

THE CONTRIBUTION OF NON-FARM INCOME TO AGRICULTURE

The Case of Pineapple Production in Akuapem South
Municipality

KNUST
BY

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DECLARATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any degree of the University, except where due acknowledgement has been made in the text.

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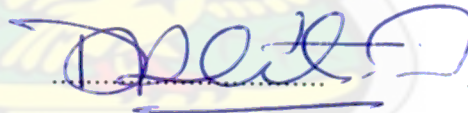
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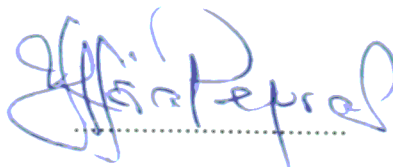
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DEDICATION

Dedicated to my adorable parents; mother, Rehema O. Millanzi and my father, the late Oswald Nganyanyuka. May God rest his soul in eternal peace. Amen!!

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Notwithstanding the numerous contributions, especially those not mentioned here, the author takes full responsibility for any shortcomings of the study report.

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ABSTRACT

This study investigates the contribution of non-farm income to agricultural activities; specifically examining the use of non-farm income in financing the purchase of farm inputs for pineapple production in the Akuapem South Municipality. The study focuses on exploring the determinants of non-farm income, the share of non-farm income within farming households, the factors determining its use in farming activities and recommends the measures to be undertaken to improve the access to investment capital for farming activities, including the use of non-farm income.

The study utilizes survey data collected from a sample of 92 farmers from three settlements within the municipality, namely Fotobi, Amanfro and Pokromu. A stepwise multiple regression model is used to estimate input use in the pineapple production and fertilizer is employed as a proxy.

The results of the study indicate that farmers' own cash is the most important source of capital financing. Furthermore, the findings of the study show that non-farm income is associated with an increase of fertilizer use and thus suggesting the use of non-farm income in the purchase of farm inputs within households engaged in non-farm activities. High levels of education and formal employment have also been found to determine the level of non-farm income. On the other hand, distance from the town centers influences the cost of production in the pineapple farming.

Following the findings of the study, ways to improve liquidity of small scale farmers and the entire farming sector are proposed. These include improving access of farmers to affordable credit financial schemes and increase market access and competitiveness of the non-farm activities. On the other hand, as non-agricultural income has become more substantial among farming households, a new perspective on the linkages between farm and non-farm economy need to be created. This study proposes inclusion of non-farm activities in the current agricultural extension services. In order to sustain these measures, keeping of updated statistics on non-farm and farm sectors; and increased research on the linkages between non-farm and farm sectors are also recommended.

The study concludes that non-farm income relaxes liquidity constraints in farming households; however, well functioning credit facilities for small scale farmers are required for improving investment capacities, thus ensuring better and sustained income of the farmers and the development of the nation as a whole.

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LIST OF ACRONYMS

GSS	Ghana Statistical Service
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
MADU	Municipal Agricultural Development Unit
MD2	Del Monte Gold 2
RNF	Rural Non-Farm
RNFE	Rural Non-Farm Economy
RoG	Republic of Ghana
SPSS	Statistical Package for Social Scientists
USAID	United States Agency for International Development



CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 Introduction

The role of agricultural credit to rural poor farmers in improving productivity does not require an overemphasis. Agricultural credit enhances productivity and promotes standard of living by breaking the vicious cycle of poverty of small scale farmers (Adebayo and Adeola, 2008). However, this remains a nightmare to many farmers in rural Africa. Whilst there is wide and growing experience with micro-credit, the vast majority of rural people do not have access to credit schemes. In Ghana, high interest rates and transaction costs, perceived risky nature of agriculture and lack of documented assets for use as collateral constitutes the major hindrances to the availability and access of financial services to rural farmers (RoG, 2002).

In Africa, non-farm income is usually the main source of cash, or is a "collateral substitute" used to obtain credit (Reardon, 1998). Access to non-farm income is crucial for purchasing farm inputs, for example seeds, fertilizer and animal traction equipment. This can create a dynamic effect, as cash from the non-farm sector is reinvested in farm equipment, thus creating capital that substitutes for labour and reduces farm labour demand (*ibid*).

To a great extent, the literature on non-farm income has concentrated on quantifying the share of non-farm in total income and identifying the factors driving households to diversify outside of agriculture (Reardon, 1994; Haggblade et al., 1989; Islam, 1997; Ellis, 1998). On the other hand, research on non-farm income has also focused in examining equity and food security implications (Smith et al., 2001; Tiffen & Mortimore, 1992). These studies have shown the range of roles played by non-farm activities in the household economy. Non-farm activities can be an important source of cash income, which can potentially improve farm productivity if it is used to finance farm input purchase or longer term capital investment. Non-farm activities can also provide income during periods other than harvest time; help reduce the variance of overall household income in case of imperfect covariance between farm and non-farm income; and help mitigate risk and improve food security by allowing the household to buy food in case of food production shortfall, thus smoothing income inter-annually. If opportunities to earn non-farm income are weak where agriculture is weak, income from migration and other activities that do not depend on agriculture will be especially important to finance farm investments or to compensate for poor harvests (Reardon, 1994; Reardon, 1996).

Good prospects on non-farm activities should not jeopardize the importance of agriculture – it is essential for the two to complement each other. Since most rural non-farm activities in Africa are linked to the farm sector (Haggblade et al., 1987; Reardon et al., 1998), expanding non-farm income will be difficult if agriculture is stagnant. Also, ignoring agriculture would conflict with the goal of many African governments to improve food security and overall growth by stimulating productivity enhancing investments in agriculture (e.g., inputs to livestock husbandry; chemical inputs to cropping and improved seed; equipment purchase; and land improvements such as irrigation, bunds, and terraces) in suitable agro-climatic zones (Reardon et al., 1994).

Shrinking government budgets and recent development adjustments which have led to trimming down government financial responsibility, however, have brought large cuts in formal credit and input supply programs and in subsidies for fertilizer, credit, and animal traction equipment. Moreover, natural resources conservation measures are increasingly urgent, but are difficult to finance through credit because their impact on household income is uncertain and land improvements do not serve well as collateral (Adebayo and Adeola, 2008). Therefore, an important agricultural productivity and food security issue is how to encourage farm households to reinvest non-farm earnings into farm input acquisition and capital formation.

1.2 Problem Statement

Agriculture is an important sector in Akuapem South Municipal economy, employing 60% of its population¹ and contributes about 60% of the Ghana's pineapple exports². Lack of capital is one of the most enduring challenges within pineapple farmers irrespective of the great rewards and importance of the pineapple production to the farmers and the Akuapem Municipal as a whole. A prominent obstacle is that pineapple farmers are typically credit-constrained, i.e. unable to borrow to finance productive agricultural investments. Lack of credit is one of the key constraints in agricultural production in Ghana. The Bank of Ghana Statistical Bulletin reported that the share of agriculture and forestry in the outstanding credit balance of money deposit banks (MDBs) in December 2005 and 2006 were 7% and 5% respectively. This is an indication of a low and deteriorating level of credit supply to the agricultural sector (RoG, 2007).

¹ Medium Term Development Plan for Akuapem South Municipality 2009 - 2013

² Cudjoe et al., 2002

The observed credit constraints might severely limit agricultural production and productivity growth. In the absence of functioning credit institutions, investment linkages between non-farm activities and farm sector are very important. Access to non-farm income might relax farmers' liquidity constraint and play a role in financing agricultural production.

A number of studies have been carried out to explore the relationship between farm and non-farm activities. Mathenge and Tschirley (2007), summarize the literatures as follows:-

A few of the earlier studies examining the interaction between farm and off-farm sectors in Africa have been empirical in nature (Collier and Lal, 1984; Hagghlade et al., 1989; Savadogo et al., 1994; Clay et al., 1998). These studies, though looking at different aspects of farm investments, have however not given a clear indication of the exact direction of off-farm work effects on farm investment. The study by Savadogo et al. (1994) concludes that non-farm earnings do positively influence animal traction (AT) adoption. While Clay et al. (1998) find a positive effect of non-cropping income on land conservation investments; they find insignificant effects on use of chemical inputs like fertilizer. Reardon et al. (1994), in laying down a capital market perspective on this subject, argue that the evidence on the interaction between farm and off-farm sectors is mixed and points to the lack of studies in Africa that explore the 'direction and nature of reinvestment' into the farm. A similar finding was later echoed by Clay et al. (1998)

(Mathenge, M. & Tschirley, D., 2007:2).

A recent study by Al-Hassan, R. and Egyir, I. (2002), which examined the linkages between the cassava market and the rest of the Ghanaian economy, found that there are substantial forward linkages due to necessity for processing and transportation. On the other hand, the study discovered that cassava production is not backward³ linkage friendly as the technology applied in production does not generate demand for inputs other than labour. This calls for an understanding of backward linkages and this study caters for that knowledge gap by looking into the possibility of how outputs from non-farm activities can be utilized as farm inputs.

³ Backward production linkages refer to linkages from the farm to the part of the non-farm sector that provides inputs for agricultural production, for example agrochemicals. Forward production linkages refer to the part of the non-farm sector that uses agricultural output as an input (Davis et al., 2002)

Researching in Kenya, Mathenge and Tschirley (2007) established that there was a possibility to use off-farm earnings for input purchase for maize production especially for farmers without forms of credit. They also found that engagement in off-farm work may allow some partial intensification but may also compete with farming at higher levels. Nonetheless, the study did not answer the question of gender as it would also be important to understand how the household member earning the income affects its reinvestment into agriculture.

While the modern literature (Davis et al., 2002; Stamoulis et al., 1998) offers many interesting case studies of farm/non-farm linkages, there remains a lack of empirical studies at household level on whether and how non-farm income capitalizes agriculture that might inform a deeper understanding of the driving forces behind any non-farm income reinvestment behaviour among rural farmers. Most of that literature also fails to make clear whether non-farm earnings are reinvested in agriculture through purchase of farm capital, commercialization or other non-income generating activities e.g., education, health which too may have an impact on farming and non-farm activities but in the long-run. This study offers such analysis, drawing on data from households engaged in pineapple production in Akuapem South district.

1.3 Research Questions

- What are the key determinants of farm and non-farm income to pineapple farming households?
- What is the share of non-farm income within pineapple farmers in the study area?
- What factors affect the decision to use non-farm income in financing agriculture?
- How can the access to agricultural finance be enhanced?

1.4 Research Hypothesis

The construction of the hypothesis to this study employs three considerations – as a suggested answer to the problem; as an assumption made to provide a guide to the problem under investigation; and as a restricted focus to direct attention in the observation stages of the study (Ranjit, 1999; Kumekpor, 2002).

The principal aim of the study is to analyse the contribution of non-farm income on agricultural growth and to assess its potential as a tool to finance farm investments. It is based on the central proposition that non-farm income can be utilized to finance agricultural

investments when formal capital financing structures are not able to cope with the demand, especially of small scale farmers in rural areas

In view of the above considerations, the following research hypothesis has been formulated

- In the absence of effective credit schemes to finance agriculture, non-farm income is the potential source of cash capital for farm investments

1.5 Research Objectives

The objective of this study is to analyse the contribution of non-farm income as a source of cash capital for farm investment. Specifically, the objectives of the study include the following -

- To establish the key determinants of farm and non-farm income to pineapple farming households
- To ascertain the share of non-farm income within pineapple farmers in the study area
- To determine the factors affecting the decision to use non-farm income in financing agriculture
- To provide recommendations that will enhance the access to agricultural finance

1.6 Scope

The study is geographically limited to Akuapem South district. Contextually, the study is limited to the analysis of the investment behaviours of non-farm income farmers engaged with pineapple cultivation.

The study adopts the definition of "non-farm" from Gordon & Craig (2001), which refers to those activities that are not primary agriculture or forestry or fisheries. However, non-farm does include trade or processing of agricultural products (even if, in the case of micro-processing activities, they take place on the farm). These may include manufacturing activities, mining and quarrying, transport, trade and services. In addition, the seasonal and contractual jobs unconnected with farming as such, available within the study area or a nearby town are a part of non-farm in this study.

1.7 Significance of the Research

Pineapple production is one of the important economic activities in Akuapem South District. But the full utilization of the sector is hindered by many problems, the serious one being lack of organised credit to facilitate purchase of farm inputs especially for pineapple production.

That means the development of pineapple production and processing will depend much on, among other factors, the availability of enough cash income to farmers to purchase farm inputs. The study contributes to such achievement by providing knowledge and recommendations which will assist pineapple farmers in overcoming capital constraints when making farm investments. This report thus contributes to literature on the possible impact of promoting smallholder agriculture in Ghana.

Moreover, this study supports Ghana's efforts to diversify its export base and overall economy through improvement of non-traditional crops like pineapple. This study is of great importance to governmental and non-governmental agencies, agricultural institutions, agro-industries (fruit processing industries) and international agencies supporting the production and export of horticultural products in Ghana. Donor organization and aid agencies that are supporting Ghana's agricultural diversification program and also working to improve the livelihood of rural dwellers will gain a lot of insight from this study, especially in the move toward promotion of non-traditional crops.

1.8 Limitations of the Study

As applied to other studies in developing countries that are meant to capture peoples' income, this study experienced difficulties in obtaining reliable data on non-farm employment and income of pineapple farmer households, specifically on revenues derived from both farm and non-farm work. This is mainly caused by lack of record keeping on income and expenditure. Conversely, people are rather disinclined to disclose the amount of money they earn and sometimes the same may apply to the respective sources of income they have. Therefore, this study employed household daily expenditure pattern as a proxy of household income. Some pineapple farmers had difficulties in recalling the exact prices and quantities of products consumed within the immediate past month preceding the interview date. Thus the prices and expenditure figures collected may not be very accurate.

On the other hand, income and poverty indices for the municipality could not be achieved. This would have allowed execution of a comparative analysis between income levels of pineapple farmers and all other citizens of the municipality. Alternatively, World Bank poverty indices were used for the study (poverty line of \$1 per person per day).

Lastly, the author experienced difficulties to communicate with the farmers as not all the people in the local areas are fully conversant in English, especially the older generation. The use of research assistants who have relevant ethnic and local backgrounds avoided language

problems. However, since the questionnaires were in English, translation problems from any of the local languages into English may have occurred. Still, the effects resulting from translation problems are not significant to affect the quality of study findings.

1.9 Organisation of the Report

In addition to this introductory chapter, the rest of the report is organized into other four chapters. The next chapter briefly outlines the literature review on non-farm economy. It provides specifically the definition of concepts and terms applied in the study. In addition, determinants of participating in non-farm activities and non-farm income are both discussed following the definition of concepts. Chapter two ends by providing the analytical approach used (explaining farm level investment in terms of the incentives facing farm households and the capacity of households to undertake investments).

Chapter three gives explicit information on the methodology used in the study including the design of the research strategy, sample selection and data collection. Chapter four presents the analysis and discussion of the field data from the research study area. It contains an introduction to the study area, descriptive information of the interviewed households and the analysis of data collected from them. A general description of the pineapple production in the Ghanaian farming context is also presented, with particular attention being given to levels of input investments and variables reflecting incentives and capacity to invest.

Chapter five provides an analysis of farm input use in the study area using regression analysis. The last chapter offers a summary of findings, conclusion and recommendations on how to enhance the use of non-farm income to finance agriculture.

CHAPTER TWO

THEORETICAL FRAMEWORK OF NON-FARM INCOME

2.1 Introduction

Based on the definition of the research problem, the study objectives and the identified research issue, it is necessary to understand the concepts and importance of non-farm economy as well the detailed literature on the non-farm income itself.

This chapter addresses the above issues by focusing on two key questions. First, what are the key determinants of farm and non-farm income in farmers' households? However, as a prelude to answering this question, determinants of farm household's decision to diversify its income sources into rural non-farm activities are covered in advance. Second, what factors affect the decision to use non-farm income in financing agriculture? Before going into attempting these questions, the following section presents the definitions of key terms used in this study.

2.2 Definition of Terms

2.2.1 Non-farm Income

Broadly speaking, non-farm income refers to the income generated from activities other than farming. In that case, it would be very crucial to clarify what a "non-farm" activity is. As noted earlier⁴, Gordon and Craig (2001) define 'non-farm' as activities that are not primary agriculture or forestry or fisheries. They also add that non-farm include trade or processing of agricultural products (even if, in the case of micro-processing activities, they take place on the farm). Non-farm activities would then include activities like handicrafts, mining and quarrying, household and non-household manufacturing, processing, repairs, construction, trade, transport and communication, community and personal services. In addition, Gordon and Craig (2001) provide examples from sub-Saharan Africa to include beer brewing, fish processing, edible oil processing, crochet, pottery, rice husking, groundnut shelling, preparation and sale of prepared foods, and other small trading activities that can be done in the home or nearby. Therefore, non-farm income can then be understood as the income generated from such activities.

