is approximately 115.8km long and derives its source from the Atiwa mountain ranges near kibi in the Eastern region.

3.3.2 Climate and Vegetation

The climate is classified as the wet semi-equatorial with a double maximal rainfall recording an average annual rainfall of between 125cm and 200cm. The municipality, like the rest of the

² A town located at a gap between hills, providing a good defensive site and route centre that led to a trade and market function.

southern/coastal zones of Ghana has two rainy seasons that enable all year round farming activities based on rain-fed agriculture. The first rainy season is from May to June and the second, from September to October. The highest temperatures are, recorded between March and April, averaging around 30°C whilst the average lowest temperature of 26°C, is recorded in August.

The municipality has two main ecological zones, namely semi-deciduous forest and Coastal Savanna Grassland with a share of 90 per cent to 10 per cent, respectively. However, due to uncontrolled exploitation of timber and the shifting cultivation system of farming, very little of this forest remains today. Common tree species include *Antiriarichloropogon*, such as *Aningeriarobusta*, *chrysophyllum Arcanum* and *Mansoniaaltissima*. The Coastal Savanna Grassland which is dominated by *Andropogangayanus* and *Hyperemia rufa* (spean and elephant grass), forms the transition zone between the costal savanna and rain forest region.

3.3.3 Topography and Drainage

The Relief of the municipality is generally categorized into three; the Densu Plains, the Ponpon narrow lands and the Akuapem–Togo Ranges. The Densu Plains cover the Western half of the Municipality and are generally undulating with occasional isolated peaks such as the Amama and Nyanao Hills, which reach about 5000 and 1000 feet above sea level, respectively. The plains are home to Nsawam, the Municipality Capital and constitute a potential for irrigation and mechanized farming. Some parts of the town are liable to floods due to lack of adequate drainage facilities. Pools of stagnant water are also common in the rainy season leading to the breeding of mosquitoes and other vectors.

The Pompom Narrow Lowland is located to the north east with an average height of between 150 feet and 200 feet above sea level, although a few isolated hills around Pakro reach heights of about 1000 feet above sea level.

The Akuapem – Togo Ranges are located in the eastern part of the Municipality. The hills provide a good view of the Accra Plains and are therefore attractive sites for tourism development and for first-class residential development. They form part of the South-East Greenbelt where developments are to be strictly controlled. The Municipality is drained by river Densu and its tributaries such as the Ntua, Pompom, Ahumfra and Dobro.

3.3.4 Geology and Soils

The geology of the Municipality is mainly sedimentary rocks metamorphosed to quartzites, schist, shale and phillite, forming the Akuapem – Togo ranges. Quarrying activities are taking place at the foot of the ridge to supply aggregates for the construction industry in the Municipality and in Accra.

In the most semi-deciduous forest zone, the principal soil is forest ochrosols. However, the location and relief pattern makes modification to the soil. Detailed analysis of the soil types, show that there are mainly four types, which are outlined below:

Table 3.1: Soil Types and Suitable Crops

SOIL TYPE	SUITABLE CROPS
Adawso-Bawjiase-Ofin Compound Association	maize, cassava, yam and pineapple
Ayensu Chichiwere Association	rice, vegetables, sugar cane and tree crops
The Fete and Nyanoa-Opimo Association	Tree crops, arable crops and forestry
Yaya Pimpinsu-Befua Association	rice, sugar cane, coffee, vegetables, cassava, maize, banana, ginger, shallots and oil palm.

Source: NAMA, Medium Term Development Plan (2014)

3.3.5 Spatial Analysis

The municipality is made up of four (4) sub-municipal areas, namely; Adoagyiri, Djankrom, Nsawam and Panpanso with a total of about one hundred and twenty-two (122) communities. Other notable settlements in the municipality are Drobo, Prisons, Amoakrom, Sakyikrom, Amoakrom, and Atsikope.

3.3.6 Demographic and Ethnic Characteristics

The 2010 Population and Housing Census estimated total population of the municipality to be 86,000, comprising 42,733 (49.7%) males and 43,267 (50.3%) females (Ghana Statistical Service, 2012). The current projected population of the municipality is estimated to be Ninety One Thousand Two Hundred and Sixteen (91,216) (Municipal Health Directorate Survey, 2013). The NAMA has a population growth rate of 1.6% per annum which is lower the national rate of 2.7% but slightly higher than the regional population growth rate of 1.4% per annum.

The Municipality is densely populated with a density of 465 persons per square kilometers. The urban population constitutes 50,864 (59.1%) whilst rural is 35,136 (40.9%) indicating a rural-urban split of 1:1.2.

In terms of ethnicity, the Akuapem tribe dominates as they constitute about 63% of the population. Ewes constitute about 9%, Ga-Adamgbes make up 7%, and other Akans apart from Akuapems constitute 17%. The remaining 4% are mainly Northerners and other tribes. The existence of a dominant tribe, the Akans, has created a social cohesiveness, which is ideal for community development.

3.3.7 Education and Health

The municipality has two (2) Senior High Schools, 5 vocational institutes, 20 Junior High Schools and 30 primary schools. It is endowed with a major hospital and a few health centers which cater for the major health concerns of the municipality which include malaria, buruli ulcer, maternal mortality and HIV/AIDS among others

3.3.8 Water and Sanitation

Sources of water available to the people of the NAMA are pipe-borne water, the Densu River, streams, ponds and bore-holes. About 30 percent of the municipality's population enjoys pipe-borne water, provided by the Community Water and Sanitation Agency (CWSA) and the Ghana Water Company (GWC).

Pipe-borne water is available in Nsawam, Adoagyiri, Sakyikrom, Djankrom, Ntoaso, Amoakrom, Owuraku, Prisons, Dobro and Atsikope. 47.9 percent of the municipality's population, covering mainly small towns and rural areas (up to 45 communities), has been provided with boreholes and hand dug wells.

Environmental conditions around the Densu River Basin have continued to deteriorate due to pollution from human activities.

Sanitation issues, which are of critical concern in the municipality, include; lack of solid and liquid waste disposal sites, inadequate public places of convenience, domestic refuse disposal site, lack of modern slaughter houses and inadequate manpower at the Environmental Health department.

3.3.9 Transportation and Telecommunications

Characteristically, the human settlement pattern to a great extent is influenced by the road network, with settlements dotted along the main arterials to Nsawam and also along the rail lines connecting Accra to Cocoa and Gold producing hinterlands.