⁴ The study adopts Gordon and Craig (2001) definition of non-farm as noted in "research scope" section.

Usually the term 'non-farm' is confused with 'off-farm' but that should not be the case for this study as the latter refers to activities carried out away from the household's own farm. It can be seen that the term off-farm focuses more on the locality of household's activities rather than the distinction of primary agricultural activities from the other as applied to 'non-farm'.

Sharad (2006) identifies another source of confusion as whether rural non-farm employment refers to employment anywhere by rural households, or is solely confined to rurally located employment. Conversely, Saith (1992) affirms that the rural sector should include all economic activities which display sufficiently strong rural linkages, irrespective of whether they are located in designated rural areas or not. This study adopts the works of Saith (1992) and Sharad (2006), hence rural non-farm income will also include that income generated by non-farm workers who have worked outside the villages but exhibited linkage with the rural areas activities.

2.2.2 Farm Income

Barret et al., (2001) argues that the most basic classification of activities follows the sectoral distinctions of national accounting systems: primary (agriculture, mining, and other extractive), secondary (manufacturing), and tertiary (services). This leads directly to the distinction between "agricultural" or "farm" income (derived from the production or gathering of unprocessed crops or livestock or forest or fish products from natural resources) and "non-agricultural" or "non-farm" income (all other sources of income, including from processing, transport or trading of unprocessed agricultural, forest and fish products). So sectoral farm/non-farm assignment concerns only the nature of the product and the types of factors used in the production process. It does not matter where the activity takes place (in the domicile, on the farm premises, in town, abroad), at what scale (in a huge factory or by a single person), with what technology, or whether the participant earns profit or labour income (wages or salary) from the activity. Perhaps the most common error is classifying agricultural wage employment income as non-farm rather than as agricultural (sector) and off-farm (location) income.

In this study, adopting the work of Hertz (2007), farm income refers to total agricultural income which can be broken down into (a) the estimated value of crops, livestock, and animal products sold; (b) the estimated value of crops (but not animal products) that were paid-in-kind for rented land or hired labour, given to friends or relatives, fed to animals,

stored, or consumed by the household; and (c) the value of payments received for land rented to, or otherwise farmed by, other parties.

2.2.3 Farm Households

A household can be defined in various ways, the common ones include members who have a common source of major income, they share a common source of food; and they sleep under the same roof or within the same compound. For that matter, this section provides a definition of household adopted for this study and acts as the scope.

The study adopts the Ghana Statistical Service (GSS) definition of a household as it captures most of the household typologies in the study area. GSS defines a household as - a person or group of persons living together in the same house or compound, sharing the same housekeeping arrangements and being catered for as one unit (GSS, 2005). GSS further classifies households and group them on the basis of varied living arrangements on cultural and ethnic lines which give rise to the following forms of households (*ibid*):

- A man, his wife and children with other relative(s) or house-help living with them;
- In large family houses with more than two generations of people, a common catering arrangement is employed as the underlying principle in breaking people up into households when all other activities are carried out as a unit;
- A lodger who sleeps and eats at least one meal a day with the household is considered a member of that household;
- Two or more unrelated persons living together in one flat or in one room are considered as constituting a household only if they have a common catering arrangement.

Subsequently, farm households, are defined as those households (falling under the definition given above) who report that they own or rent farm land, at least some of which was devoted to pineapple production (i.e. planted).

2.3 Determinants of Participation in Non-farm Activities

In order to establish the key determinants of farm and non-farm income in farmers' households, there is a need to understand the reasons that lead to diversification among them. There are two main driving forces that characterise livelihood diversification: the distress-push and demand pull (Ho, 1986; Haggblade et al., 2006; Sharad, 2006). Craig and Gordon (2001) define distress-push as the situation when the poor are driven to seek non-farm

employment for want of adequate on-farm opportunities; while the demand pull refers to when rural people are able to respond to new opportunities. In the former situation, large numbers may be drawn into poorly remunerated low entry barrier activities, whilst the latter are more likely to offer a route to improved livelihoods (*ibid*).

According to Sharad (2006), push factors emphasize the limited capacity of agriculture to absorb labour, given limited arable land. Therefore, in a scenario of increasing population density and a reduction of the size of landholding, families see themselves having the necessity to find alternatives to complement their agrarian income. On the other hand, the pull factors are related to the availability of attractive and more profitable opportunities of work in the non-farm sector. He also argues that the relative importance of these factors depends partly on the state of economic development and the intensity of the population pressure by land use. Table 2.1 below shows the list of push and pull factors of rural non-farm employment diversification.

Table 2.1: The Push and Pull Factors of Rural Non-Farm Employment Diversification

Push Factors	Pull Factors
<ul style="list-style-type: none"> • Population growth • Increasing scarcity of arable land and decreasing access to fertile land • Declining farm productivity • Declining returns from farming • Lack of access to farm input markets • Decline of the natural resource base • Temporary events and shocks • Absence or lack of access to rural financial markets 	<ul style="list-style-type: none"> • Higher return on labour in the rural non-farm employment • Higher return in investments in the rural non-farm employment • Lower risk of rural non-farm employment to on-farm activities • Generation of cash in order to meet household objectives • Economic opportunities, often associated with social advantages offered in urban centres and outside of the region or country

Source: Davis and Pearce (2000), adapted from Sharad, R. (2006).

At a general level, a household decision to participate in non-farm rural activities depends on: 1) the incentives that it faces when carrying out the farming activities. 2) The capacity of the family to undertake the rural non-farm activities, determined by its level of education, income, access to assets, credit etc (Reardon et. al., 1998; Ellis, 1999). Non-farm income is crucial to rural farm households, because it helps to smooth the flow of farm income over the cropping cycle and it stabilizes income by spreading risk through diversification (Lanjouw and Lanjouw, 1995). For smallholders in areas where agricultural output varies greatly over a year or years because of unpredictable weather conditions, the seasonal smoothing and risk

diversification obtained through non-farm income sources can be very important (Kimenye, 2002).

2.4 Determinants of Non-Farm Income

The motives for rural household income diversification into the non-farm sector were explored as a function of related incentives and capacity in the section 2.3 above (determinants of participating in non-farm activities). This section emphasizes several factors related to empirical evidence on incentives and capacity as an introduction to discussing the determinants of non-farm income within households.

While reliance on non-farm income diversification is widespread in rural Africa, not all households enjoy equal access to attractive non-farm opportunities. Reardon's (1997) review of the available data in Africa found a strong positive relation between non-farm income share and total household income, and therefore an even more pronounced relationship between the level of non-farm income and total income. Incentives are largely driven by the profitability of an activity, which will depend among other things on the macroeconomic framework, output and input prices and the risk associated with the activity. The capacity to invest in non-farm activities will be determined by the vector of assets – natural, human, physical, financial, social and public - owned by the individual, household or community. Box 2.1 below explains the different types of capital assets. These categories provide an appropriate way in which to structure the evidence on livelihood choices and outcomes.

Box 2.1: Capital Assets

Natural Capital: The natural resource stocks from which resource flows useful for livelihoods are derived (e.g., land, water, wildlife, biodiversity, environmental resources).

Social Capital: The social resources (e.g., networks, membership of groups, relationships of trust, access to wider institutions of society) upon which people draw in pursuit of livelihoods.

Human Capital: The skills, knowledge, ability to labour and good health important to the ability to pursue different livelihood strategies.

Physical Capital: The basic infrastructure (e.g., transport, shelter, water, energy and communications) and the production equipment and means which enable people to pursue their livelihoods.

Financial Capital: The financial resources which are available to people (whether savings, supplies of credit or regular remittances or pensions) and which provide them with different livelihood options.

Source: Carney (1998), adapted from Scoones (1998), Adopted from Gordon and Craig (2001).

2.4.1 Human Capital

Human capital comprises the skills, knowledge, ability to labour and good health important to the ability to pursue different livelihood strategies.

2.4.1.1 Education

The existence of a positive link between access to, and level of, education on one hand and involvement in the more remunerative non-farm activities on the other is virtually undisputed in the literature. Barret et al. (2001) found that educational attainment is one of the most important determinants of non-farm earnings, especially in more remunerative salaried and skilled employment. Just as in high-paying professions (e.g., law, medicine) in post-industrial countries, skills and educational attainment serve as substantial entry barriers to high-paying non-farm employment or self-employment in rural Africa. In Kenya, Marenja et al. (2003) observed that early investments in education led to a flow of non-farm wage earnings which

in turn financed investments in agriculture and resulted in a diversified and growing household asset and income trajectory over time.

Reardon (1997) assert that better-educated members of rural populations have better access to any non-farm employment on offer, and are also more likely to establish their own non-farm businesses. Better educated individuals are more likely to migrate to take up employment opportunities in other areas, as they have greater chances of success than their less-educated or uneducated counterparts. In addition, Haggblade (2006) argues that educated households who are likely to be skilled will have easy access to most lucrative opportunities in the rural non-farm economy. As a result, they earn returns many times greater than do poor households. Conversely, asset-poor households remain confined to the low-return segment of the rural non-farm economy.

2.4.1.2 Health

The health status of household members has a significant importance on their participation in income-generating activities (Gordon and Craig, 2001). While this general rule applies to health in its broadest sense, at the present time in parts of sub-Saharan Africa concerns about health tend inevitably to focus on HIV/AIDS. White and Robinson (2000) outline the considerable extent to which HIV/AIDS has impacted on household livelihoods in sub-Saharan Africa. Many of their conclusions might be equally applicable to health problems other than AIDS (*ibid*).

Islam (1997) discusses the importance of investment in health more broadly, which results in reduction in morbidity and improved nutrition, and thereby increases labour productivity, in both farm and non-farm sectors. Households which have limited access to health facilities, whether for reasons of location or affordability, inevitably suffer the consequences in loss of potentially productive time. In their research in Uganda, Smith et al. (2001) note that the rural non-farm (RNF) activities of the poor are often more demanding physically. Respondents recognized that good health was important to their ability to earn RNF income.

2.4.1.3 Age

Household age composition (usually assessed in the form of dependency ratios) and education levels are an often-cited measure of human capital used empirically in explaining the degree of participation across a wide range of income groups in the rural non-farm economy. An example of this has been tendered by Abdulai and Delgado (1999) who found

that the probability of participation in non-farm work increases with age up to 33 years for men and 30 years for women, and is thereafter inversely related to age.

Smith (2000) notes that it is generally the younger household members who migrate in search of non-farm, income-earning opportunities, and points out that age is a factor synonymous with moving into the non-farm sector more broadly. Bryceson (1999) considers that both gender barriers and barriers to youth involvement in the non-farm sector are declining. She points out that through the expansion of the service economy, youth have been afforded cash-earning opportunities that were previously lacking (Bryceson, 1999; cited in Davis et al., 2001). However, in Chile, a different case is observed by Kuiper et al., (2006), who reported that age does not appear to be a strong determinant of non-farm employment, with the exception of the expected lower probability for children under 15 years.

2.4.2 Social Capital

Social capital comprises the social resources (e.g., networks, membership of groups, relationships of trust, access to wider institutions of society) upon which people draw in pursuit of livelihoods.

2.4.2.1 Gender

Newman and Canagarajah (1999) found in both Ghana and Uganda that female participation in non-farm work is increasing. During the periods studied, their findings were that poverty rates in both countries fell most rapidly among female household heads engaged in non-farm work. Their research considered sub-groups within the overall group of women, including female heads of households, female spouses and 'other females'. Interesting differences were found in the extent of involvement of those sub-groups in non-farm activities. Working females with the greatest responsibility for family welfare, i.e. heads of household and spouses, were more active in non-farm activities than 'other women'. Women in both Uganda and Ghana work primarily in agriculture, but among secondary activities, women were more likely to be involved in non-farm work than men. Newman and Canagarajah (1999) also found that women in Ghana and Uganda earned substantially less than men.

In relation to the gender profile of migrant labour, Smith (2000) suggests that although historically the majority of migrants were men, this varies within and between regions, and over time, depending on the types of employment available for women and men in rural and urban economies. Women's household responsibilities are more likely to prevent them from

spending extended periods away from the home. Abdulai and Delgado (1999) confirm these findings, and also dis-aggregate by gender and show that the education-effect on non-farm earnings and participation is even higher for women than for men in Ghana.

2.4.2.2 Networks

Individuals and households with better social networks have greater opportunities in the non-farm sector. Once again, this discriminates against the poorest, who suffer a lack of (useful) social networks and are, therefore, unable to capitalize on informal opportunities and remain excluded from formal support systems (Smith, 2000).

Tovo (1991) found that the women she interviewed in Tanzania had made some important contacts through training or extension in which they were involved. These contacts helped them to obtain scarce inputs for their businesses and to find customers.

2.4.2.3 Family size and structure

The structure of rural families plays a significant part in determining access by individuals to non-farm opportunities. Reardon (1997) observes that family size and structure affect the ability of a household to supply labour to the non-farm sector. Larger families and those with multiple conjugal units supply more labour to the RNF sector, as sufficient family members remain in the home or on the farm to meet labour needs for subsistence. Smith (2000) applies the same logic to migration opportunities, observing that extended family structure influences access to migration. In this case, the longer absences involved make it all the more important than those remaining in the home are able to supply the basic labour required for subsistence.

2.4.3 Physical Capital

Physical capital includes hard infrastructure (e.g., roads, telecommunications, power and water), as well as production equipment and buildings that are more likely to be individually owned. Gordon and Craig (2001) observes a consensus in the literature on the critical role of infrastructure in the development of the RNF economy. Nearly all the studies find that infrastructure is an important determinant of RNF economy. For example, where infrastructure is good, transport costs are low, so effective output prices of non-farm products are higher. Lanjouw (1999) established the constrained access of rural enterprises to power and telecommunications, and the high transaction costs caused by inadequate roads. Moreover, there is ample evidence to show that banks, marketing and service centres, training

centres and other support activities tend to locate where infrastructure is adequate (Binswanger et al., 1989).

Proximity to towns and access to infrastructure such as roads, electricity and water are crucial capacity determinants of rural non-farm employment and income levels; a number of Latin American studies showing this are reviewed in Reardon, Berdegue and Escobar (2001), African studies, in Barrett, Reardon, and Webb (2001), and South Asian studies (Hossain 2004 and Lanjouw and Shariff 2002). Greater physical access to market likewise consistently improves non-farm earnings opportunities, as shown in Uganda by Smith et al. and in Tanzania by Lanjouw et al. It nonetheless remains difficult to disentangle regional fixed effects associated with agro-ecological, cultural, historical, and other spatial attributes from market-access measures.

2.4.4 Financial Capital

One of the principal problems for rural households and individuals wishing to start a business, whether in the farm or non-farm sector, is access to capital or credit. Without start-up funds, or with only little cash available for investment, households are limited to a small number of activities which yield poor returns, partly because of the proliferation of similar low entry barrier enterprise. In the same way, individuals with little or no personal savings may find themselves unable to meet the 'start-up' costs of migration.

Islam (1997) cites the results of a four-country study in Africa (Bagachwa and Stewart, 1992) where 30–84% of rural industries complained of poor access to credit – next in importance to lack of infrastructure inputs and markets. Land is often required as loan collateral and this can exacerbate income inequality associated with RNF activity.

Reardon (1997) observes that own-cash sources, or financing from moneylenders, are an important determinant of capacity to start non-farm businesses or to obtain employment. Horn et al. (2000), however, found that women in northern Mozambique generally chose not to borrow from family members, due to the potential problems if they were unable to repay the loan (Gordon and Craig, 2001).

Off-farm employment opportunities and non-farm economic activities have often been observed to be biased to relatively richer and more educated households (Dercon and Krishnan, 1996; Abdulai and CroleRees, 2001; Barret et al., 2000). However, a different

aspect of influence of income is highlighted by Maertens and Swinnen (2008), who report that in Senegal, employment opportunities in the horticulture export agro-industry was relatively well accessible for poorer and less educated households. To justify the variation, Maertens established that the condition was a result of the existence of farm-non-farm investment linkages from horticulture export agro-industry (*ibid*).

2.4.5 Natural Capital

Natural capital comprises the natural resources, such as water, land and common property resources that are so central to rural livelihoods. These resources provide a foundation for farming and also for much of the RNF economy. Gordon and Craig (2001) identify the influence of natural capital on non-farm activities to include the following:

- through forward and backward linkages between agriculture, post harvest activities and agricultural inputs and services;
- through consumption multipliers, that magnify the effects of growth (or decline) in the farm economy;
- through linked labour markets for farm and non-farm activities and hence, transmission of higher wages in one sector to the other;
- through correlation between household access to land and other wealth-enhancing assets such as education, contacts, finance;
- through the knock-on effects of risk and vulnerability associated with certain natural resource-based activities on the choice of RNF activities also pursued.

Many studies point to positive spill-over effects from the farm sector to the rural non-farm economy (e.g., Delgado et al., 1998; Woldehana, 2002; Anriquez and Stamoulis, 2007). The effects emerge through backward and forward production linkages from agriculture to rural input suppliers and agro-processors, and through expenditure linkages as farm incomes are spent on locally produced goods and services or invested in non-farm activities (Davis et al., 2002).

There would be two clusters - of low-return and high-return activities, which are engaged in by poor and affluent households, respectively. Moreover, if distress-push diversification dominates, we would expect poorer households to engage more in diversification than others. In the case of predominantly demand-pull diversification, we would expect that higher income households would engage more in non-agricultural diversification than the poorest

households. The two extremes of contextual factors will result in differing rural non-farm employment entry motivations, access capabilities and livelihood trajectories.

It is to be expected that distress-push diversification would characterise households in a rural population, which are less endowed, or which have lower incomes. These households will enter non-agricultural activities that are less rewarding (e.g., in terms of labour productivity) than demand-pull diversification activities, since the higher-return activities typically require higher investment that only the richer households can afford. For instance, poorer households will obtain a larger share of their non-agricultural income from wage employment, while richer households have better opportunities to enter non-agricultural activities in their own independent enterprises (Sharad, 2006).

Unequal access to RNF income to a large extent echoes inequality in access to land, an effect that is mediated through both capital and labour markets. Thus, those with better access to land (or access to better land) are likely to be wealthier and more educated. They are also likely to be better connected. Education and contacts improve prospects in the RNF labour market considerably.

Similarly, where land is important as loan collateral it affects access to start-up capital for non-farm enterprise. Moreover, Reardon et al. (2000) provide examples of where steady pay in the non-farm sector may serve as loan collateral for agricultural loans in the informal and formal markets, further reinforcing the effects of relative wealth in one sector on wealth in the other.

Inequality in non-farm incomes may exacerbate inequality in land endowments, where those with non-farm incomes are able to purchase land sold under distress conditions. Examples of this process in Africa have been documented by Francis and Hoddinott (1993) (for Kenya) and Andre and Platteau (1998) (for Rwanda) (Gordon and Craig, 2001).

2.5 Farm/Non-farm linkages

The concept of farm/non-farm linkages is most commonly used to describe the relation between the farm and non-farm sectors. The literature⁵ identifies two major types of farm/non-farm linkages: production and expenditure. Production linkages can be further divided into backward and forward linkages, or up-stream and down-stream linkages. When

⁵ For example Reardon, 1995 and Davis et al., 2002.

growth in the farm sector induces the non-farm sector to increase its activities by investing in productivity or additional capacity for supplying inputs and services to the former, the linkage is upstream. It is downstream (and is often referred to as a value-added activity) in cases where the non-farm sector is induced to invest in capacity to supply agro-processing and distribution services, using farm products as inputs (Reardon, 1995; Davis et al., 2002).

Expenditure linkages refer to the fact that households deriving income from one type of activity, farm or non-farm, are likely to spend that income on products of other activities (*ibid*). Farmers buy non-farm products with income generated from agriculture. Local entrepreneurs and wage earners use income from the sale of non-farm products to buy food and other agricultural outputs. Expenditure linkages can be divided into consumption and investment linkages. Consumption linkages refer to expenditures related to household consumption; investment linkages refer to expenditure used to finance farm or non-farm activities.

Returns on non-farm activities may be invested to initiate or expand farm activities and vice versa. This study is centred on the former, which aims to provide more information on constraints faced by poor people seeking to work in the farm economy. Some of the constraints identified may be equally applicable to participation in the non-farm sector. Many factors are at play, and the particular activities that result are rarely attributable to a single factor.

On the other hand, non-farm income can compensate for a lack of capital and credit, and provide the necessary cash for farm expenses, resulting in agricultural growth. It is a well-known fact that highly imperfect – or even missing – credit markets (and factor markets in general) severely constrain agricultural productivity growth in developing countries (Maertens, 2008).

However, there is much more debate on the effects of non-farm income on agricultural production and the existence of farm/non-farm investment linkages at the household level. On the one hand, the use of family labour non-farm reduces the availability of labour on the family farm which can lead to productivity loss and stagnating or declining agricultural incomes (Ruben and Van den Berg, 2001).

The farm and non-farm sectors can be linked directly via production linkages, which occur either upstream or downstream. Indirect expenditure linkages, on the other hand, occur when incomes generated in one of the two sectors are spent on the output of the other. Finally, there may be investment linkages between the two sectors, in which case profits generated in one are invested in the other. RNF production linkages with local agriculture take place through sale of inputs to and purchase of output from the farm sector, with the agricultural output being used as an input for RNF activities (such as agro-processing and distribution) (Reardon, 1995).

Hence, the type of local agriculture will play an important role in determining the incentives for these kinds of RNF activity, as its characteristics will affect the profitability of RNF products and services as well as the market outlets for them. On the side of farm implements, for example, the average farm size determines whether there is a profitable market for tractors in addition to hand-tools. On the farm output side, the composition, timing and quality of output produced by local farms can influence the profitability (and optimal plant size) of agro-processing industries. The type of technology used in cattle farming affects animal health and milk productivity which, in turn, affects the profitability of non-farm activities such as cheese production and milk pasteurizing (*ibid*).

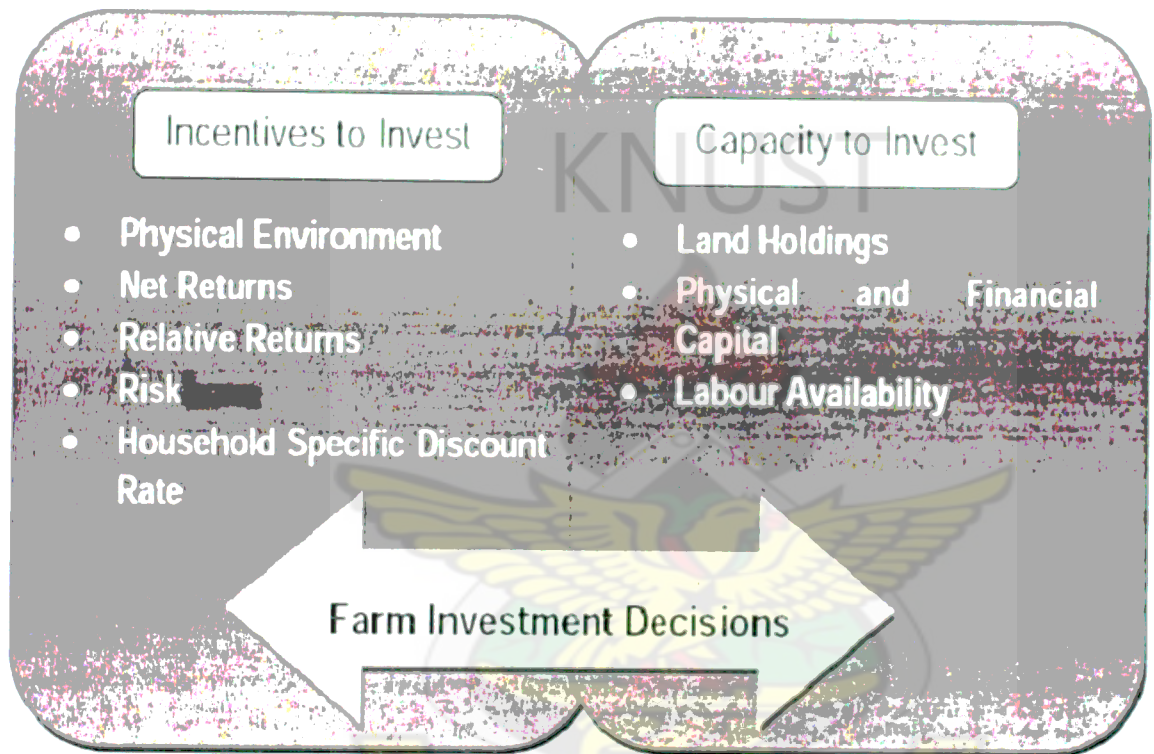
There are expenditure linkages between RNF and farm activities in that income generated from farm activities is spent on the output of non-farm enterprises and vice versa. Therefore, the profitability and market outlet for these are determined by local incomes (level and distribution) and tastes. Smallholders, the poor, are more likely to spend on local goods and services in the RNF sector, while richer households would tend to spend on items from the modern manufacturing sector located in cities, or on imports. The implication of this is that technical change in agriculture that benefits smallholders will have a greater impact on the local economy via expenditure linkages than would technical change that benefits large landholders (Davis et al., 2002).

2.6 Determinants of Farm Investment: Analytical Framework

This section discusses an analytical framework for the determinants of farm investment. The term "farm investments," refers to expenditures on both production inputs (e.g., fertilizer) and durable capital goods (e.g., tractors). The framework draws on the work of Reardon et al., (1995) and Daniel et al., (2001) and provides a means of organizing the analysis and subsequent discussion of findings.

Farmers must make difficult decisions about how best to allocate scarce resources between consumption (e.g., food, education, health and housing) and production ends. For farmers in sub-Saharan Africa who use recommended doses, fertilizer purchases can represent the largest single input expenditure for a production season (Daniel et al., 2001). As investing in agricultural intensification implies forgoing other consumption and/or investment opportunities, farmers are likely to consider two basic factors, the incentives and capacity to investment. These factors are explained below as depicted in figure 2.1.

Figure 2.1: Factors Affecting Farm Investment Decisions



Source: Author’s Construct, 2009.

2.6.1 Incentive to Invest

Incentive to invest refers to factors that influence profitability and includes environmental factors, net returns, relative returns, risk, and the household-specific discount rate. Incentives to invest can also be categorised into two groups: monetary and physical incentives. Monetary incentives are those associated with the profitability of agriculture in a zone (e.g., output prices, input prices, access to markets, prevailing wages for agricultural and non-agricultural activities). In general, higher output prices, lower input prices, better market access, and lower wages incomes from competing non-farm opportunities provide positive monetary incentives for agricultural investments. On the other hand, physical incentives are

those associated with farm and plot characteristics (size and location of plot, amount of fallow, fragmentation of plots, slope, rainfall, etc.).

2.6.1.1 The Physical Environment

Soils, rainfall, temperature, diseases and pests determine the technical feasibility of investments, affecting their profitability and risk. Land degradation is a function of past production and investment decisions, but it also influences future input use, crop choices, and soil conservation investments. In Rwanda, Clay et al. (1995) found that steepness discourages the use of fertilizer and organic matter because of runoff. Conversely, increasing land scarcity obliged many farmers to depart from traditional farming system, which in turn, increased soil conservation investments. On the other hand, farmers' decision to invest is triggered by soil degradation through erosion and nutrient loss as a result of continuous cultivation (Kelly et al., 1995). Therefore, pineapple farmers will likely be expected to invest in soil conservation and improved inputs (use of better seeds and fertilizer) if they are under greater stress but possess land that can be improved (good location and acceptable levels of rainfall).

2.6.1.2 Net Returns

Net returns of the given investment depend on the yields and input requirements per-unit-of-output, and the prices of inputs and outputs. Reardon et al. (1995) argues that the better the net return of a potential investment, the greater the probability of farmers' investing (capacity constraints remaining constant). They also found that African farmers are sensitive to net returns to their investment choices. Fertilizer use declined substantially in three countries; Senegal, Burkina Faso, and Zimbabwe and when subsidies were removed and/or access to credit was made more difficult (Kelly et al., 1995; Savadogo et al., 1994; and Jayne et al., 1994). For Senegal, Gaye (1992) showed that farmers' demand for fertilizer was more sensitive to changes in input/output price ratios than to net returns. Sharp declines in the ratio in the mid-1980s led to drastic reductions in the fertilizer used by farmers in the Peanut Basin, despite economic analyses showing that fertilizer remained profitable in the southern Peanut Basin with average value/cost ratios of greater than 5 (Kelly, 1988). This shows that withdrawal of agricultural support services and input subsidies increased input costs, reduced net returns, and led to a decrease in the use of agricultural inputs.

2.6.1.3 Relative Returns

A given investment may be profitable, yet not sufficiently attractive relative to alternative farm and non-farm investments to motivate the farmer to invest. African farmers are sensitive

to their returns on investments in cropping relative to returns in the non-farm sector. Returns can be high for capital and labour used in rural non-farm businesses and wage employment relative to farming (Fall, (1991); Lowenberg et al (1994); Reardon et al (1992)).

Farm and non-farm sectors compete for farmer investments though they can be complementary especially in the more favourable agro-climatic zones where agricultural payoffs are higher. Christensen (1989) found in northern Burkina Faso that better returns from non-farm activities decreased on-farm investments. The competition is more apparent in risky, drier zones, where farmers diversify activities to manage risk. Non-farm activities often occur in the dry season, when conservation measures such as bund or terrace building and maintenance are done.

On the other hand, Savadogo et al., (1994 and 1996) found farmers in Burkina Faso were much more likely to use capital and inputs for cash crops as the payoff, in terms of the marginal value product use of animal traction, manure, and fertilizer was much higher for cash crops (cotton and maize) than for semi-subsistence food grains (millet and sorghum). In the same token, Clay et al., (1995) found that farmers in Rwanda were much more likely to make land conservation investments and use fertilizer when farming was more profitable. Substantially more fertilizer was used on cash crops (white potatoes and coffee), since the payoff was much higher than on subsistence food crops.

2.6.1.4 Risk (Absolute and Relative)

Risks include price and yield variability, political and policy instability, insecure land tenure, etc. The greater the risk, the lower the probability of investment (Newbery and Stiglitz, 1981).

Risk is a factor that can alter a farmer's perception of both monetary and physical incentives. For example, an investment will become riskier and incentives will decline if a farmer is not sure that he will be able to recover the full benefits of a particular investment (e.g., applying manure to a rented field). Similarly, volatile, unpredictable output prices can reduce incentives as farmers will be uncertain of their ability to recover their investment costs by selling surplus production. In general, a higher return (reflected in financial or physical incentives) on investment will stimulate a higher rate of investment (Daniel C. et al., 2001). Conversely, greater risk leads to lower investment for risk-averse farmers. Feder et al. (1985) break risk into two categories, risks (such as from price or rainfall instability) affecting

"confidence in the short term," and risks (such as insecure land tenure) affecting "confidence in the long term."

In Kenya, Mathenge and Tschirley (2007), found that households with salaried wages income (low risk and stable) were more likely (than those with income from remittances or informal business) to invest their earnings in risky crop production systems so long as the expected returns outweigh the risk. Furthermore, it was noted that even though the use of fertilizer and improved seed was likely to increase as a result of both the expected returns and the variance of those returns, there were other important non-monetary gains from investing in farming such as food security.

2.6.1.5 The Household-Specific "Discount Rate"

This is also called the "time value of money," and reflects how much a household values income received now versus later. It is influenced by household characteristics that raise the importance of immediate survival and return on investment. For example, the poorer the household, the more the household values immediate income. A resource conservation investment such as agro-forestry typically has delayed payoffs, and a household with a high discount rate might be less inclined to make this type of investment (Reardon et al., 1995).

2.6.2 Capacity to Invest

Capacity to invest depends on the household's (a) landholdings, (b) physical and financial capital, and (c) labour availability. Clearly, while the incentives to invest might be quite strong, the capacity to invest might be weak.

2.6.2.1 Landholdings

The quantity and quality of land affect the types of investments which are technically feasible and profitable. Land is therefore a critical factor influencing net returns. Nevertheless, one can only formulate an ambiguous hypothesis regarding how farm size affects farm investment, as its effects are complex. On the one hand, small farmers can have strong incentives for intensification investments, but not always have the capacity to do so. Land enhancing investments are especially suitable for small farms because their owners depend more on their small landholdings, they usually have a lower share of land under fallow, and organic input use and soil conservation investments can substitute for fallowing (Reardon et al., 1995). However, small farmers also often face stiff constraints to obtaining credit and physical capital, as shown for example in Kenya by Carter and Wiebe (1990), and in Rwanda by Clay et al. (1995). The very smallness of their farms and (often) the risk of their

environment mean that small farmers want to diversify their incomes off-farm to manage income risk. Yet the non-farm income can help pay for investments.

On the other hand, large farmers may have less incentive to intensify, but their wealth means that they can afford the investments. Larger farmers can rely on more extensive techniques and set aside land for fallow, pasture, and woodlots. This means they have less need of intensification investments. Yet large farmers are sometimes in schemes or regions where private or public input delivery schemes make the inputs and equipment cheaper for them than for small farmers outside the schemes (Clay et al., 1995; Adesina et al., 1994).