Generally, towns in the Municipality are not well planned and therefore do not have good internal road network. Feeder roads connect villages within Panpanso, Adoagyri and Nsawam sub-municipals.

Mobile telephone coverage is over 75% and increasing. Service providers include Vodafone-Ghana, MTN, Expresso, Airtel and Tigo respectively.

3.3.10 Economic Composition

The main economic activities within the municipality and their contribution to employment are as follows; agriculture (37%), commerce (28%), industry (15%) and service (20%). Agriculture is the main economic activity and biggest employer of the people in NAMA, majority of whom engage in commercial farming especially, in the area of pineapple, pawpaw, mango and other fruits. Some of these produce are exported while others are sold in the open market.

Main commercial activities include sale of foodstuffs, textiles, plastic wares and electrical gadgets. Additionally, Nsawam is one of the busy towns along the Accra-Kumasi road due to a lot of hawking activities involving goods such as bread, fried turkey tail (popularly called “tsofe”) and fried yam. The municipal capital Nsawam, hosts two (2) market days in a week; Mondays and Thursdays. Many farmers, sellers and buyers from within and outside the municipality come to the market to sell or buy causing traffic jams on major roads. The

municipality is also endowed with a number of small and medium scale industries in the municipality. The industries range from agro-processing, stone quarrying, Artifacts/Craftworks production and batik tie and dye.

3.3.11 Agriculture

Due to the good nature of the land coupled with other favourable factors, farming has been a major source of employment for the people. The forest and savannah soil types are suitable for the cultivation of a variety of crops including cocoa, cola-nuts, citrus, oil palm and staple food crops such as cassava, yam, cocoyam, maize, rice and vegetables.

Out of the 37% of labour force engaged in agriculture, 60% are males whilst 40% are females. Subsistence farming is the common system of farming due to scarcity of land for farming purposes and or lack of access to credit. About 35% of the farmers practice mixed-farming method whilst the remaining majority, of about 65%, practice mono cropping. Additionally, farmers generally employ low levels of technology and use simple farm implements such as cutlasses, hoes and axes in their farming. Family labour is the commonest source of labour for farming activities, with the use of friends “nnoboa” and hired labour, mostly by commercial farms.

Agriculture in NAMA is also characterized by a number of reputable commercial farms that mostly cultivate pineapples, pawpaw and vegetables. The municipality accounts for about 60% of all pineapples and 30% of vegetables exported from Ghana. Notable among these large scale commercial farms include Forest Resources, Blue Skies, Bomart and Dansak. Livestock and Poultry production is done but mainly at a subsistence level.

The shared tenancy system of land acquisition is a major hindrance to agricultural development within the municipality. In this system, proceeds of farms are either divided into two equal halves between the farmer and the landlord, which is the “abunu” or “abusa”, where the landlord is given a third of the proceeds.

Other factors militating against agriculture development in the municipality include; poor road network, post-harvest losses due to lack of ready market and storage facilities, the over-reliance on rainfall for farming activities, bush fires as well as a lack of access to credit facilities. The agriculture development focus in the municipality is the promotion of NTE crops, through mobilizing farmers groups with the support of the GEPA.

3.3.12 Industrial Activities

NAMA is one of the peri-urban areas which is home to many industries with activities ranging from the manufacture of pharmaceutical produce and fruit processing with the use of high technology and equipment. The municipality is also home to many agro-based industries, timber related industries, quarrying and construction industries. There are also a good number of technician and mechanical workshops employing light or low level of technology in their production. Major industries with well-known brands include;

1. Nsawam Cannery which produces beverage and Food products,
2. Blue Skies Limited (pineapple, pawpaw, watermelon and mango beverages),
3. Astek Fruit processing Limited (fruit beverages and mineral water),
4. La Gray Pharmaceuticals Limited (Drugs),
5. Africa Cola (fruit beverages),
6. Sunripe Limited (fruit beverages) and the

7. Nsawam Foam Ghana Limited (bedding and mattress products). **Source: NAMA; Medium Term Development Plan (2014)**

3.3.13 Financial Services

The presence of brisk economic activities like agriculture, commerce and quarrying is a major pull factor to a number of financial institutions. Financial service providers in the municipality include Ghana Commercial Bank (GCB), Akuapem Rural Bank, South Akim Rural Bank, Citizens Bank as well as many microfinance institutions which serve the financial needs of the people.

3.3.14 Tourism

The municipality is blessed with a number of sites of historic, scientific and aesthetic importance. There are waterfalls at Mensaman, and Baode at Nsakyé. The Baode waterfall has a pond which contains crabs, mudfish and lobsters, in addition to a well-preserved grove which represents an added factor to eco-tourism in the Municipality. There is also the Oboadakaso grove. It is made up of four naturally arranged coffin-shaped rocks lying on top of each other. One can also visit the “Adade Yaw So” Cave, which can shelter about hundred people at a time.

One site of national historic importance is the shrine at Brekuso where the parents of the Founder of the Ashanti Kingdom, Nana Osei Tutu were known to have gone to seek blessing of the gods before giving birth to the great king.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.0 Introduction

This chapter presents analysis of the data collected for the study and discussions. The broad objective of the study was to determine the level of adoption of the MD2 among smallholder farmers in the study area. The study was conducted on seventy-nine (79) smallholder farmers from two communities in the Nsawam Adoagyiri Municipal Assembly.

4.1 Demographic Characteristics of Respondents

4.1.1 Some Demographic Characteristics of Pineapple Farming Households

Table 4.1: Some Demographic Characteristics of Pineapple Farming Households

	Household size	Number of Children	Number of Children in Sch.
Total	339	172	111
Mean	4.29	2.18	1.41
Maximum	8	5	3
Minimum	1	0	0

Source: Field Survey, July 2015

This study, defines a household as “a person or a group of persons, who live together in the same house or compound and share the same house keeping arrangement” (Ghana Statistical Service, 2012). Table 4.1 shows that, in all, there were a total of 339 members in pineapple households sampled. The mean household size for the total sample is 4.29. The largest household had 8 members. Similar studies on pineapple farmers by Achaw, (2010) revealed a mean household size of 5.4 from 70 households sampled. The relatively lower mean household size in this study may be attributed to the presence of many young and single farmers.

The table also shows that there were a total of 172 children. Out of this number 111 are in school implying that the majority of children are in school and are being supported with proceeds realized from pineapple farming. During the FGD a farmer recounted how the shift from Smooth Cayenne to MD2 affected his ability to cater for the education of his children.