2.6.2.2 Capital

Capital consists of not only cash and liquefiable assets (e.g., livestock) that can be used to finance an investment, but also equipment, structures, land improvements, etc., which support production.

Crop and livestock sales and non-farm activities are the main cash sources for investment. There is substantial evidence that outside of cash crop credit programs, informal and formal credit markets are used very little for input purchases in Africa (Christensen, 1989). One's own sources of cash are crucial when the credit market is underdeveloped or absent as it is in much of Africa. The effect of non-farm income on farm investment is especially interesting, because of the importance of non-farm income in African rural households shown by farm household surveys in the 1970s and 1980s (Reardon et al., 1994). The literature presents a mixed picture concerning the investment of non-farm income in farm capital. In some areas, especially where agriculture is profitable and not too risky, there is a complementary relationship; in areas where agriculture is risky and poor, the two sectors compete.

For example, in Rwanda, Clay et al. (1995) found that small farmers invested more per hectare in soil conservation measures (anti-erosion ditches, terraces, windbreaks, grasslines) than larger farmers. Smaller farms are more likely to use organic matter, while larger farms are more likely to use more expensive inputs such as fertilizer and lime. But small farmers often face stiff constraints to obtaining credit and cash to buy the latter. Larger farms can rely on more extensive farming and less use per-hectare of improved inputs and conservation investments. An exception to this, however, is larger farms in the "paysannat" scheme for coffee in Eastern Rwanda (see Clay et al., 1995).

2.6.2.3 Labour Availability

Labour supply in quantity and quality terms (family size and composition, health, education), is critically important. The "quantity" aspect of labour is important when considering labour as an input used in the labour-intensive production of on-farm infrastructure (e.g., building and maintaining irrigation canals, terraces, anti-erosion ditches, alley cropping). Farm households frequently do not have an adequate supply of labour to carry out improved farm practices. Household demographics (e.g., worker/consumer ratio) affect the quantity of labour available for such practices.

All else being equal, cheaper (more available) labour drives farmers to substitute labour for land or capital, (choosing labour-using technology). In some cases, however, farmers with off-farm labour opportunities actually want labour-saving technologies so as to free labour for off-farm work (Low, 1989).

2.7 Summary

This chapter has reviewed the relevant literature which provided the basis for understanding the concepts and importance of non-farm economy as well the detailed information on the non-farm income. Several factors influence the households' decision to participate in different activities. From the above discussions, it suggests that the decision to participate in a certain activity is triggered by the rewards offered, risks associated with the activity and households' capacity, which is determined by the assets endowment. This framework highlights the role of households' assets in activity choice decision, controlling for demographic and facilitating factors in influencing decision among pineapple farmer households. Furthermore, this framework helped in the development of the research methodology including the data collection and analysis presented in the next chapter.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1: Introduction

This chapter presents the bases and processes within which this study was conceived and executed. It points out the instruments employed for selecting, classifying and analysing the linkages between non-farm and farm activities specifically on the use of non-farm income to finance pineapple production and how conclusions were derived. It outlines how the study strategy and overall research were designed.

3.2 Research Strategy

The study employs a case study as the appropriate research strategy and Akuapem South district is chosen for that purpose. The district is chosen for the study due to three reasons. First, the district is one of the areas with significant production of pineapple as a cash crop. The production of pineapple in the district has attracted two processing plants. On the other hand, the importance of the crop to the district economy has attracted the joint collaboration between the Horticultural Export industry initiative of the Ministry of Food and Agriculture (Government of Ghana) and Trade and Investment Program for a Competitive Export Economy (USAID) to distribute planting materials of high productive variety MD2 (Nyarko-Adu, 2006). Second, farmers in the district have limited access to credit, thus creating a potential for use of off-farm sources of cash to finance input purchases. Third, the district was a field study area for Workshop in Development Planning and Management course, of which the author was a participant and thus exhibiting potential benefits especially for the data collection exercise.

The study looked at how non-farm income affects farm input use. Specifically, the study attempted to understand the relationship between income generated in non-farm income activities and its use in purchasing of farm inputs for pineapple production. The selection of pineapple has been intrigued by two major reasons: (i) it is one of the major cash crops in the district suggesting that increased productivity is likely to be an important choice for many households in deciding whether to intensify their agricultural production; (ii) pineapple production accounts for a great share of the fertilizer used in the district, thus indicating that its production demand for purchasing of inputs (Nyarko-Adu, 2006).

In order to analyse the possibilities to utilize non-farm income as potential cash capital for farm investments in Akuapem South municipal, a survey of rural households engaged in pineapple production was conducted. Secondary data sources including municipal agricultural reports, policy documents, farm and non-farm income literature including published researches were also used for the study.

Fieldwork was carried out in three settlements, chosen to be as representative as possible of variables affecting pineapple farmers in Akuapem municipality, particularly in relation to access to non-farm activities. These settlements are Fotobi, Amanfrom and Pokrom⁶. The selection of the three settlements is mainly based on two reasons: firstly and most importantly, they are the major pineapple producing areas of the municipality and secondly, they portray both urban and rural characteristics such that there is high impetus of involvement in farm and non-farm activities. The selection of appropriate study settlements was done in the baseline phase and the methods employed at this stage mainly included one-to-one interviews with key informants (Municipal Agricultural Development Unit staff).

3.3 Research Instruments

The research instrument selected for the study is the use of interviews. Semi-structured and structured interviews were employed in the study. Questionnaires were designed to obtain information from households. The survey targeted heads of households chosen randomly

from a stratified sample frame. The formula $n = \frac{N}{1 + N(\alpha)^2}$ was employed to determine the

sample size of farmers required for the study; where n = sample size, N = total population of the farmers and α is the confidence interval (90% was adopted for this study). With a sample frame of 1189⁷ pineapple farmers, a sample size of 92 was obtained as the sample population for the study (see appendix 1).

The fieldwork was organised in two phases – the reconnaissance and main phase. The reconnaissance phase aimed at establishing the major pineapple producing settlements within the study area in order to generate the sample frame from which the sample size was determined.

⁶ See location map page 34.

⁷ Source: Municipal Agricultural Development Unit, 2009 – Pokrom, 504; Fotobi, 464; and Amanfro, 221.

The study employed multi-stage sampling technique using both stratified and the simple random sampling methods to identify the farmers to be included in the data collection process. Pineapple producers in this study are classified into three categories, however, the study focuses on two – small scale and medium scale farmers. The farmers are grouped into two strata or categories which exhibit definite characteristics such as income levels, locality, farm size and scale of production. The author assumes that the characteristics of the selected categories represent farmers who are more likely to be affected by the research issue – lack of access to formal credit financing. Simple random sampling was used to select farmers from each stratum by use of random numbers⁸.

The main phase of the study aimed at exploring and collection of data relating to the study area, as developed in the baseline fieldwork. In particular, the intention was to get the information that would provide answers to the research questions. The methods employed at this stage included household interviews and semi-structured interviews with key informants – the input sellers, pineapple buyers, farmers associations and the Municipal Agricultural Development Unit (MADU). The data included detailed information on the allocation of labour to home, farm and non-farm employment, income sources, purchase of farm inputs including hired labour, sale of farm outputs, consumption expenditures, credit and household composition. Other information that was addressed by the questionnaire include: demographic characteristics of all household members and the plans, aspirations and opinions of household heads regarding investment and farm intensification.

3.4 Unit of Analysis

Based on the research questions, the primary units of analysis for this study are the pineapple cultivating households. The study distinguishes three major categories of pineapple farmers namely small scale, medium scale and large scale producers. Farm size is used as a proxy for the scale of production and thus small scale farmers include all farmers who devote less than 2.5 acres of their land for pineapple production. Medium scale farmers are those whose

⁸ Random numbers were generated for the list of pineapple farmers in the study area by use of EXCEL spreadsheet. A list of farmers was copied and pasted into a column in an EXCEL spreadsheet. Then, in the column right next to it, a function =RAND() was inserted, which is EXCEL's way of putting a random number between 0 and 1 in the cells. Afterwards, both columns were sorted - the list of names and the random number - by the random numbers. This rearranged the list in random order from the lowest to the highest random number. Lastly, a number of first names were taken from the sorted list corresponding to the number of required farmers i.e. first 36 names from the sorted list of farmers in Fotobi.

pineapple farms exceed 2.5 acres while large-scale farmers are those who have vertically integrated production and export, usually having pineapple farms of between 15 and 100 acres of pineapple. Another major factor that distinguishes large scale farmers from the other two categories is the use of mechanised agriculture. However, as described earlier, this study did not include large scale farmers.

3.5 Method of Data Collection

Primary data were collected through interviews with the farmers and the other actors and institutions. With the help of interpreters, interview schedules were administered in the three communities in which the farmers are cultivating pineapple – Fotobi, Amanfro and Pokrom. Informal discussions with key informants were also applied to complement the gathered data.

Farm size was applied as a factor to identify the three categories of farmers. Moreover, the actual identification of farmers in the given categories was done by the area level chief farmers who were asked to group the farmers according to size of farms from which a list of farmers was generated.

3.6 Data Processing

Data processing involved the processing of completed instruments, i.e. interview schedules and interview guides. Information received from these instruments collected during fieldwork was converted into data represented by numbers or characters. The main method used for this conversion was the use of edge coding – transfer of the information into summary sheets and then keying the coded data into the computer.

3.7 Data Analysis

Data analysis for this study made use of both the qualitative and quantitative techniques. Data disaggregation, cross tabulation and statistical application techniques were used in analysing responses. The Statistical Package for Social Scientists (SPSS) software was used in analysing the data obtained from the field. Stepwise multiple regression was applied to determine the causal relationships of the factors/variables that determine the decision to use non-farm income in pineapple farming.

The analysis of quantitative data took the form of tables used to compare the situation between the various pineapple cultivating areas and between the different categories of farmers. Percentages of the various livelihood variables for the various categories and the various strategies they adopt were analysed.

On the other hand, the analysis of qualitative data took the same process as for quantitative data which involved labelling or coding of every item of information so that to recognise differences and similarities between them. However, coding qualitative data required different techniques and thus, a process called content analysis was applied. For example, the study has employed a qualitative approach to explore farmers' decisions on the use of non-farm income by interviewing farmers. The analysis of such information implies that the researcher had to read through all the responses and, at some point, find reference to why the interviewee last used non-farm income labelling (coding) items of data which appear in the text of a transcript so that all the items of data in one interview can be compared with data collected from other interviewees. Content analysis was applied for all qualitative data collected through interviews and documentary analysis since it is concerned with analysing text.



CHAPTER FOUR

ANALYSIS OF FIELD DATA

4.1 Introduction

This chapter offers a presentation of the information gathered from the field. It contains an introduction to the study area, descriptive information of the interviewed households and analysis of data collected from them.

4.2 Background of the Study Area

The study was carried out in Akuapem South Municipality, specifically in three settlements namely Fotobi, Amanfro and Pokrom. Unless stated otherwise, in this report the term 'study area' refers to a combination of the three settlements mentioned above. However, for the sake of introduction under this section, the focus on describing the study area is first given to the municipality as whole and then the location of the three settlements is provided afterwards. It is important to note that most of the information presented in this section is borrowed from draft Medium-Term Development Plan for Akuapem Municipality developed by SPRING II 08/09.

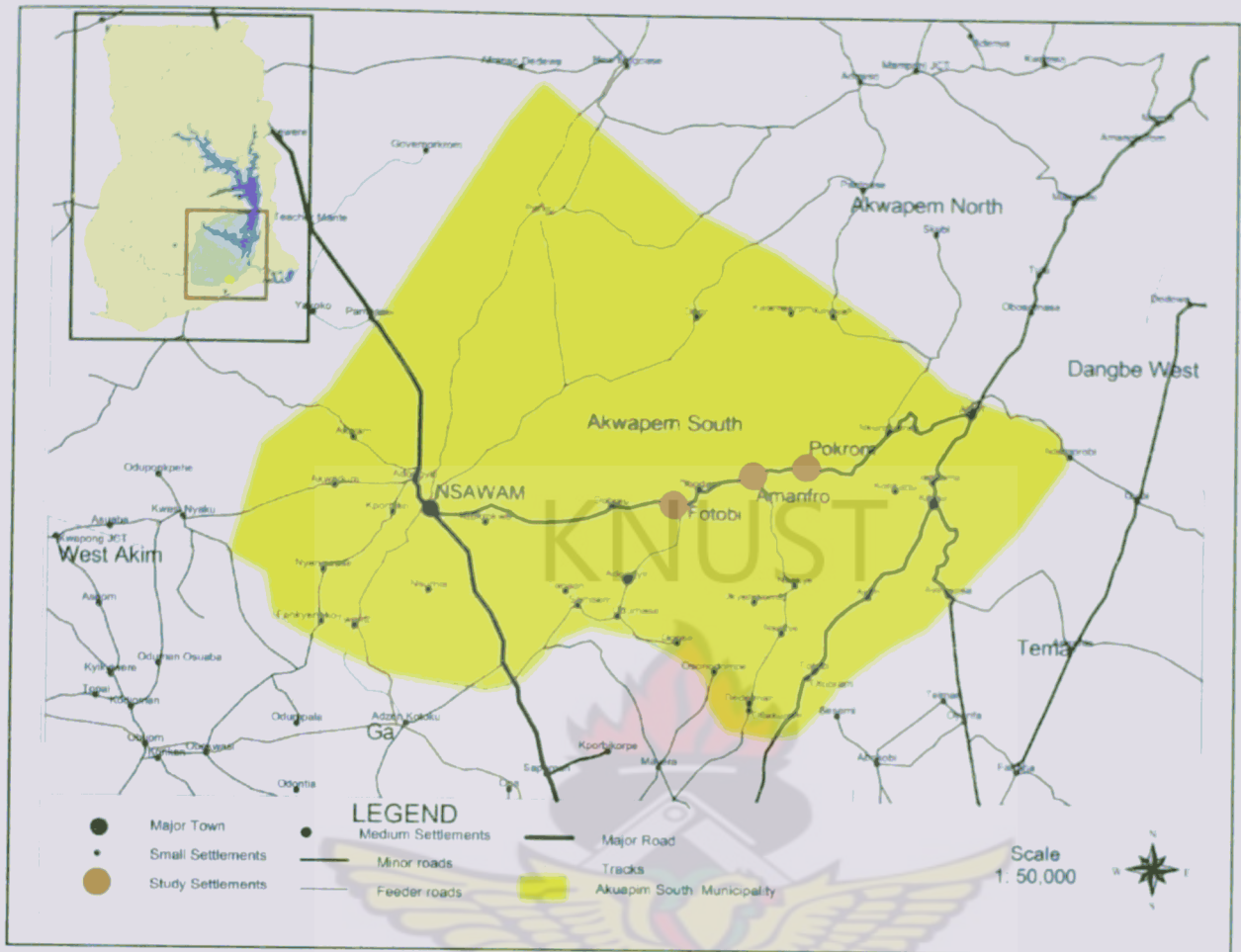
4.1.1 Location and Size

The Akuapem South Municipality is one of the Districts in the Eastern Region of the Republic of Ghana and it is located between latitudes 5.45°N and 5.58°N and longitudes 0.07°W and 0.27°W. It is bordered to the south by the Ga District and Tema Metropolis of the Greater Accra Region and to the North and West by the Akuapem North District and the West Akim District respectively. The municipal's capital, Nsawam is located about 23 km from Accra along Accra – Kumasi Highway and hosts most of the administrative and socio-economical facilities. The municipality has a land area of about 503 square kilometers. Map 1 below shows the location of the municipality.

The three settlements, Fotobi, Amanfro and Pokrom are located 20 km, 30 km and 35 km respectively from Nsawam town along the Nsawam-Aburi road. All the three settlements share both urban and rural characteristics and fall under third order settlements of the municipality⁹.

⁹ Arranged in a hierarchical order according to the population size, type and number of services present in the settlements; Nsawam is described as first order settlement, while Adoagyiri and Aburi are identified as second order settlements.

Map 1: Location of the Study Area



Source: Accra Mapping Division & Author's Field Study, April 2009.

4.1.2 Climate

The municipality lies within the wet semi-equatorial zone marked by double rainfall maxima; June and October with a mean annual rainfall between 1250 mm and 2000 mm. The first rainy season is from May to July (maximum) with the heaviest rainfall experienced in June and the second rainy season is from September to October (minimum) when the municipality comes under the influence of the Wet Maritime Airmass. This has brought about two farming seasons based on rain-fed agriculture.¹⁰

There is a sharp dry season between the two rainy seasons with the main one coming between November and March when the Tropical Continental Airmass in the country sweeps over the

¹⁰ This kind of seasonality does not apply to pineapple cultivation as pineapples are grown throughout the year.

area. Relative humidity is generally high ranging between 75% and 80% during the two rainy seasons and 70% and 75% during the rest of the year. Temperatures are generally high throughout the year with the highest average temperatures of about 30°C recorded between March and April while the least average temperature of about 26°C is usually recorded in August.

4.1.3 Population Size

The population of the municipality as of 2009 is estimated to be 145,442 while the population density is estimated to be 289 persons per square kilometre as of 2009. Akuapem South Municipality had a population of 116,344 in 2000 representing 5.5% of total population of the Eastern region. Population growth is estimated at 1.6% per annum which is lower than that of the country, which stands at 2.7%, but slightly higher than the regional population growth rate of 1.4% per annum.

The population of Pokrom, Fotobi and Amanfrom as of 2009 is estimated at 2519, 2319 and 1105 respectively (see appendix 2). Ranking the settlements of the municipality according to the population size, Pokrom, Fotobi and Amanfro attains 5th, 6th and 15th positions respectively.

Table 4.1: Population Size in the Study Area

Location	2000			2009		
	Male	Female	Total	Male	Female	Total
Municipality	57,306	59,038	116,344			145,442
Fotobi	960	1,048	2,008	1,109	1,210	2,319
Amanfro	460	497	957	531	574	1,105
Pokrom	1,051	1,131	2,181	1,214	1,306	2,519

Source: Ghana Statistical Services, 2000 and Population Projections performed by Author.

4.1.4 Land Tenure System

Land in the Municipality is mostly owned by Chiefs and these are held in trust as vested in the stools. However, ownership of land in the Municipality is by heads of families. Therefore acquiring land for agricultural purposes is through landlords or heads of families (Abusuapanini). Share cropping is the dominant system of land tenure for farming purposes. This is done in such a way that 2/3 of yield after harvest is owned by the tenant and 1/3 is given to the owner of the land. Hiring of land is now the dominant practice in the municipality, where a person pays for land for a particular period; in this case he/she owns the entire yield after harvest.

The land tenure system in the municipality does not discriminate against women. Women in the Akuapem South can own land and are free to utilize it for various purposes including agricultural uses.

4.2 Descriptive Analysis of the Sample Households

All interviewed farmers are producing pineapples and they fall into two major pineapple producing groups - small scale (84%) and medium scale producers (16%). Ninety two (92) farm households were interviewed and among them 15 percent of the households in the sample were headed by women (see table 4.2). All interviewed farmers reported to engage in pineapple production.

Table 4.2: Locational Distribution of Respondents

Location	Frequency			Percent
	Male	Female	Total	
Fotobi	32	4	36	39.1
Amanfro	15	2	17	18.5
Pokrom	31	8	39	42.4
Total	78	14	92	100

Source: Author’s Field Survey, April 2009.

4.3 Pineapple Production and Practices in the Study Area

In Ghana now pineapple is mainly grown in the Eastern region i.e. Nsawam in the Akuapem South district and Central region. Pineapples grown in Akuapem South district constitute about 60% of Ghana’s pineapple exports while the rest come from other parts of the country. Around 65% of the total volume of the pineapple produced in Ghana comes from Akuapem South district area, with the other 35% produced in the Central and Greater Accra Regions (Cudjoe et al., 2002).

4.3.1 Major Activities in Pineapple Production

The main activities carried out by the pineapple farmers in Akuapem municipality include establishing a nursery, acquiring and preparing the land (clearing and burning), planting other crops in the prepared plot, planting of pineapple seedlings, maintenance of the farm (weeding, clearing, watching, pruning, removal of mistle toe and spraying), harvesting, fermenting, drying, transportation and selling.

Because of the use of growth regulators to force floral initiation pineapple is planted all year round and forced to mature nine to 13 months after planting. In equatorial tropical climates

like Ghana, the crop requires 11 to 14 months of a crop cycle; six to eight months for the vegetative phase and five to six months from forcing to harvest.

4.3.2 Varieties Grown and Source of Seeds

Pineapple is produced asexually from various parts of the plant including the crowns, slips, hapas and suckers (Cudjoe et al., 2002). In Ghana (including the study area), suckers are commonly used for propagation of pineapple. All the farms visited utilize suckers either self raised or purchased from other farms. A good and reliable source of suckers is an asset and wherever possible suckers produced in situ on the farm are preferable for the sake of avoiding transferring diseases and pests from a badly infested farm to other farms (*ibid*). Currently, the main variety planted in the municipality is Del Mont Gold 2, commonly known as MD2.

4.3.3 Pineapple Farming Practices

4.3.3.1 Land preparation

Land preparation is performed differently but the main practices are one or two ploughing followed by harrowing and then planting out. The nature of the land and availability of machinery dictate the processes used. Farms without machinery employ the slash and burn technology and go back to remove grasses and stumps. No planted rotations are followed, often because the farms are still young. However, farmers with large farms plant pineapples in a succession to allow a consistent supply of fruits to buyers all year long. Post planting activities comprises fertilization, weed control, pest and disease control, forcing, de-greening and then harvesting.

4.3.3.2 Weed Control

Pineapple farmers in the study area practices mechanical weeding by cutlasses and heavy hoes. Experience of the farmers shows that delayed weeding is more laborious than early weeding and may lead to damage of the roots (hoe) or crop (cutlass). On the other hand, large scale farmers do away with the weed through the use of herbicide together with glyphosate. Thorough land preparation is another best way to reduce the amount of weed in the pineapple farm as it minimizes the risk of damaging the roots and fruits. It was also observed that farmers who practice mechanical weeding are forced to perform regular and frequent weeding to allow fast shallow weeding that does not affect the roots of the pineapple.

4.3.3.3 Post Harvesting Treatment

After harvesting, pineapples are brushed against mealybugs and the cut stems are usually treated with approved fungicides. Treatments are usually done for consignments to be shipped to Europe.

4.3.3.4 Marketing

Three types of pineapple buyers exist in the municipality – the exporters, local fruit processing factories and local fruit consumers. However, many smallholders interviewed preferred to sell their produce to exporters because of higher prices. About 60% of Akuapem South pineapples are exported and the remaining 40% find themselves in the local market (Akpotosu & Musah, 2007). Nevertheless, dealing with the exporters involves high levels of risk and uncertainty. For example, export pineapples must meet certain quality standards for size, colour, weight, and sugar/acid content. Farmers reported that exporters frequently rejected the smallholders' produce because of low quality.

In 1998, a farmer owned cooperative started its operation in Akuapem South municipality called Farmapine Ghana Limited. The cooperative comprised of small scale farmers and exporters in which the farmers had shares in this company. There were about 5 co-operatives involved. The idea of forming Farmapine was to solve the marketing problems of the small farmers whom the exporters cheat most of the time. At the time of the study, however, Farmapine was no longer functioning.

In addition, a free zone fruit processing company called Blue Skies Company exists in the municipality which buys pineapples from farmers and processes for export to Europe. Two local processing companies also exist in the municipality - Astek Food Processing Ltd and Mixed Fruit Company which produce pineapple and other fruits juices for the local market.

4.5 Access To and Use of Assets

The assets of the pineapple farmers examined in this research include their main resource base land and other physical capital, human capital, financial capital and social capital.

4.5.1 Land

Land acquisition by the pineapple farmers is generally through renting, inheritance, purchase and shared tenancy. About 84 percent of interviewed farmers fall under leasing category while 10, 4 and 2 percent of the farmers acquired their land through inheritance, buying and shared tenancy, respectively (see table 4.3). Eighty five (86) percent of the farmers fall in the

category of those who do not own land and the rest owns land through inheritance or purchase i.e. landowners constitute 14% and refers to farmers who acquired land through inheritance and buying (see table 4.3).

Table 4.3: Types of Land Acquisition

Land Acquisition type	Frequency	Percent
Buying	4	4
Leasing	77	84
Inheritance	9	10
Shared tenancy	2	2
Total	92	100

Source: Author's Field Survey, April 2009.

About 42 percent of the interviewed farmers indicated that they use less than a quarter of the total land they manage to cultivate pineapples. On the other hand, 22 percent of the farmers allocate between 25 and 49 percent of their land for pineapple cultivation. Twenty percent of the interviewed farmers apportion their land between 50 and 74 percent while the rest (16%) of the farmers utilize more than 75% of their farm lands for pineapple cultivation (see table 4.4 below).

Table 4.4: Land Allocation for Pineapple Production

Ratio of farm land to pineapple	Frequency	Percent
Below 25 %	39	42
25 – 49 %	20	22
50 – 74 %	18	20
75 % and above	15	16
Total	92	100

Source: Fieldwork Survey, April 2009.

Eighty two percent of the farmers reported to have reduced the size of pineapple farm land since they started cultivating the crop. Moreover, 10 percent of the farmers reported an increase of size of land devoted for pineapple production while 8 percent of farmers have been maintaining their pineapple plots ever since they started producing the crop.

Reasons for the reduction of pineapple land were fall in demand for Smooth Cayenne, inadequate money to buy inputs and loss of fertility¹¹. Conversely, farmers who increased their pineapple farm land did it as a way to re-invest the previous profits accrued after experiencing good harvests and availability of pineapple buyers.

It was observed that pineapple farmers allow part of the infertile land to fallow for a period between 2 to 5 years.

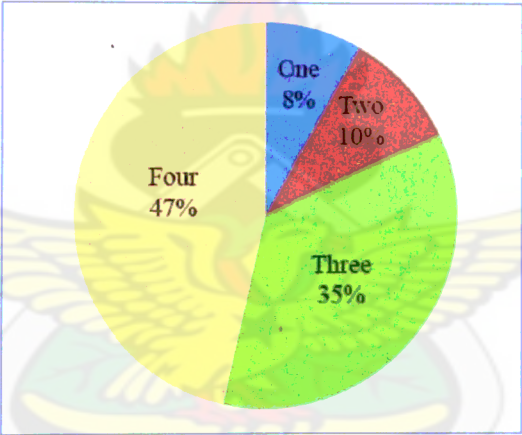
Table 4.5: Change in Pineapple Farm Size

Change in pineapple farm size	Frequency	Percent
Increased	10	10.9
Reduced	75	81.5
No	7	7.6
Total	92	100

Source: Fieldwork Survey, April 2009.

It should be noted that the rest of the land is either being allocated for other crops or rented to other farmers (this applies to farmers who own land). Sixty one percent of farmers cultivate three crops among pineapple, cassava, maize, coco yam, plantain and horticultural crops like tomatoes and vegetables. About 14 percent of farmers reported to cultivate one crop (pineapple) while the remaining farmers in the proportion of 17 and 8 percent cultivate two and four crops respectively as shown in figure 4.1 below.

Figure 4.1: Number of Crops Cultivated By Pineapple Farmers



Source: Author's Field Survey, April 2009.

Although pineapple is the major cash crop in the study area, farmers interviewed reported to generate income from the sale of other crops. Factors contributing to this situation include failure to recoup investment from pineapple and long cycle of pineapple (between 9 and 13 months from planting to maturity/harvest) that require other sources of income before realizing the income from pineapple. Non-farm income also plays a very important role in both situations.

4.5.2 Human Capital

The mean age of the household head was about 40.7 years, and 97% of the farmers have formal education while the rest are non educated. Generally, it can be said that approximately

75 percent of the interviewed pineapple farmers fall within the age of 26 and 50 (see table 4.6.).

Table 4.6: Age Distribution among Pineapple Farmers

Age Group (years)	Male		Female	
	Frequency	Percentage	Frequency	Percentage
< 25	2	3	0	0
26 - 50	61	66	9	10
51 - 75	15	16	5	5
Above 75	0	0	0	0
Total	78	85	14	15

Source: Author's Field Survey, April 2009.

4.5.2.1 Labour Payment Arrangements

There are two types of labour which are used in the pineapple production, hired and family labour. About 46 percent of farmers utilize both hired and family labour while 45 percent only use hired labour. Farmers who only use family labour comprised 10 percent. Hired labour is found in two forms: (i) short-term hire labourers which ranges from a day to a week and the payment is done per day or per piece of land worked upon and (ii) long-term hire where a person is hired to work on the farm for a period of at least a month and the payment is made on monthly bases. The average monthly payment was 25 Cedis while the average daily payment was 5 Cedis. It can be observed that those who work on monthly bases are paid less than working on daily or piece meal basis. However, the author conceives that the monthly labourer works lesser compared to a daily labourer due to fluctuation in magnitude of work within a month on the part of the monthly labourer.

Family labour refers to the use of family/household members to work on the farm (spouses and other family members). Usually family labour is paid in kind rather than use of cash - taking care of the well being of the household. Table 4.7 shows the labour payment arrangements with the medium scale farmers not utilizing their family members as labourers while great portion of the small scale farmers mainly use family labour.

Table 4.7: Sources of Labour

Pineapple Farm Size (acres)	Labour Source			Total (%)
	Family (%)	Hiring (%)	Family and Hiring (%)	
< 2.50	9	25	33	67
2.50 - 4.99	0	10	7	17
5.00 - 7.49	0	3	3	6
7.50+	0	7	3	10
Total	9	45	46	100

Source: Author's Field Survey, April 2009.

4.5.3 Financial Capital

The pineapple farmers are generally classified as being rich, especially given their physical capital. From the income perspective it was identified that the mean annual income for the interviewed farmers is 3572 Cedis. The least farmers earn an annual income of 900 Cedis which is higher above a 1 US dollar poverty line (approximately 620 Cedis, i.e. 1 USD = 1.45 Cedis). However, not all of this income is generated from pineapple production, as farmers diversify into other income generating activities including non-farm sources and sale of other crops.

Lack of capital for the start-up or expansion of pineapple and the cost of maintaining the present farms was the major problem of the farmers. As stated earlier, a great number of farmers (82%) claimed to have reduced the size of pineapple land size due to inability to maintain them. Self financing is a very common way of financing pineapple production. About 95 percent of the interviewed farmers used their own money to finance the start-up of pineapple production. Only 1 percent of the farmers were able to finance the start-up by use of loans while the rest of the farmers either received remittances from relatives or received assistance from parents (2%).

The study found that pineapple farmers have almost no access to formal loans, however, they go for small loans from friends, parents or other farmers belonging to the same association/cooperatives. The study could not capture the magnitude of this kind of loans due to its complexity in terms of lack of information. Confidentiality from the farmers and poor record keeping contributes to difficulties in accessing information on informal loans and credit. The major sources of capital for pineapple farmers include savings from wages (formal and informal employment), business trade and sell of other crops. Table 4.8 below presents the proportion of farmers and their sources of capital finance.

Table 4.8: Sources of Capital to Finance Start-Up of Pineapple Farming

Means to raise capital	Frequency	Percent
Sell of farm products	31	34
Wage	30	33
Business/trade	28	30
Remittances/Parents	2	2
Formal Loans	1	1
Total	92	100

Source: Author's Field Survey, April 2009.

It can be seen that, besides the money from farming activities, farmers also rely on the income they get from wages (33%), business/trade (30%), remittances from their children (2%) and formal loans (1%). It is also important to note that income from wages and sale of farm products have almost equal importance to pineapple farmers in the study area.

The discussion with farmer associations revealed that mobilization of funds by means of facilitating pineapple farmers to access credit was one of the objectives of each of the three studied farmer cooperatives¹². However, none of the three cooperatives has started to provide credit services to its members due to difficulties in linking farmers to financial institutions. On the other hand, the small funds generated from membership fees and monthly dues are hardly enough to finance the running costs of the organisations.

4.5.4 Social Capital

The study has identified two major forms of social interactions that allow the existence of social capital in the study area. Formal associations in the form of farmers' cooperatives constitute one of the major forms of social capital with which pineapple farmers benefit. Another form of social interactions observed in the study area is the family ties and friendly relationships.

Pineapple farmers have formed associations which function as farmers cooperatives with the intent to solicit better common markets, facilitate access to loans and formulate an institution to voice farmers' concerns among other reasons. The farmers also prefer living with extended family members which allow the use of family labour. The friendly relationship and

¹² Apesika Cooperative Pineapple Growers and Marketing Society Limited (Fotobi), Amanfro Cooperative Pineapple Growers and Marketing Association (Amanfro), and Pokrom Patriotic Cooperative Farmers Pineapple Growers Society (Pokrom).

cooperation between the farmers allow farmers to share farm equipments like spraying machines, boots and cutlasses and planting materials (suckers).

4.6 Non-Farm Activities in Fotobi, Amannfro and Pokrom

The study has found that pineapple farmers diversify into non-farm activities to cope with income constraints and the most important activities in the study area are discussed below.

Pineapple farmer households rely on several non-farm income generating activities like business/trade, formal employment, self employment and informal wage employment. About 62 percent of the interviewed pineapple farmers are engaged in non-farm activities. Out of pineapple farming households that are engaged in non-farm activities, 61 percent are involved with business or trade activities including operating of a shop and food vending. Farmers who are act as middlemen by buying pineapple from other farmers and selling to exporters and factories also fall in the business/trade group.