I dropped out of school so I have always wanted the best education for my children but in 2005 when we lost so much money due to MD2, I had to take my children out of boarding school into a public school where teaching and learning is ... as you know, not good.

4.1.2 Gender Distribution of Respondents

Table 4.2: Gender of Respondents

	Male	Female	Total
Frequency	75	4	79
Percentage	94.9	5.1	100.0

Source: Field Survey, July 2015

The results of the study summarized in table 4.2 above reveals that of the total sampled population of pineapple farmers, 4 were females representing 5.1% and 75 were males representing 94%. The study shows that pineapple farming is dominated by men. This may be attributed to the gender roles assigned by society with the notion that pineapple farming is tedious and therefore supposed to be done by men. Another probable explanation is that pineapple farming is more capital intensive and risky compared to other crops grown in the community and therefore more likely to be undertaken by men. It was observed also that this is partly a manifestation of the gender division of labour in households. One of the smallholders attempted to explain this observation in the FGD.

“We the men do the work of pineapple farming whilst our women go to the maize and cassava farms to make sure we at least have some food to eat”(Member, Fotobi Cooperative Society)

However, in the supply chain, it was observed that women play a vital complementary role in the marketing of pineapple produce especially in the local market. When farmers harvest their produce, they rely on retailers who are mostly women to buy and sell in the market.

4.1.3 Age of Respondents

Table 4.3: Age of Respondents

Age (years)	Frequency	Percentage	Cumulative Percent
18 -24	15	19.0	19.0
25-34	29	36.7	55.7
35-44	19	24.1	79.7
45+	16	20.3	100.0
Total	79	100.0	

Source: Field Survey, July 2015

From table 4.3, it is observed that the greatest proportion of respondents, 36.7 percent, is within the 25-34 year age group. This is followed by respondents in the 35-44 year age group, 24.1 percent and then by those in the 45 and above group, 20.3 percent. The survey shows that there is a relatively higher proportion of young people involved in pineapple farming, represented by the cumulative percent of 55.7 percent for those who are 34 and below. This could be an indication that pineapple farming is lucrative in Ghana and hence the involvement of the younger generation. In this particular context, however, explanations of this phenomenon during the

Focus Group Discussion indicated that most of the 18-24 categories had dropped out of school to engage in pineapple farming. The words of two participants of the FGD illustrate this;

“ when MD2 was introduced most of our parents who were pineapple farmers lost money and we had to drop out of school to join them on the farm, even those who completed could not continue” (18 year old pineapple farmer).

“there are no jobs anywhere in Accra, pineapple farming is our only work here, so all the youth have to do it. What else will they do?” (Member, Fotobi Cooperative).

The results of the study are consistent with findings from similar studies carried out in Ghana by Asuming-Brempong et al, (2013; 628). Their study focused on 300 farmers from three districts in the southern zone including the Akuapim South District. The results showed that (91%), of respondents fell between the ages of 15 and 59 years causing them to conclude that farmers “are relatively young”.

4.1.4: Level of Education

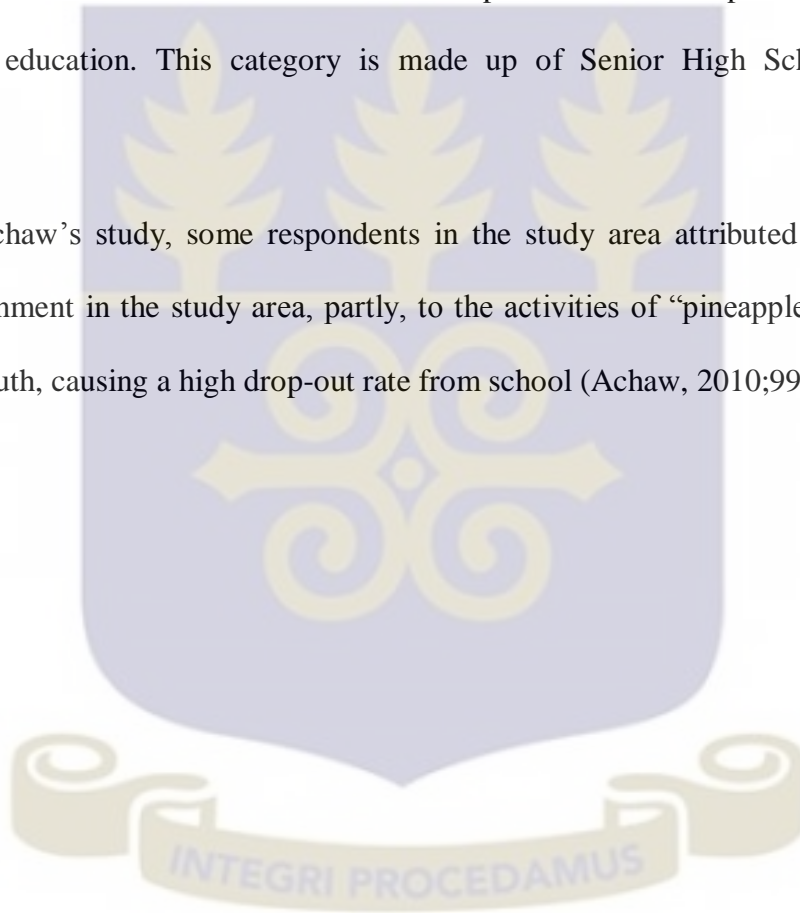
Table 4.4: Level of Education

	Frequency	Percent	Cumulative percent
No Education	27	34.2	34.2
Primary education	28	35.4	69.6
Junior High School	19	24.1	93.7
Higher Education	5	6.3	100.0
Total	79	100.0	

Source: Field Survey, July 2015

Table 4.4 provides information on the highest level of education attained by the respondents. The results show that up to 34.2 percent of respondents have had no formal education. About 35.4 percent had either completed or had some primary education, making it the highest category in terms of educational attainment of respondents. Those who had completed or had some Junior High School education, constituted the second highest category in terms of educational attainment. Only 5 farmers who constitute about 6.3 percent of the sampled farmers had some higher level of education. This category is made up of Senior High School and tertiary institutions.