On the other hand, 18 percent of pineapple farmers fall under informal employment mostly comprised pineapple farm labourers. Furthermore, farmers who have formal employment make up a proportion of 12 percent and they constitute public employees (teachers and health personnel), and other famers employed by the factories, corn mills and factories. Self employed farmers constitute 9 percent encompassing electricians, electronic appliance repairers and tailors to name a few. Table 4.9 below presents the distribution of non-farm activities among pineapple farmers.

Table 4.9: Distribution of Non-Farm Activities among Pineapple Farmers

Non-farm Activities	Frequency	Percentage
Self employed	5	9
Formal employment	7	12
Informal employment	10	18
Business/Trade	35	61
Total	57	100

Source: Author's Field Survey, April 2009.

Moreover, informal discussions with pineapple farmers discovered that a very small proportion of farmers receive remittances from relatives residing outside the country and urban centres within the country. It can be seen that a great proportion of the pineapple farmers are engaged in non-farm income activities thus depicting its importance among them. Income from these activities complement farming activities already discussed above to

ensure access to income for livelihood and capital for other activities including pineapple farming.

4.6.1 Share of Non-Farm Income

The study has found that the share of non-farm income in pineapple farmer households ranges between 20% and 35% of the household total income. Furthermore, the study also has observed that poorer and less educated households i.e. labourer have higher share of non-farm income compared to wealthier and educated households.

Richer and more educated households have often been observed to have better advantage from non-farm employment opportunities and non-farm economic activities (Dercon and Krishnan, 1996; Abdulai and CroleRees, 2001; Barret et al., 2000). The same is observed for the employment opportunities accessed by the pineapple farmers. Farmers who have formal employment have a relatively higher and stable non-farm income compared to those engaged in self employment, labourers and informal employment. This means that non-farm income is likely to benefit farmers who have skills to engage in more lucrative non-farm income activities like formal employment and business.

4.6.2 Gender and Non-Farm Activities

The study revealed that more men than women are involved in non-farm activities in the study area communities at present. Table 4.10 below shows gender distribution of the pineapple farmers engaged in non-farm activities where males constitute 81 percent while women make up only 19 percent. Although women are undoubtedly involved in much of the self employment, food vending and small-scale sale of agricultural produce, this is relatively invisible. It is much more likely that the male members of a household are involved in visible types of non-farm activities. Where women are involved in non-farm activities at a more visible level, this is usually on a contractual basis, working for others, rather than as entrepreneurs – although there was an exception in Fotobi, one of the study communities, where there was a shop run by a woman.

In all three communities studied individual businessmen are mainly men, while most of those employed in public jobs like nursing and teaching, are women (nonetheless the study did not capture any public female employee as pineapple farmers). It is mainly men who are involved in masonry, carpentry and occasional labouring jobs.

Table 4.10: Gender and Non-Farm Activities

Non-Farm activity	Sex				Total	
	Male		Female			
	Frequency	%	Frequency	%	Frequency	%
Self employed	5	9	0	0	5	9
Formal employment	6	11	1	2	7	12
Informal employment	10	17	0	0	10	18
Business/Trade	25	44	10	17	35	61
Total	46	81	11	19	57	100

Source: Author's Field Survey, April 2009.

4.6.3 Determinants of Non-Farm Activities in the Study Area

There are four main types of non-farm income activities in the study area including formal employment, trade/business, self employment and informal employment. Formal employment includes public employment such as teachers and nurses. Members of poorer households, about 65 percent of the non-farm workers, found employment in low-wage non-farm jobs such as farm labourers. The remainder, from better-off households, found non-farm work in more lucrative pursuits such as trade enterprises and government jobs. Better education, larger land holdings (which enabled rental income or sales) and strong political contacts enabled this group to finance and access the more lucrative segments of the rural non-farm economy. As reported by Hart (1994) and Reardon et al (2006), the study confirms that the rich and the poor diversify differently, because of differential access to human, financial, physical and political capital.

Due to the closeness of the settlements to Nsawam town, (thus providing easy access to an urban market), many households try to sell small quantities of surplus agricultural produce, and of processed agricultural produce (such as gari and cassava dough) to the urban market, either taking it themselves to the town or selling it to middlemen. Although this represents only a very small cash income compared to the one generated in pineapple production, it can be quite significant for households which have no cash at all.

Most pineapple farmers think of working as labourers in another pineapple farm when they think of setting up a livelihood activity outside subsistence farming and which does not involve being employed by someone else either regularly or casually. It is only those with professional skills and very good social networks who are able to look higher than this.

4.6.4 Farm/Non-Farm Linkages at the Household Level

As discussed in chapter two above, there are two forms of farm/non-farm linkages which are backward and forward production and consumption linkages. Employment linkages associated with pineapple farming and non-farm activities are very minimal because of low participation by smallholders in non-farm enterprises emanating from pineapple production. Fresh pineapples are either sold to exporters or local processing factories and the purchase is done at farm gate. This eliminates the need for re-processing on the part of the farmers which would have created non-farm opportunities as it is with cassava.¹³ However, the survey observed one form of forward linkages from which pineapple farmers engage – acting as middlemen by purchasing pineapples from other farmers and selling to exporters, local factories and local fresh fruit consumers in urban centres.

Conversely, backward linkages exist in the pineapple production as the nature and magnitude of pineapple production in the study area has induced supply of non-farm production inputs. The theory on linkages and experience from past studies point to the fact that the type and extent of development of backward linkages is determined by factors such as the farm size, type of crop and agricultural technology, and whether production is rain fed or not. The farms holdings are fairly big and the technology for producing pineapples appears to require fertilizer, pesticides, hired labour and other chemicals for forcing and colouring. These characteristics have in theory different implications regarding the type and magnitude of backward linkages. With large farms, for example, linkages associated with the demand for tractors and related services would be expected, however, low capacity of farmers to afford tractors make it difficult for the realization of the potential. On the other hand, pineapple's tolerance to drought limits linkages associated with demand for irrigation equipment.

Although pineapple production has created a significant demand for non-farm inputs such as fertilizers, farm tools and equipment, most of these commodities are not supplied by local suppliers. In terms of backward linkages associated with other traditional production inputs, many farmers obtain farm production inputs for pineapple (fertilizer and agrochemicals) from larger and medium scale suppliers in Nsawam. Accessibility to the three settlements from Nsawam is fairly good as the road connecting them is paved and transport buses are available

¹³ Forward production linkages in cassava production exist in two major forms (i) the need to transport the produce to markets or processing centres and (ii) processing of fresh cassava into *gari* and cassava chips (Al-Hassan & Egyir, 2002).

all day through. However, there is a potential for supply of the inputs to the farmers in Fotobi, Amanfro and Pokrom. This practice would provide an opportunity for the spread of backward linkages into the small-scale non-farm economy.

Use of tractors is very limited as only 2 percent of interviewed farm households rent tractors from other larger-scale farmers in the municipality; however, none of the farmers in Fotobi reported demand for tractor services. Nevertheless, none of those who were renting out tractors was captured in the sample of this study, however, perhaps because the farmers who own tractors are large-scale farmers who were excluded from the survey. The rental rate for tractors varies from 50 Cedis per acre to 70 Cedis per acre, depending on whether it is used to plough or to harrow; the mean is 60 Cedis per acre.

The survey has also found that 80% of the interviewed farmers own at least one or two knapsack sprayers because production of pineapples requires spraying of chemicals. A great number (95%) of the farmers owning knapsack sprayers purchased them from Nsawam town. However, 4% of the farmers reported to have bought them from Accra and the rest 1% received from relatives and friends. A few farmers rent sprayers from other neighbouring and close related farmers.

From the above discussion, it can be seen that forward linkages at the farm level are insignificant. The only meaningful forward linkage is the supply of pineapples to exporters and processors. However, most of the exporters and processors collect pineapples from the farms and thus the farmer do not have to incur transport costs. Because the focus of pineapple production at local level is on small-scale producers, production and consumption linkages are especially important in terms of stimulating national economic growth and because they can have profound effect on poverty alleviation and spatial growth patterns.

4.7 Summary

Pineapple is the major cash crop in the study area, however, pineapple farmers generate income from other crops and non-farm activities. Lack of credit facilities forces farmers to use own cash to finance agriculture. On the other hand, long crop cycle (13 months) impel farmers to diversify into other sources of income in order to cushion the household during periods other than harvest time. That means the development of pineapple production and processing will depend much on, among other factors, the availability of enough cash income to farmers to purchase farm inputs. The next chapter analyses farm input use in the study area by use of regression.

CHAPTER FIVE

THE ANALYSIS OF FARM INPUT USE IN THE STUDY AREA

5.1 Introduction

This chapter provides the analysis of farm input use in the study area by use of regression analysis. Stepwise multiple linear regression model was used in estimating the factors that affect the use of farm inputs in pineapple production (fertilizer is used as a proxy).

5.2 Regression Analysis

The simple linear multiple regression model was used in estimating the effects of selected explanatory variables on the use of fertilizer in pineapple production within the study area. SPSS software was used for the analysis from which a statistical method¹⁴ was employed in the selection of explanatory variables.

5.2.1 Multicollinearity

A choice of independent variables requires an existence of strong correlation with the dependent variable. On the other hand, a strong correlation between independent variables is not preferred and however, when a high correlation is detected between two or more independent variables, the situation is called multicollinearity. Such high correlations cause problems when trying to draw inferences about the relative contribution of each predictor variable to the success of the model. SPSS provides a means of checking for this, which was applied in the analysis.

¹⁴ There are different ways that the relative contribution of each independent variable can be assessed the major ones being simultaneous, hierarchical and statistical. Three versions of statistical methods exist, (forward, backward and stepwise selection) and the order in which the predictor variables are entered into (or taken out of) the model is determined according to the strength of their correlation with the criterion variable.

In stepwise, each variable is entered in sequence and its value assessed. If adding the variable contributes to the model then it is retained, but all other variables in the model are then re-tested to see if they are still contributing to the success of the model. If they no longer contribute significantly they are removed. Thus, this method ensures that you end up with the smallest possible set of predictor variables included in your model.

5.2.2 Definition and Selection of Variables

This section presents the definition of the variables that were used in the analysis. The reason for selection of these variables originates from the review of literature as presented earlier in chapter two. The variables used in estimating the relationship between the use of farm input (fertilizer) and other determining factors are presented below.

5.2.2.1 The Dependent Variable

The dependent variable, fertilizer (FERTILIZER) represents the use of farm inputs in the pineapple production. In this study, the amount of fertilizer per acre used by a household in one farming season is used as a proxy for farm investment. A bag weighing 50 kilograms is used as a unit to capture the quantity of applied fertilizer (usually fertilizer is packed in 50 kg bags). Therefore, it can be seen that the dependent variable is a continuous input of the intensity of use as given by the quantity of bags of fertilizer.

5.2.2.2 Explanatory Variables

The explanatory or independent variables used to estimate the farm investment model fall into two major categories, incentives and capacity to investment. Based on the theoretical framework presented above, the study hypothesizes that the choice of utilizing non-farm income for the purchase of inputs on pineapple farm will be a function of the following variables.

5.2.2.2a Household Income

The household farm capital endowment (NETINCOME) is measured by the value of its total annual income. The household net income is included not only as a control for other potential sources of income to finance input purchases, but also to capture the household's capacity and orientation towards farming.

5.2.2.2b Pineapple Farm Size

The total area sown by the households (PINEAREA) is used as a measure of the amount of land for farm production instead of the size of land by which a household possess either through inheritance or hiring (i.e., the amount of land controlled by the household). This is because most of the interviewed pineapple farmers hold larger parcels of land compared to the portions they dedicate for pineapple farming and thus the amount of land controlled by the household will not necessarily reflect the amount of land used for pineapple production.

The effect of farm size is ambiguous; however, access to physical capital is crucial to acquire wealth, which in turn influences the choice of activity to participate in. For instance, access to land may allow households to participate more in agricultural activities as opposed to non-farm activities. Through increased income from farming, households are able to invest more in non-farm income activities as it was observed for some households who claimed to have used farm profits to open up businesses/shops. Conversely, increased access to land can also lead to a decrease in their participation in non-farm activities. This is because the households decide to allocate more labour to farming.

5.2.2.2c Non-Farm Income

Households' total cash generated from non-farm activities (NFINCOME) gives a measure of households' income from non-farm employment. All receipts in kind in exchange for household labour are excluded from the definition of non-farm income because it is not possible to establish the values for some of them.

5.2.2.2d Pineapple Price

Price for pineapple (PINPRICE) in the previous season is also included in the model as a proxy for expected net returns by the farmer.

5.2.2.2e Location of Pineapple Farmers

Location of pineapple farmers is used as proxy for household observable plot characteristics. The dummy variables included in the estimation are for Fotobi (LOC1), Amanfro (LOC2) and Pokrom (LOC3). Due to location differences between the settlements it is assumed that it may capture unobservable characteristics that may affect input prices, transportation costs and output prices. These are included as dummy variables.

5.2.2.2f Education

Education is also included in the model as dummy variable. Education (EDU) is captured as a variable for whether the household head is uneducated or had acquired formal education. In addition, other three dummy variables are added to the model to capture the different levels of education. Although a difference on the adoption and use of fertilizer is expected between educated and non educated farmers, it is also hypothesized that the differing levels within the educated (primary, secondary or tertiary) may affect the model as well.

5.2.2.2g Gender

The study takes account of gender (male headedness) to assess whether and how the regression intercept changes between male and female headed household who is assumed to make decisions on input use. This variable is also added in the model as a dummy.

5.2.2.2h Types of Non-Farm Activities

Furthermore, the study includes variables for disaggregated type of non-farm activities, formal wage employment (FORMNF), trade/business (TRADE), informal employment (INFNF) and self employment (SELFNF). These variables are also captured as dummies. Remittances are not captured in this study as very few farmers reported to have received this kind of income. Besides, specific information on the motive and worth of the received remittances was difficult to capture. It is hypothesized that the nature of non-farm income activities correlates to the amount of income generated and thus may affect its utilization on the purchase of farm inputs.

5.2.2.2i Age of Household Head

Another variable used to capture the effects of households' socio-economic characteristics is the age of the household head (HHAGE). The age of the household head is important in determining the extent to which the household has developed in its life cycle.

5.2.2.2j Association Membership

It is important to note that this study appreciates the importance of social capital on non-farm sector as individuals and households with better social networks have greater opportunities in the non-farm sector. This would require capturing a variable that reflects whether a household member is involved in any association or informal group activities. The study was able to capture one form of associations in the three settlements - farmers' cooperative organisations.

The study has also found that more than two farmer cooperatives exist in each settlement; however, it was able to reach four cooperatives (one from each settlement and one for farmers supplying pineapples to a factory). A great proportion (96.7%) of interviewed farmers belonged to at least one cooperative. Such organizations provide mechanism for mutual aid among members. These associations and groups are established to secure labour,

skills as well as credit.¹⁵ This study assumes that all farmers have equal opportunities towards benefits seized from social networks and thus it is not included in the model.

The summary and sample means of the variables used in the analysis is presented in Appendix 1. However, it should be noted that the inclusion of price of fertilizer in the model would be a good control for variations in input use as a result of changes in economic incentives facing households. Still, the analysis did not include price of fertilizer as it was observed that almost all farmers buy fertilizer at the same price (all farmers buy fertilizer in Nsawam). It is hereby assumed that the effect of difference in transport cost will be manifested in the locational characteristics.

5.3 Results and Discussion

The multiple regression method was used in estimating the amount of fertilizer used in pineapple farms. A stepwise regression model was run with observations for all 92 households. The independent variables used in the estimation of the use of fertilizer model are net farm household income, location (Pokrom), non-farm income and formal employment. These variables have been chosen since they are very significant statistically and contribute on the determination of the amount of fertilizer used in the farm. The dependent variable is the amount of fertilizer measured in bags of 50 kilograms.

The criterion for selecting or dropping an independent variable from the final model was based on its significance probability. Variables with significance probability of less than or equal to 0.05 were entered while those with significance probability greater than 0.05 were dropped. Four variables were selected as being the key independent variables contributing to the fertilizer utilization model. These variables are net income, location (Pokrom), non-farm income and formal employment. From the regression output, it was found that, all the independent variables of the model had the significance probability of 0.000 as shown in table 5.2 below. These significance probabilities are all less than the 0.05 needed to be included in the final model.

¹⁵ It was observed that in all farmer cooperatives, group members contribute 5 Cedis as registration fee and 50 Pesewas as monthly dues each to the group each time they sell their harvest. This money is meant to be loaned out on a rotation basis to members for liquidity provision when needed, however, none of the cooperatives has given out the loans yet (1 US\$ = 1.45 Cedis and 1 Cedis = 100 Pesewas).