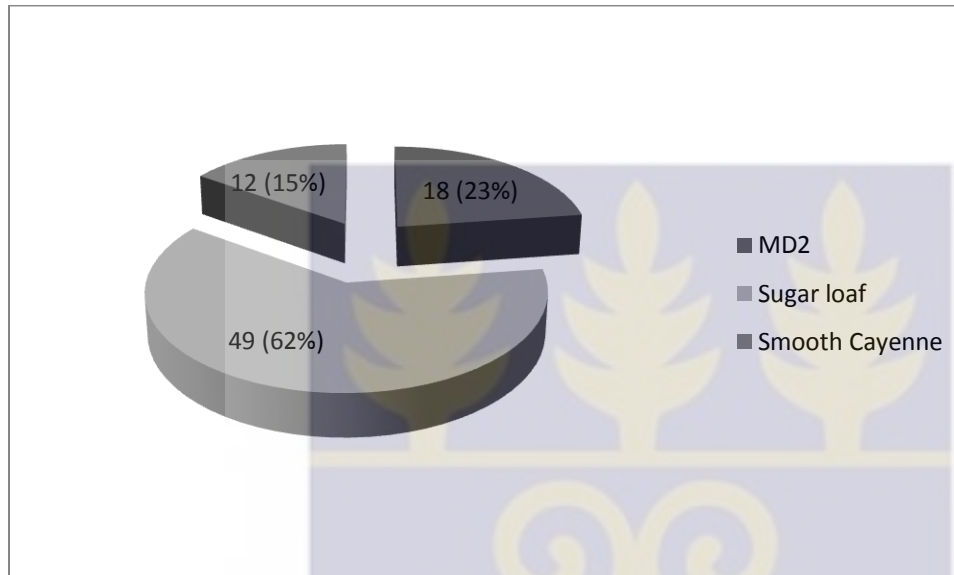
According to Achaw's study, some respondents in the study area attributed the low level of educational attainment in the study area, partly, to the activities of "pineapple companies" that employed the youth, causing a high drop-out rate from school (Achaw, 2010;99)



4.2 Pineapple Production, Varieties and Adoption

4.2.1 Main Variety of Pineapple Farmed

Figure 4.1: Main Variety of Pineapple Farmed



Source: Field Survey, July 2015

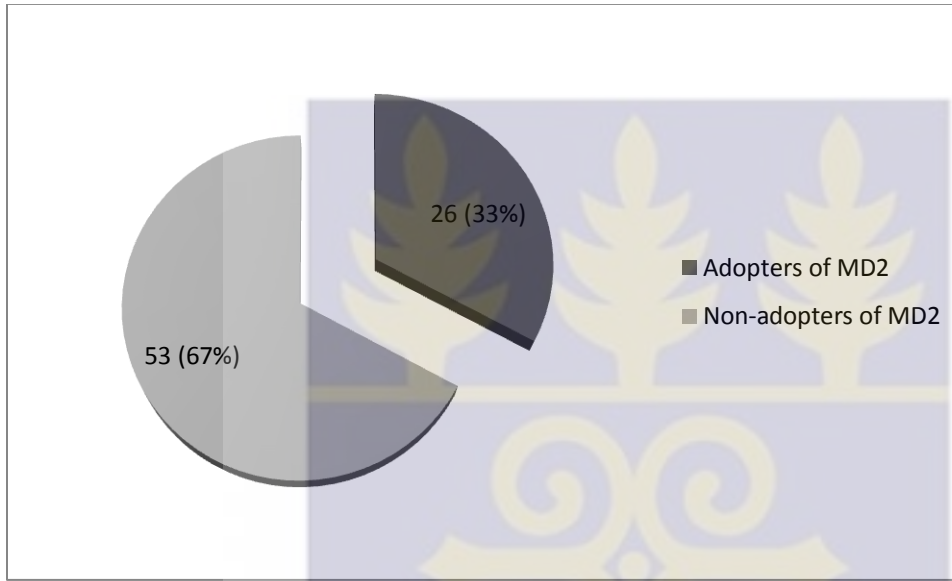
Figure 4.1 shows results on the question of the main variety of pineapple cultivated by the smallholders. 18 respondents representing about 22.8 percent stated that MD2 was the main variety of pineapple they cultivated on their farm. 62 percent of respondents farm Sugar Loaf as a major variety of pineapple while only 15.2 percent of respondents farm Smooth Cayenne as a major variety. These figures indicate that Sugar Loaf has become the dominant pineapple variety in the study area which is a microcosm of the major pineapple belt of Ghana.

This is consistent with information provided by the director of the GEPA, who mentioned that Sugar Loaf had become the dominant variety in recent times due to the advent of MD2. For this reason, the GEPA had sought avenues and began to export the Sugar Loaf to niche markets in

Europe. Currently, exports are by air-freight because the Sugar Loaf has a low shelf life and therefore not suitable for sea freight exportation.

4.2.2 Adoption of MD2 Pineapple Variety

Figure 4.2: Adoption of MD2

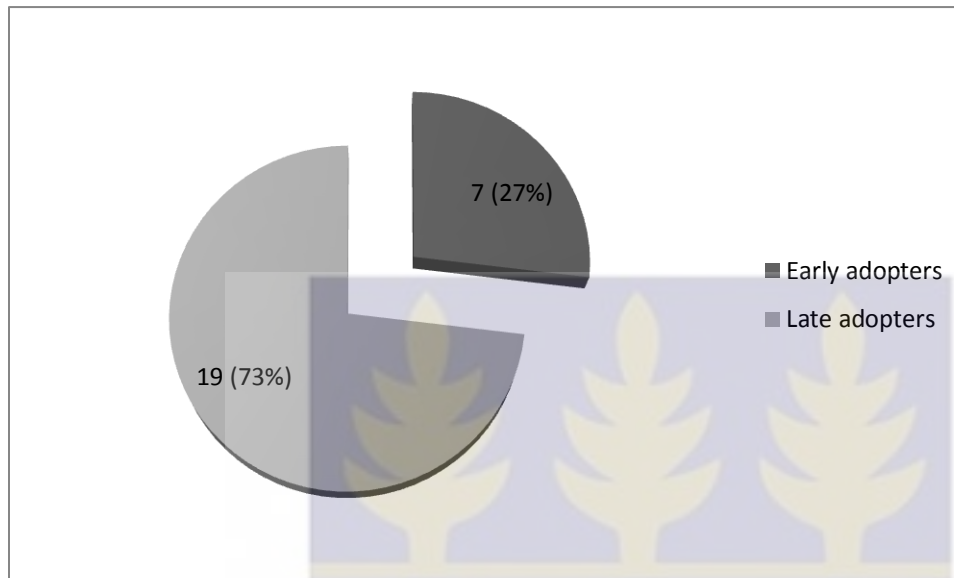


Source: Field Survey, July 2015

Figure 4.2 shows that of the 79 farmers sampled, 26 of them representing 32.9 percent had adopted and were cultivating the MD2 variety whilst 53 of them representing about 67.1 percent were not involved in the cultivation of the MD2 variety. The variable was derived from the question; do you farm MD2? The farmers responded with either a yes or no. Thus, the survey results depict a relatively low level of adoption,

4.2.3 Early and Late Adopters

Figure 4.3: Early and Late Adopters



Source: Field Survey, July 2015

Figure 4.3 shows that among the 26 adopters of the MD2, 7 farmers being 27 percent, were found to be early adopters whilst 19 of them representing 73 percent were found to be late adopters. The question for this variable asked adopters of the MD2, which was the first year they started cultivating the variety. The early adopter category includes respondents who began MD2 cultivation between the years, 2004 to 2009 whilst those who started farming MD2 from 2010 to date were considered late adopters. The response data shows that the earliest adoption date by respondents was in 2008. Many reasons were given by the farmers for this.

Initially, it was difficult to cultivate the MD2 because of non-availability of plantlets. However, more recently, our various cooperatives are being supported with funds from the Skills Development Fund to undertake MD2 cultivation. They provide us with plantlets (Leader Pokrom Farmers' Cooperative).

4.2.4: Variety Preference and Adoption**Table 4.5a: Adoption and Variety of pineapple preferred**

	Variety of Pineapple Preferred			Total
	MD2	Sugar Loaf	Smooth Cayenne	
Adopters	25	1	0	26
Non-Adopters	24	22	7	53
Total	49 (62%)	23 (29%)	7 (8.9%)	79(100%)

Source: Field Survey, July 2015

Table 4.5a is a cross tabulation of the variable on adoption and the variety of pineapple preferred by smallholders. It shows that a total of 49 respondents, representing 62%, prefer the MD2 over the other 2 varieties. The reasons most respondents gave for this preference is the high level of profit associated with farming the MD2. During the FGD, a leader of the Aburi Amanfo Cooperative and Marketing Society gave the costs and profits associated with the various varieties as follows;

“the costs involved in farming an acre of Sugar Loaf , Smooth Cayenne and MD2 are about GHS 3000.00, GHS 5000.00 and GHS 7500.00 respectively. In terms of profit, it is GHS 5000.00, GHS 12,000.00 and GHS 18,000.00 respectively”

Table 4.5b: Preference and MD2 Adoption

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.210 ^a	2	.000
Likelihood Ratio	23.966	2	.000
Linear-by-Linear Association	16.591	1	.000
N of Valid Cases	79		

Source: Field Survey, July 2015

Table 4.5b presents the results of a Chi-square test which was employed to determine the statistical significance of the principal hypothesis of the study that there is an association between adoption of the MD2 variety and its preference by smallholder farmers. At 0.05 significance level, the chi-square value of 19.210 > the critical value at the .05 significance level. therefore the null hypothesis of no association is rejected and the alternate is accepted. That is smallholder adoption of MD2 is associated with preference for it.

Specifically, the research hypothesis could either be that smallholders do not prefer MD2 and are therefore not adopting it or that smallholders prefer MD2 and are therefore adopting it. Coupled with the evidence of a high number of late adopters, it is possible to conclude that whereas smallholders prefer the MD2 over other varieties, its adoption is being inhibited by some factors as the section on constraints will show.

4.2.5 Land Size and Proportion of Land for Varieties.

Table 4.6a: Average Land size for Pineapple Varieties

	Mean (acres)
Size of farmland	1.80
Land in MD2	.33
Land in Sugar Loaf	1.22
Land in Smooth Cayenne	.24

Source: Field Survey, July 2015

Table 4.6a shows that the average land size of all 79 respondents was 1.80. In terms of the average land allocated to the three main varieties, Sugar Loaf had the highest average land size of 1.22 acres followed by MD2 with an average of .33 acres and Smooth Cayenne with an average of .24 acre. It was observed that most adopters of MD2 reported a relatively small portion of land allocated to its cultivation. Explanations for this observed phenomenon during the FGD showed that most adopters either had fewer plantlets or did not have the capacity to contain higher costs to be incurred in the case of a larger portion of land in MD2. Others said they were trying to grow suckers themselves

Table 4.6b: Ease of Land Acquisition

	frequency	percent	Cumulative percent
Very easy	27	34.2	34.2
Easy	42	53.2	87.3
Somewhat difficult	10	12.7	100.0
Total	79	100.0	

Source: Field Survey, July 2015

Table 4.6b shows that land is relatively readily available for pineapple farming within the study area. The respondent was required to indicate on this three step ordinal scale, how easy it was to acquire land for MD2 farming activities. The results show that 27 farmers, being 34.2 percent indicated that it was very easy whilst 42 (53.2 percent) of them indicated that it was easy to acquire land.

Table 4.6c: Gender and Ease of land Acquisition

Gender	Ease of land Acquisition			Total
	Very Easy	Easy	Somewhat difficult	
Male	25	42	8	75
Female	2	0	2	4
Total	27	42	10	79

Source: Field Survey, July 2015

Table 4.6c, seeks to determine, if any, the extent to which access to land is a barrier to female involvement in pineapple farming. The results shown by a cross tabulation of gender and ease of land acquisition shows that of the 4 females engaged in pineapple farming, 2 reported that it was very easy to acquire land whilst 2 indicated that it was somewhat difficult to acquire land for pineapple farming.

The FGD showed that there were no known barriers to female access to land for pineapple farming purposed.

4.3 Constraints to MD2 cultivation

Table 4.7: Constraints to MD2 Production

	Frequency	Percentage
Lack of finance	27	34.2
High Cost of cultivation	22	27.8
Land is not suitable for MD2	9	11.4
Unavailability of plantlets	14	17.7
Exporters cheating behaviour	7	8.9
Total	79	100.0

Source: Field Survey, July 2015

Table 4.7 shows results from a question where farmers were asked to state the biggest constraint to their adoption of the MD2 variety. Lack of finance emerged as the dominant constraint, with 34.2 percent of respondents followed by the high cost of cultivation. The high cost of cultivation is related to financial constraints pertaining to working capital and cost of farm inputs especially plantlets and fertilizer. According to the farmers, the MD2 cultivation requires 50 percent more fertilizer than the smooth Cayenne. Other constraints include the non-suitability of farmland to MD2 cultivation, unavailability of plantlets and the cheating attitude of exporters. On the non-suitability of farmlands, the farmers' explained that when they plant the MD2 on their farmlands, the plantlets die off and decompose. Officials of MOFA did not corroborate this explanation and suggested that the failure of MD2 on some farms may be attributed to other factors such as poor agronomic practices.