Table 5.1: Model Summary

Model Summary ^e				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.831 ^a	.691	.687	1.613
2	.850 ^b	.723	.717	1.535
3	.860 ^c	.740	.731	1.496
4	.870 ^d	.757	.746	1.454
a. Predictors: (Constant), NETINCOME				
b. Predictors: (Constant), NETINCOME, POKROM				
c. Predictors: (Constant), NETINCOME, POKROM, NFINCOME				
d. Predictors: (Constant), NETINCOME, POKROM, NFINCOME, FORMEMPL				
e. Dependent Variable: FERTILIZER				

Table 5.1 shows the summary of the multiple stepwise regression analysis for the input use model and it can be seen that the regression coefficient was 0.746. This indicates a reasonably strong relationship between fertilizer as a dependent variable and net income, location (Pokrom), non-farm income and formal employment as independent variables. The correlation of determination (R^2) of the model is 0.757 while the adjusted R^2 is 0.746. This means that about 75 percent of the variability in the use of fertilizer can be explained by the regression on the independent variable. The F value of the model is 67.997 and this is significant at less than 5%. Thus, there is a significant relationship overall between the fertilizer use and the independent variables in the model.

From the model results, it was realized that, the net household income is the main independent variable contributing about 58 percent to the entire coefficient of determination (R^2) of the model (see table 5.2). The next variable to be selected by the model is location (Pokrom) which contributes 21 percent negatively. Furthermore, non-farm income was the third variable to be added in the model and adds up 21 percent to the model. Lastly, formal employment, contributes 15 percent to the variability in the use of fertilizer within pineapple farming households.

Net income of pineapple farmer households significantly affects the amount of fertilizer used positively (58%) as shown in table 5.2 below. Wealthy household are associated with higher capacity to afford the purchase of fertilizer. In the absence of well functioning and accessible credit services, farmers are expected to finance their activities by use of own sources of cash. Connected to higher incomes, wealthy households are likely to have enough capital required

and thus are able to afford investing and managing larger farms compared to low-income households. These results show that physical capital and financial capital have significant effect on the application of fertilizer in pineapple farmers' households.

Table 5.2: Model Coefficients

Model		Coefficients					
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation
		B	Std. Error	Beta			
1	(Constant)	1.242	.271		4.588	.000	
	NETINCOME	.000	.000	.831	14.175	.000	1.000
2	(Constant)	1.788	.309		5.792	.000	
	NETINCOME	.000	.000	.796	14.015	.000	.994
	POKROM	1.075	.334	.183	3.219	.002	.994
3	(Constant)	1.926	.306		6.294	.000	
	NETINCOME	.000	.000	.671	8.794	.000	.808
	POKROM	1.226	.331	.209	3.699	.000	.929
	NETINCOME	.000	.000	.180	2.402	.018	.925
4	(Constant)	2.066	.303		6.825	.000	
	NETINCOME	.000	.000	.875	6.897	.000	.401
	POKROM	-1.203	.322	-.205	-3.733	.000	.929
	NETINCOME	.000	.000	.213	2.875	.005	.810
	FORMEMPI	1.649	.665	.182	2.479	.018	.739

a. Dependent Variable: FERTILIZER

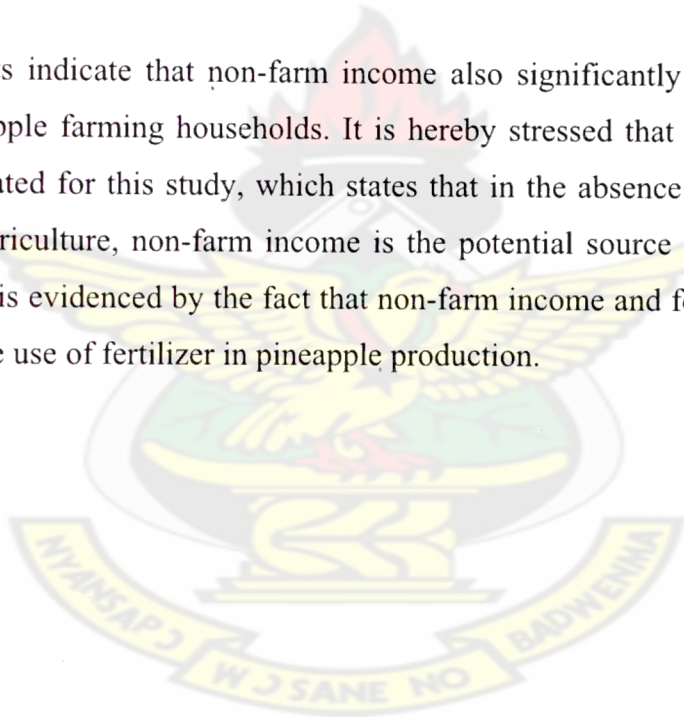
The significant and positive coefficients of non-farm income suggest that farmer households engaged in non-farm activities are usually associated with high rates of fertilizer use. In this case, non-farm earnings could be viewed as acting to relax the cash constraint on fertilizer use. Although non-farm income has a positive effect on the amount of fertilizer, the results shows that the nature of non-farm activity practiced also contributes in determining the variability of fertilizer use. This is justified by the fact that formal employment has a significant effect on the amount of fertilizer used in pineapple production.

From table 5.2 above, the model shows that POKROM has a significant negative effect on fertilizer use. Possible explanation could be that POKROM being the farthest settlement from Asawam town, pineapple farmers in this community are forced to pay for additional costs compared to their counterparts in Fofoti and Ananillo. This is because as farms get larger,

sold in Nsawam town. Other non observable reasons can also contribute to this demonstrated phenomenon.

Regression results also indicate that having a formal employment significantly increases the use of fertilizer. This implies that, in general and holding other factors constant, pineapple farmers with formal employment have a higher probability of using more fertilizer. Moreover, it should be noted that the significance of formal employment in the model also depicts the relationship between education and non-farm activities. As discussed above, formal employment requires professional skills that are likely to be attained through formal education. In that case, it is correct to argue that those engaged in formal employment have higher education than those in other types of non-farm activities. These evidences reinforce that education is of importance for non-agricultural income earnings (Islam, 1997; Sharad 2006).

These empirical results indicate that non-farm income also significantly affects the use of fertilizer within pineapple farming households. It is hereby stressed that the results accepts the hypothesis formulated for this study, which states that in the absence of effective credit schemes to finance agriculture, non-farm income is the potential source of cash capital for farm investment. This is evidenced by the fact that non-farm income and formal employment significantly affects the use of fertilizer in pineapple production.



CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents key findings of the study, the appropriate recommendations to address observed issues and lastly, the conclusion of the study.

6.2 Summary of Findings

The study has found that pineapple farmers face liquidity constraints as pineapple production is a capital intensive activity. The production cycle of the crop takes between nine (9) and thirteen (13) months, depending on weather and management (i.e. the application of fertilizer, agrochemicals and forcing). This situation substantiates the need for cash income to allow pineapple farming households to finance the management of farms and its livelihood. It is on this fact that credit financing could be an important source of cash income to pineapple farming households. However, the study has found that credit financing is almost non-existent in the study area. Access to formal sources of credit¹⁶ within the study area is very limited (only 1% of the pineapple farmers reported to have accessed loans during their start-up). However, the interviewed farmers reported to rely more on informal credit sources (borrowing money from friends and relatives).

The sale of pineapple is a key mechanism for the monetization of farmers. This means, the higher the household self-consumption as part of the total agricultural production, the higher their need to generate income by producing and selling pineapples. Thus, this activity is performed almost the whole year, requiring excessive work hours from the household members.

Notwithstanding the importance of the pineapple production within pineapple farmer households in the study area, the study has revealed that non-farm activities play a significant role in the livelihoods of these households. The findings of this study show that non-farm income is associated with an increase in fertilizer use and thus demonstrating the importance of non-farm income in pineapple production. These findings correspond to the findings of other studies (Mathenge, 2007; Chikwama, 2004 and Hertz, 2006).

¹⁶ Formal sources of credit refer to credit institutions and microfinance projects.

The study also finds that distance from urban centres play a determining role in the extent to which farm production cost is concerned. This implies that the growing attention for non-farm employment as a strategy for rural poverty reduction is warranted, but needs to account for geographical differences.

Although the results of the study confirm that non-farm employment is important for pineapple farming households it can however not be taken for granted that non-farm employment provides a path out of cash constraints. Besides commonly analyzed factors like education and gender differences, distance from urban centres plays a key role in determining access to non-farm employment. This limits the scope for using local non-farm employment for cash constraints in remote areas, suggesting possibly a focus on migratory employment. In terms of sustainability of agricultural production the study has revealed that non-farm income is conducive with pineapple production as the management of the crop provide idle periods within its cycle. A differing situation may create competition between farm and non-farm activities in terms of resource allocation by the farmer.

6.3 Conclusion

The preceding chapters have both conceptually and analytically demonstrated farmers own cash income as major and the only important source of capital financing. As this prevails, non-farm income relaxes farmers' liquidity constraint and plays a role in financing agricultural production, thereby creating farm-non-farm linkages at the household level.

Looking at the findings, specifically the significance of non-farm income on the use of farm inputs in pineapple production, there is no doubt in saying that non-farm income is one of the most potential sources of capital finance for farmers on which the future of many of the small scale farmers can rely.

This work has developed a theoretically consistent model of a farming household's source of capital finance in situations where functioning credit schemes are not available. It improves on the previous literature which has either focused on farm investment considering the effects of non-farm income or focused on non-farm work without consideration of on-farm investment decisions. The findings demonstrate the potential for non-farm income to be more important to farming households' pineapple farm investment decisions than characteristics of pineapple farms and farmers.

These findings imply that the development of agricultural sector can be associated with farm-non-farm linkages and growth multiplier effects, and should therefore be an important element in development strategies. Moreover, the results suggest that an analysis of the welfare implications of increasing agricultural exports and associated agro-industrialization in Ghana should look beyond direct production linkages.

6.4 Recommendations

Three of the variables that had relatively large impact on fertilizer use are income (total income and non-farm income), formal employment and distance from the urban centre in this case Nsawam. All of these variables are ones that are directly affected by current government policies covering social service provision, economic and employment opportunities (including agriculture, infrastructure and trade policies). Focusing on these issues as raised in the findings, the recommendations of the study are as follows:-

(i) The need to develop non-farm income through improving the access to capital assets

Available evidence suggests that despite the importance of agricultural income for the rural households, growth of non-farm economy will improve the standard living of rural population. Nevertheless, as far as the poor households are concerned, those better endowed with financial, human and political capital; prove better equipped to take advantage of growth in the high-productivity segments of the rural non-farm economy. The fact that more educated and wealthier farmers have higher possibility to use non-farm income to finance agriculture may signify this phenomenon.

While acknowledging macro and micro poverty reduction and growth promotion efforts of the government, this study recommends a special focus on addressing the need to improve access to capital assets including financial, human, political and social capital. This will ensure access to incentives and capacities to invest as these are the main factors that determine farmers' investment decisions. This implies diagnosing the capital assets constraining small scale farmers with respect to entrance into the more dynamic and remunerative non-farm income activities, and using policies and programmes to address those asset constraints.

Study results shows that financial capital, basic education and professional skills contribute to a great degree in determining the diversification into non-farm activities and consequently the

income generated from them. In turn, the improvement of access to capital assets will often require investments in general education and specific skill building for non-farm income generating activities (such as agro-processing technologies) and in market and technology information centres in rural areas for the purpose of identifying promising opportunities. It will also mean promoting non-farm employment and strengthening agricultural linkages in areas poorly served by infrastructure. This involves public investments aimed at allowing the poorer hinterlands to benefit from and participate in the growth.

(ii) The need for improved access of farmers to credit financial schemes

The observed credit constraints might severely limit both farm and non-farm production and productivity growth. Although access to non-farm income might relax farmers' liquidity constraint and play a role in financing farming production, a well functioning credit market is needed for the two sectors to have a significant and required development. Two measures are recommended in order to enhance farmers' access to credit. Given the low motivation for the farmers to go for loans, it is recommended that farmers should be educated on the better credit management skills.

Notwithstanding other constraints of farmers' access to credit, the existing high interest rates in commercial banks is one of the major reasons contributing to low motivation to loans especially for small scale farmers. The existence of subsidized low interest rates for farm loans will increase the motivation of farmers to go for the loans. This can be achieved by lowering borrowing costs and removing the burden of the farmer paying for the administrative costs. Frameworks on special interest rates assistance programme can be conceded by the government to motivate entrepreneurs and commercial banks to invest in such credit schemes.

(iii) The need for a new perspective on the linkage between farming and non-farm economy

The growing recognition that non-farm economy is playing an important role within farming households gives an indication that appropriate policy response to it is needed. Given the size and significance of the non-farm economy, a comprehensive and informed approach is called for. However, before developing such an approach, the ways in which the two sectors (farm and non-farm) are treated need to be reconsidered. Efforts to promote non-farm activities are disorganized and insufficient, however, and the links between farm and non-farm activities are not fully recognized. Most government organizations and NGOs have focused exclusively

on agriculture, because the majority of the population is engaged in it. Non-farm activities should not be left to the industry and trade ministries; the agricultural ministries should be able to give special focus to rural non-farm activities in order to ensure sustainable farming.

Current agricultural extension programmes should include farm and non-farm activities, encourage growth of small-scale business and create non-farm employment opportunities in rural areas. Complementary policies and programmes at both the central and local governments must be developed to strengthen the link between farm and non-farm activities.

(iv) Increased market access and competitiveness of the non-farm activities

Proximity to a market base promotes all kinds of economic activities, be they farming, livestock keeping or non-farm. Market access is determined by factors such as distance to markets, access to transport infrastructure and telecommunications, access to market information, the quality of goods and services produced, volumes produced, etc. Pineapple farmers lack a better market for both farm and non-farm products.¹⁷ Possible policy options would be to improve access to market information for people employed in farm and non-farm activities. With the presence of mobile phones (which most farmers in the study area have access to)¹⁸, an information system can be established from which farmers will subscribe and get market information whenever required. Similarly, a web-platform can be introduced to provide information on agricultural markets and other statistical data as it is with West African Market Information Systems Network (RESIMAO/WAMIS-NET)¹⁹.

(v) The need for setting up a data bank

To strengthen the contribution of non-farm income to farmers and all those engaged in such activities, the typology, nature, magnitude and contribution of non-farm activities need to be

¹⁷ It was found that some farmers have given their produce (pineapples) to buyers on credit and more than six months have passed without being paid. This situation affects the farmer adversely as it precludes them from spending the money at appropriate time. Still, the buyers do not pay interest and thus the farmer loses more through depreciation of the money, given the high and fluctuating inflation rates in the country i.e. annual inflation rate of 10.7% for 2008 placing Ghana at 197th rank in the world (the first having the lowest inflation rate), Source: CIA World Fact Book, 2008. Inflation rate as of January 2009 was 19.86% (Source: Ghana Statistical Service, 2009).

¹⁸ The author observed that almost all farmers owned mobile phones. On the other hand, the three settlements have mobile phone network for MTN, Zain, Vodafone and Kassapa (own observation).

¹⁹ RESIMAO/WAMIS-NET is a Network of Market Information Systems from Benin, Together they provide to all stakeholders up to date and accurate information on 400 rural and urban agricultural commodity markets via different media. The network monitors the development of the agricultural sector through the collection and publication of prices and related statistics and analytical reports.

(Source: <http://www.isicad.org/isicad/index/english/mis>, accessed on 22 May 2009).

visible to policy makers. An improved non-farm economy statistics and other information on related sectors like farming and livestock keeping is needed to bring about comprehensive and robust policies. This is in line with the recognition of the fact that statistics are of vital importance in the development planning process.

The existence of a data bank that would allow longitudinal analyses is likely to serve a great deal in understanding the trends and linkages of both farm and non-farm activities. This call for Ghana Statistical Service, together with other stakeholders including the Ministry of Food and Agriculture under its decentralized Municipal Agricultural Development Unit to develop improved methods for the collection and compilation of data on the full range of those engaged in farm and non-farm economy, including the self employed in informal enterprises and a whole range of informal wage workers.

(vi) The need to facilitate contract agriculture

The study revealed that there had been experiences where input suppliers and pineapple buyers exercised contract agriculture – a situation where the farmer receives investment capital in forms of cash or equipments to facilitate the farming and required to refund when produce gets to the market. A need to facilitate contract agriculture is an extremely important and widely used mechanism for connecting rural producers to firms; it has the flexibility to continue this function in the future. There have been some problems of contracts not being honoured, by both the companies and farmers.²⁰ To penalize these harmful practices, which create distrust in the institutions and among farmers, there must be changes in the legal system to make litigation quicker and less costly. Producers need more access to information on their rights, to consultations on their means of recourse and to professional services that help them defend their interests. This can be tackled by forming producer groups of contract farming.