It was found that most initial efforts, prior to 2005 such as the Horticulture Export Industry Initiative (HEII) program of rapid pineapple sucker multiplication aimed at providing smallholders with plantlets failed mainly because they were not demand-driven. Subsequent efforts since 2005 by the GEPA also failed because farmers lacked financial resources because exporters failed to pay them, especially, in the immediate aftermath of the shift.

Several studies testify to the high cost of cultivating MD2. For example, Achaw, (2010;87) concludes that “the cost of producing and storing MD2 is way too much for small-scale producers”. He goes further to quote an interviewees testimony in this regard, thus

“the costs of MD2 plantlets are very expensive and hard to find. Only the few out-grower farmers in this community are able to produce MD2 because they receive support from the companies around” (Interviewee 41 in Achaw, 2010;87)

With respect to the cheating behaviour of exporters, a farmer expressed his frustration at what an exporter told him when he asked for his money during the FGD.

“The exporter told me that he will come for some money from me to pay for the extra cost he incurred from disposing off the waste generated by the rotten pineapples in Germany” (77 Year Old Pineapple Farmer).

Without denying the veracity of the above assertion, evidence from the literature indicates that the perceived “cheating behaviour” of exporters might be wrong in some cases. For instance research by (Suzuki et al (2011; 1611) shows that exporters incur huge costs due to high rejection rate of pineapples. This would tend to serve as a genuine reason for their inability to pay the farmers what is due them.

Again, evidence from the literature shows that constraints to adoption tend to vary due to different contexts. For instance, results from a study on the adoption of sweet pepper by Schipmann & (Qaim, 2010; 361) indicate that missing land titles, weak infrastructure conditions, and limited access to information constituted serious constraints during the early phases.

4.4 Cooperative Membership

Figure 4.4: FBO/Cooperative membership



Source: Field Survey, July 2015

Figure 4.4 shows that 40 respondents representing 51 percent of the total sample are not members of an FBO whereas 39 respondents being 49 percent of the total sample are members of an FBO.

The study area has been noted in the literature to have a much higher concentration of FBOs relative to other communities. This is mainly attributed to the existence of projects by government agencies and NGOs (Asuming-Brempong et al, 2013). Particular mention is made of

the role of the Millennium Development Authority (MiDA) in the formation of these FBOs as part of programs within the Southern Intervention Zone.

For Non- FBO members, one of their reasons for not belonging to an FBO was that they did not see any usefulness of the cooperative to their pineapple farming activities. Other farmers who were formally members of an FBO stated that they had to quit because it only crippled their activities, mentioning, especially that FGL is particularly responsible for the declining plight of smallholders. Asante et al, (2011;2277) attribute Non-FBO membership to past negative experience with an FBO as well as the fact that some want to “avoid responsibilities associated with membership such as payment of dues”.

FBO members, on the other hand, cited access to credit, subsidized inputs and training occasionally, from Non-Governmental Organisations and government agencies, as their reasons for joining an FBO. Some of the above reasons are supported by literature, for example, Asante et al, (2011;2275) find a “positive correlation between access to credit and machinery as a basis for farmers joining FBOs” because these tend to “make them better off”.

Other researchers have considered the important question of the relationship between membership in an FBO and innovation adoption. Markelova et al, (2009;2), for instance, suggest that FBOs tend to promote “shared objectives for technology adoption”. Asante et al, (2011;2273, 2278) also find that FBOs are “one of the keys to more rapid diffusion” and enhance successful innovation. Owusu & Quaye, (2006;9) identifies “weak smallholder cohesion” as a major factor militating against adoption of the MD2 in Ghana.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the findings of the study and recommendations. The main aim of the study was to determine the level of adoption of the MD2 variety among smallholder farmers. The study additionally sought to identify some of the constraints to the adoption of the MD2. . In order to achieve these objectives, questionnaires were administered to seventy-nine farmers in the Fotobi and Pokrom communities of Nsawam Adoagyiri Municipal Assembly covering the following areas: Personal and Demographic Details, MD2 adoption, their Source of Finance, membership in FBOs and Constraints to MD2 adoption. Interviews were also conducted with officials of MOFA and GEPA.

5.1 Conclusions;

The study found that there is a low level of adoption of the MD2 variety among smallholders. However, a majority of smallholders who cultivate the variety were found to be late adopters. This fact coupled with the close to thirty (30) percent level of adoption is an indication that the rate of adoption will likely increase as adoption reaches the level of the critical mass required to ensure that further rate of adoption is self-sustaining.

The main constraints to adoption identified by the study are; lack of finance, non-availability of plantlets and high cost of production due to required heavy investments in inputs such as labour

and fertilizer. These constitute the overriding constraints to adoption of MD2 perceived by respondents.

Another constraint perceived by some smallholders was the non suitability of farmlands to the cultivation of MD2. Such a perceived constraint was, however, denied by officials of the MOFA who explained such a perception to be rather an indication of the lack of technical-know how in MD2 cultivation.

Again, the study found that prevailing factors since the advent of MD2 have resulted in the Sugar Loaf, becoming the commonly grown and dominant variety among smallholders in the pineapple belt. Hitherto, the Smooth Cayenne used to be the dominant variety but the MD2 could not take its place due to afore mentioned constraints. Apart from ensuring a guaranteed market locally, plantlets of the Sugar Loaf are easily available and it requires little in terms of fertilizer and labour inputs implying a lower cost of production.

The study also found that there is a significantly high youthful population involved in pineapple farming. Some of the pineapple farmers of school going age were found to have dropped out of basic school to engage in this economic activity as a main source of livelihood.

5.2 Recommendations

Based on the findings, the study recommends the following:

1. There is the need for deliberate policies to provide smallholder farmers with plantlets of the MD2 at cheaper and affordable prices to enable a faster rate of adoption.

2. Additionally, farmers should be provided with cheap and flexible credit facilities to enable them participate in MD2 cultivation effectively by purchasing plantlets and fertiliser inputs.
3. There is also the need to engage technical experts to transfer skills in soil management best practices, land preparation and land engineering to smallholder farmers to reduce the incidence of loss of plantlets due to poor agronomic practices.
4. Another suggestion is that stakeholders in the Pineapple industry should capitalize on niche markets being created by organic pineapple farming which is best suited for smallholder cultivation. Additionally, to enhance the efforts of smallholders, concerted efforts at Research and Development (R&D) in product development could for instance, focus on improving shelf-life of the Sugar Loaf variety which is now being exported. This would enhance its international trade by expanding volumes to the European market and even enable participation in the US market which is the largest.
5. There is also the need to improve the provision of social infrastructure including health and education services where these directly impinge upon the livelihoods of the smallholders. Education support should especially take the form of adult literacy programmes given that the majority of smallholders lack basic literacy, numeracy and ICT skills. This would enhance farmers' effectiveness in their pineapple farming activities. For instance, they will be able to follow and understand information in published manuals as well as be in a better position to enter into binding contractual agreements with exporters.

6. There is also the need to design programmes that will re-organize and strengthen FBOs in the pineapple sector whilst drawing vital lessons from the collapse of laudable models in the past such as the FGL.
7. Additionally, given that most pineapple farmers lie within the age bracket described as youthful, the existing policies on how to sustain youth in agriculture should develop models that concentrate on the horticultural export sector and the pineapple industry in particular.



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APPENDIX A

The Socio Economic Effects of Varietal Shifts in Demand for Pineapples on Smallholder Farmers: A Case Study of Nsawam-Adoagyiri Municipal Assembly

Dear Respondent,

This study is being conducted among smallholder pineapple farmers on the shift in demand of export variety of pineapples from Smooth Cayenne to MD2. The study is conducted with a focus on determining the level of adoption and constraints to MD2 production by smallholders. It also seeks to know what interventions could speed up adoption by addressing the underlying barriers.

This is in partial fulfillment of the requirements for a Master of Arts Degree in Development Studies. I solicit your kind consent and cooperation to assist me complete this questionnaire. All the responses you provide are and will remain confidential

IDENTITY NUMBER:

SECTION A: SOCIO-DEMOGRAPHIC PROFILE OF RESPONDENT

1. Sex
 - A. male
 - B. female
2. How old are you? (years)
 - A. 20 and below
 - B. 20 – 30
 - C. 31 – 50
 - D. 51 – 65
 - E. 66 and above
3. Marital status
 - A. Single
 - B. Married
 - C. Divorced
 - D. Widowed
 - E. Other
4. What is the occupation of your spouse?

5. What is your highest level of education?
 - A. Primary
 - B. Junior high school
 - C. Senior high school
 - D. Tertiary

6. What is your primary occupation (what kind of work do you do mainly)?
 - A. Farming
 - B. Artisan
 - C. Trade
 - D. Civil servant
 - E. Public servant
 - F. Other

7. (a) What is the size of your household?
- (b) Number of children
- (c) Number of children in school

8. What other economic activities apart from farming do you engage in?
.....

9. How many years of experience do you have in pineapple farming?

SECTION B: PRODUCTION

1. PINEAPPLE VARIETIES GROWN

10. Do you farm MD2?
 - Yes
 - No

11. When (what year) did you start cultivating MD2
.....

12. What variety of pineapple do you farm mainly?
 - A. MD2
 - B. Sugar Loaf
 - C. Smooth Cayenne
 - D. Other (please specify)

13. What other varieties do you cultivate?
- A. No other variety
 - B. MD2
 - C. Sugar Loaf
 - D. Smooth Cayenne
 - E. MD2 and Sugar Loaf
 - F. MD2 and Smooth Cayenne
 - G. Sugar Loaf and Smooth Cayenne
14. Which of the varieties of pineapple do you prefer to cultivate?
- A. MD2
 - B. Sugar Loaf
 - C. Smooth Cayenne

15. What are your reasons for this preference?

.....

.....

.....

.....

2. LAND

16. What is the size of your farm?

.....

17. What proportions of your farm is allocated to

- A. MD2
- B. Sugar Loaf
- C. Smooth Cayenne

18. How easy is it to acquire land for pineapple farming in this community?

- A. Very easy
- B. Easy
- C. Somewhat easy
- D. Difficult
- E. Very difficult

19. Do you have plans to lease more land for your MD2 production activities?

- A. Yes
- B. No

3. LABOUR

20. How many full time workers do you currently employ on your farm?
.....

21. How much do you pay them per day/week/month?

22. How many full time workers do you currently employ on your farm?
.....

23. How much do you pay them per day/week/month?.....

24. Which of these types of labour do you engage in your farm?

- A. Family
- B. Hired workers
- C. both

25. Does the cultivation of MD2 variety require more labour than other varieties?

- A. Yes
- B. No

4. INPUT REQUIREMENTS

SECTION C: PRODUCTION COSTS

26. What is the annual cost of production per acre of MD2?
.....

27. What is the annual cost of production per acre of Smooth Cayenne?
.....

28. What is the annual cost of production per acre of Sugar Loaf?
.....

SECTION D: MARKETING

29. Do you export your pineapple produce?

- A. Yes
- B. No

30. If yes, kindly state the countries you export to?
.....
.....
.....

31. Are you aware of some of the procedures/requirements involved in exporting pineapples to Europe/other international markets?

- A. Yes
- B. No

32. If yes, list them below

.....
.....
.....
.....

SECTION E: INCOME

33. What is your current annual sale from pineapple produce?

.....

34. What was your expected annual sale from pineapple?

.....

SECTION F: SOURCE OF SUPPORT

FINANCE IN PINEAPPLE FARMING

35. What are the main sources of funds for your MD2 farming activities?

- A. Savings
- B. Credit
- C. Friends and relations
- D. Others

36. If credit, what is the source?

- A. Banks
- B. Savings and Loans
- C. Credit unions
- D. Money lenders
- E. Others

37. Is this source sufficient to meet the needs of your operations?

- A. Yes
- B. No

TRAINING IN MD2 CULTIVATION

38. Farmers do not need any training in order to cultivate MD2.

- A. Strongly Agree
- B. Agree
- C. Somewhat agree
- D. Disagree

E. Strongly disagree

39. A) Have you received training in the cultivation of MD2?

A. Yes

B. No

B) If yes when was this? (list all trainings if more than one including organisation)

.....

.....

.....

.....

COOPERATIVES/FBOs

40. Are you a member of a cooperatives/farmer-based associations in this community?

A. Yes

B. No

41. What types of support services do you receive/benefits from your cooperative?

.....

.....

SECTION G: PROBLEMS

42. What have been the major constraints to producing the MD2?

.....

.....

.....

.....

SECTION H: SUGGESTION FOR IMPROVEMENT

43. What recommendations will you make for improving MD2 cultivation in Ghana?

.....

.....

.....

.....

APPENDIX B

INSTITUTIONAL INTERVIEW GUIDE

The Socio Economic Effects of Varietal Shifts in Demand for Pineapples on Smallholder Farmers: A Case Study of Nsawam-Adoagyiri Municipal Assembly

Dear Respondent,

This study is being conducted among smallholder pineapple farmers on the shift in demand of export variety of pineapples from Smooth Cayenne to MD2. The study is conducted with a focus on determining the level of adoption of the MD2 and analyzing the constraints to its adoption by smallholders and to know what interventions could speed up their adjustment by addressing the underlying barriers.

This is in partial fulfillment of the requirements for a Master of Arts Degree in Development Studies. I request your kind consent to assist me complete this questionnaire. All the responses you provide are and will remain confidential.

Name of Institution:.....
.....

Name of Officer Respondent:
.....
...

Officers Position:
.....
.....

SECTION A: SERVICES RENDERED BY INSTITUTION

1. What support services are provided by your institution to pineapple farmers?
.....
.....
.....
.....

.....
.....

SECTION B: SHIFT FROM SMOOTH CAYENNE TO MD2

2. When was the new variety introduced into Ghana?

.....
.....

3. Did you have prior knowledge of the MD2 before it was introduced into Ghana?

.....
.....
.....
.....

4. What challenges did the introduction of the new variety present to the farmers?

.....
.....
.....
.....

5. What advantages do other pineapple producers have over smallholders in production and export of MD2?

.....
.....
.....
.....
.....
.....
.....
.....

SECTION C: FARMER BASED ASSOCIATIONS

6. How many Farmer Based Associations/cooperatives exist in the study area

.....
.....
7. What factors in your opinion led to the collapse of the Farmapine Ghana Ltd?
.....
.....
.....
.....

8. Do you publish manuals for use by smallholders in MD2 cultivation?
.....
.....

9. In your opinion, how relevant are the following factors to adjustment by smallholder farmers to the change from Smooth Cayenne to MD2? Please explain.

Size of Land
.....
.....

Access to finance
.....
.....

Knowledge
.....
.....
.....

SECTION D: CHALLENGES AND RECOMMENDATIONS

10. What are the current challenges in the pineapple sector?
.....
.....
.....
.....
.....
.....

11. What constraints are faced by your institution in rendering services to pineapple farmers?
.....
.....
.....

.....
.....
.....

12. What policies govern the production and marketing of pineapples?

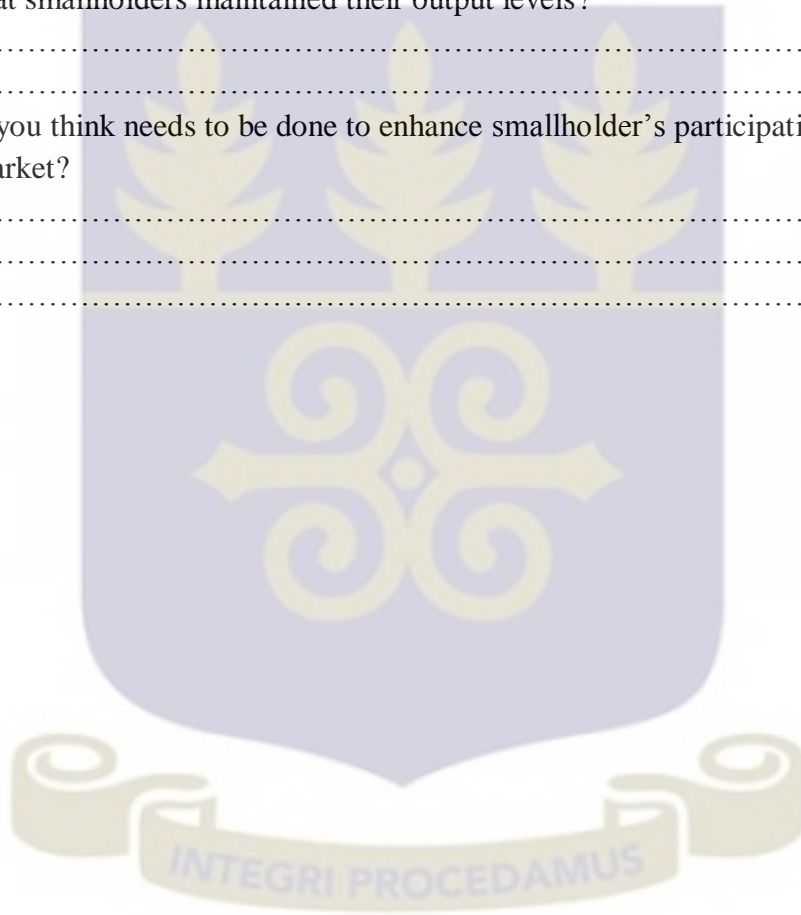
.....
.....

13. What interventions were implemented by your institution and other stake-holders to ensure that smallholders maintained their output levels?

.....
.....

What do you think needs to be done to enhance smallholder's participation in the MD2 export market?

.....
.....
.....



APPENDIX C

PINEAPPLE EXPORTS

YEAR	QTY: KGS	VALUE: US \$
1990	9,440,220	3,829,878
1991	10,674,604	5,065,298
1992	9,753,890	4,387,741
1993	13,156,990	5,177,864
1994	14,954,120	5,261,880
1995	15,763,730	5,629,762
1996	27,602,830	10,986,886
1997	25,123,579	9,631,469
1998	21,940,700	8,769,405
1999	33,440,400	13,055,416
2000	28,511,600	11,853,128
2001	35,173,900	13,316,459
2002	46,391,300	15,519,989
2003	45,145,400	14,378,037
2004	71,804,617	22,068,649
2005	46,694,534	12,784,322
2006	60,751,084	19,086,134
2007	40,456,246	13,474,551
2008	35,134,351	11,842,250
2009	31,566,665	10,628,229
2010	40,141,400	13,554,621
2011	45,057,147	16,972,432
2012	41,211,912	16,815,539
2013	40,095,385	19,208,877
TOTAL	<u>789,986,604</u>	<u>283,298,816</u>

Source: GEPA, June 2015