On the other hand, means should be put in place to take care for farmers in case they fail to sell their crops either due to lack of buyers or poor harvests. The earlier can be tackled by encouraging pineapple buyers to be involved in the contract agriculture and thus ensuring the availability of markets of farm produce. It is recommended that the problem of poor harvests

²⁰ Input suppliers have reported same problems as reported by Takane (2004) as farmers diverting part of the agrochemicals and fertilizers supplied by the company onto fields growing other crops. They may also use the credits supplied to them for purposes other than pineapple production. These practices may lead to sub-optimal farming practices that affect the quality of produce, resulting in inefficient use of company resources.

and other risks be solved by the introduction of crop insurance which will act as a shield for famers in case they are not able to repay the loans.

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REFERENCES

- Abdulai, A. and CroleRees, (2001), "Determinants of income diversification amongst rural households in Southern Mali" *Food Policy* 26 (2001) 437-452.
- Abdulai, A. and Delgado, C. (1999), "Determinants of Nonfarm Earnings of Farm-Based Husbands and Wives in Northern Ghana," *American Journal of Agricultural Economics*, 81(1), February: 117-30.
- Adebayo, O. O. & Adeola, R. G. (2008), Sources and Uses of Agricultural Credit by Small Scale Farmers in Surulere Local Government Area of Oyo State. *Anthropologist*, 10(4): 313-314 (2008).
- Adesina, A.A., Djato, K.K. and Pegatienan, J.H. (1994), Relative Efficiency of Rice Farms in Northern Côte d'Ivoire: Profit Function Analysis. Selected paper for the Annual Meeting of the American Association of Agricultural Economists, 7-10 August, San Diego.
- Akpotosu, B. & Musah, I. Y. (2007), Pineapple: Growth Requirement and Production Process. DADU, Akuapem South District.
- Al-Hassan, R. & Egyir, I. (2002), The Potential for Farm/Non-Farm Linkages in the Cassava Subsector in Ghana. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy.
- Amer, J. (1994), *American Journal of Agricultural Economics Association*, 1172-1176.
- André, C. and Platteau, J. P. (1998), Land Tenure under Unbearable Stress: Rwanda Caught in the Malthusian Trap, *Journal of Economic Behavior and Organization*, 34 (1).
- Anriquez, G. and Stamoulis, K. (2007), "Rural Development and Poverty Reduction: Is Agriculture Still the Key?" ESA Working Paper No. 07-02, June 2007. FAO, Rome.
- Barret C. B., Reardon, T., & Webb P. (2001), Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy*; 26:315-331.
- Barrett, C. B., Besfuneh, M., Clay, D. C. and Reardon, T. (2000), "Heterogeneous Constraints, Incentives and Income Diversification Strategies in Rural Africa", *Quarterly Journal of International Agriculture* 44(1):37-60.

- Binswanger, H., Khandker, S. and Rosenzweig, M. (1989), How Infrastructure and Financial Institutions Affect Agricultural Output and Investment In India. Working Paper, No. 163. Washington DC: World Bank.
- Bryceson, D., (1999), "African Rural Labour, Income Diversification & Livelihood Approaches: A Long-term Development Perspective," *Review of African Political Economy* 26, 80: 171-189.
- Carter, M. and Wiebe, K. (1990), Access to Capital and Its Impact on Agrarian Structure and Productivity in Kenya. *American Journal of Agricultural Economics* December: 1146-1150.
- Chikwama, C. (2004), Rural Off-Farm Employment and Farm Investment: An Analytical Framework and Evidence from Zimbabwe. Discussion Paper, 2004/03, Centre for Economic Reform and Transformation, Heriot-watt University, Edinburgh <http://www.sml.hw.ac.uk/cert/wpa/2004/dp0403.pdf> (accessed on 16th December 2008).
- Clay, D., Byiringiro, F., Kangasniemi, J., Reardon, T., Sibomana, B., Uwamariya, L., and Tardif-Douglin, D. (1995), *Promoting Food Security in Rwanda Through Sustainable Agricultural Productivity: Meeting the Challenges of Population Pressure, Land Degradation, and Poverty*. International Development Paper No. 17. East Lansing: Michigan State University.
- Cudjoe, A. R., Kyofa-Boamah, M. and Braun M. (2002), Handbook of Crop Production Recommendations in Ghana: An IPM Approach. Volume 4: Selected Fruit Crops (Mango, Papaya, Pineapple). Ministry of Food and Agriculture, Accra, Ghana.
- Davis, B., Reardon, T., Stamoulis, K. G. and Winters, P. (2002), Promoting Farm/Non-farm Linkages for Rural Development. FAO, Rome, Italy.
- Dercon, S. and Krishnan, P. (1996), "Income Portfolios in Rural Ethiopia and Tanzania: Choices and Constraints." *Journal of Development Studies* 32 (6), 850-75.
- Ellis, F. (1998), Survey Article: Household Strategies and Rural Livelihood Diversification. *Journal of Development Studies*, 35(1): 1-38.

- Ellis, F. (1999), Rural livelihood diversity in developing countries: evidence and policy implications. Overseas Development Institute Natural Resource Perspectives, No. 40. London: Overseas Development Institute.
- Feder, G., Just, R. E. and Zilberman, D. (1985), Adoption of agricultural innovations in developing countries: a survey. *Economic Development and Cultural Change*, 3:255–298.
- Francis, E. and Hoddinott, J. (1993), Migration and differentiation in western Kenya: A tale of two sub-locations. *Journal of Development Studies*, 30 (October) (1): 115-145.
- Gordon, A. & Craig, C. (2001), Rural Non-farm Activities and Poverty Alleviation in Sub-Saharan Africa. Policy Series 14. Chatham, UK: Natural Resources Institute.
- GSS (2005), Socio-Economic and Demographic Trend Analysis, Volume I. Ghana Statistical Service. Accra, Ghana.
- Haggblade S., Hazell P. and Reardon T. (2006), *Transforming the Rural Non-farm Economy*. Baltimore: Johns Hopkins University Press.
- Haggblade, S. and Hazell, P. B. R. (1989). Agricultural technology and farm-nonfarm growth linkages. *Agricultural Economics* (3): 345-64.
- Haggblade, S.; Hazell, P. B. R. and Brown, J. (1987), Farm/Non-Farm Linkages in Rural Sub-Saharan Africa: *Empirical Evidence and Policy Implications*. Discussion Paper 67. Washington, D.C.: The World Bank.
- Hertz, T. (2006), Determinants of Investment in Bulgarian Family Farming. Department of Economics, American University.
- Hertz, T. (2007), The Effect of Non-Farm Income on Investment in Bulgarian Family Farming. Revised for Presentation at FAO Conference on Migration and Agriculture, Rome, Italy.
- Ho, S. P. S. (1986), The Asian Experience in Rural Non-Agricultural Development and its Relevance for China, *World Bank Staff Discussion Papers No 757*.
- Horn, N. E., Da Silva, T. and Ara, S. (2000), Gender-based Market Research: Nampula Province, Mozambique. Final Report to United Nations Capital Development Fund and World Relief.

- Hossain, M. (2004), Rural Non-Farm Economy in Bangladesh: A View from Household Surveys. Center for Policy Dialogue (CPD) Occasional Paper Series no 40, Dhaka: Center for Policy Dialogue.
- Islam, N. (1997), The Non-Farm Sector and Rural Development. Food, Agriculture and Environment Discussion Paper, No. 22. Washington DC: International Food Policy Research Institute.
- Jayne, T., Reardon, T., Kelly, V., Crawford, E. and Savadogo, K. (1994), *Raising Farm Productivity in Africa to Sustain Long-Term Food Security*. MSU Staff Paper No. 94-77. East Lansing: Michigan State University.
- Kelly, V., Diagana, B., Reardon, T., Gaye, M. and Crawford, E. (1995), *Cash Crop and Foodgrain Productivity in Senegal: Historical View, New Survey Evidence, and Policy Implications*. MSU Staff Paper No. 95-05. East Lansing: Michigan State University.
- Kuiper, M., Meijerink, G. and Eaton, D. (2006), Rural Livelihoods: Interplay between Farm Activities, Non-farm Activities and the Resource Base. International Trade and Development, Public Issues Division, Agricultural Economics Research Institute (LEI) – Wageningen UR, The Hague, The Netherlands.
- Kumekpor, T. K. B. (2002), Research Methods & Techniques of Social Research. Sonlife Printing Press & Services. Accra, Ghana.
- Lanjouw, P. (1999), Policy options for employment in the rural non-farm sector. Rural Development Note, No 4. Washington DC: World Bank.
- Lanjouw, P. and Shariff A. (2002), Rural Nonfarm Employment in India: Access, Income, and Poverty Impact. Working Paper Series no. 81. New Delhi: National Council of Applied Economic Research.
- Low, A. (1986), Agricultural Development in Southern Africa: Farm Household Economics and the Food Crisis. London: James Currey.
- Maertens, M. (2008), Horticulture Exports, Agro-industrialization and Farm-nonfarm Linkages with the Smallholder Farm Sector: Evidence from Senegal. LICOS Discussion Paper Series, Discussion Paper 214/2008.

- Mathenge, M. K. & Tschirley, D. (2007), Off-farm Work and Farm Production Decisions: Evidence from Maize-Producing Households in Rural Kenya. *Paper submitted for the CSAE Conference 2007 on 'Economic Development in Africa', St. Catherine's College, University of Oxford, UK: March 18-20, 2007.*
- Medium-Term District Development Plan for Akuapem South District 2006-2009.
- Newman, C. and Canagarajah, S. (1999), Non-Farm Employment, Poverty and Gender Linkages: Evidence from Ghana and Uganda. Working draft paper. Washington DC: World Bank.
- Nyarko-Adu, A. (2006), Sessional Address During The Opening Of The Third Ordinary Meeting Of The Second Session Of The Assembly Held In The Hall Of The Assembly on Tuesday, 23rd May 2006. Akuapem South Municipality, Ghana.
- Ranjit, K. (1999), Research Methodology: A step by Step Guide for Beginners, Sage Publications. London, United Kingdom.
- Reardon, T. (1997), "Using Evidence of Household Income Diversification to Inform Study of the Rural Non-farm Labor Market in Africa," *World Development*, 25 (5), 735-748.
- Reardon, T. and Taylor, J. E. (1996), "Agroclimatic Shock, Income Inequality, and Poverty: Evidence from Burkina Faso," *World Development* 24, 5: 901-914.
- Reardon, T. and Vosti, S. A. (1995), "Links between rural poverty and environment in developing countries: Asset categories and investment poverty," *World Development*, 23 (9), September: 1495-1506.
- Reardon, T., Berdegue, J., Barrett, C. B. and Stamoulis, K. (2006), Household Income Diversification into Rural Nonfarm Activities. Baltimore: Johns Hopkins University Press.
- Reardon, T., Crawford, E and Kelly, V. (1994), "Links between Non-farm Income and Farm Investment in African Households: Adding the Capital Market Perspective," *American Journal of Agricultural Economics*, Vol. 76 (December): 1172-1176.

- Reardon, T., Crawford, E. and Kelly, V. (1995), Promoting Farm Investment for Sustainable Intensification of African Agriculture. MSU International Development Papers No. 18 Department of Agricultural Economics, Michigan University, Michigan, USA.
- Reardon, T., Delgado, C. L., and Matlon, P. (1992), Determinants and Effects of Income Diversification amongst Farm Households in Burkina Faso. *The Journal of Development Studies*, 28 (2): 264-96.
- Reardon, T., Stamoulis, A., Balisacan, M.E., Berdegue, J. and Banks, B. (1998), The State of Food and Agriculture, Part III. Rural Non-Farm Income in Developing Countries. Rome: Food and Agriculture Organization of the United Nations.
- RoG (2002), Food and Agriculture Sector Development Policy (FASDEP), Ministry of Food and Agriculture. Accra, Ghana.
- RoG (2007), Food and Agriculture Sector Development Policy (FASDEP II). Ministry of Food and Agriculture. Accra, Ghana.
- Ruben, R. and Van den Berg, M. (2001), "Nonfarm Employment and Poverty Alleviation of Rural Farm Households in Honduras," *World Development*, 29(3): 549-60.
- Saith, A. (1992), *The Rural Non-farm Economy: Processes and Policies*, Geneva, ILO.
- Savadogo, K., Reardon, T. and Pietola, K. (1994), "Farm Productivity in Burkina Faso: Effects of Animal Traction and Non-farm Income." *American Journal of Agricultural Economics*, Vol. 76 (August): 608-12.
- Sharad, R. (2006), Occupational Diversification and Access to Rural Employment: Revisiting the Non Farm Employment Debate. Munich Personal RePEc Archive (MPRA) Paper No. 7870, Online at <http://mpra.ub.uni-muenchen.de/7870/> (accessed on 14th December 2008).
- Smith, D. (2000), The Spatial Dimension of Access to the Rural Non-Farm Economy. Draft paper. Chatham, UK: Natural Resources Institute.
- Smith, D. R. and Zwick, K. (2001), Access to Rural Non-farm Livelihoods: Report of Preliminary field work in Kumi District, Uganda, *NRI Report No 2596*, Chatham, UK: Natural Research Institute.

- Stamoulis, K., Reardon, T., Cruz, M.E., Balisacan, A., Berdegue, J. & Banks, B. (1998), Rural Non-Farm Income in Developing Countries. In *FAO: The State of Food and Agriculture, 1998*. Rome. FAO Agriculture Series, No. 31.
- Takane, T. (2004), Smallholders and Non-traditional Exports under Economic Liberalization: The Case of Pineapples in Ghana. *African Study Monographs*, 25(1): 29-43, March 2004.
- Tiffen, M. and Mortimore, M. (1992), Environment, Population Growth and Productivity in Kenya: A Case Study of Machakos District. *Development Policy Review*, 10: 359–387.
- Tovo, M. (1991), Microenterprises among village women in Tanzania. *Small Enterprise Development*, 2 (1).
- Velazco, J. (2002), Non-Farm Rural Activities (NFRA) in a Peasant Economy: The Case of the North Peruvian Sierra. Paper presented at the Second EUDN Workshop on Development Research for Doctoral Students, Bonn, 18-19 October 2002.
- White, J. & Robinson, E. (2000), HIV/AIDS and Rural Livelihoods in Sub-Saharan Africa. Policy Series 6. Chatham, UK: Natural Resources Institute.
- Woldehanna, T. (2002), 'Rural farm/nonfarm income linkages in northern Ethiopia', in B. Davis, T. Reardon, K. Stamoulis and P. Winters (eds.) *Promoting farm/non-farm linkages for rural development: Case studies from Africa and Latin America*, Rome: FAO, 121-144.
- Wolz, A. (2005), The Role of Agriculture and Rural Development in Achieving the Millennium Development Goals. GDPRD. Bonn, Germany.

Appendices

Appendix 1: Determination of Sample Size

From the formula $n = \frac{N}{1 + N(\alpha)^2}$ where n = sample size, N = Sample population and α is the confidence level. Given that $N = 1189$, $\alpha = 90\%$ i.e. 0.1, the sample size (n) for the study is achieved as follows

$$n = \frac{1189}{1 + 1189(0.1)^2}$$

$$n = \frac{1189}{1 + 1189(0.01)}$$

$$n = \frac{1189}{1 + 11.89}$$

$$n = \frac{1189}{12.89} = 92.17 \approx 92$$

Therefore, the sample size (n) for the study is 92 pineapple farmer households.

Appendix 2: Population Projections

Using the 2000 Population and Housing Census data, the population projections for the municipal and the three study settlements were made using the exponential formula $N = N_0 e^{rt}$ where

- N_0 is the starting population
- N is the population after a certain time
- t a certain time,
- r is population growth rate (Municipal population growth rate which is 1.6 was used for all projections)
- e is the constant 2.71828... (the base of natural logarithms).

Appendix 3: The Definition of Variables

Variable Name	Signifier	Variable Definition
Fertilizer	FERTILIZER	Total amount of fertilizer per acre (bags) applied in the previous season
Household income	NETINCOME	Net value (Cedis) of household income in the previous farming season
Pineapple farm size	PINEAREA	Total amount of pineapple farm cultivated by the household in the previous farming season (in acres)
Non-farm income	NFINCOME	Total cash (Cedis) earned by the household from working in non-farm activities in the previous farming season
Price of Pineapple	PINEPRICE	The price offered by the buyers for one pineapple fruit in the previous farming season
Fotobi	LOC1	Dummy: equal to 1 if household is located in Fotobi
Amanfro	LOC2	Dummy: equal to 1 if household is located in Amanfro
Pokrom	LOC3	Dummy: equal to 1 if household is located in Pokrom
Household head Education	EDU	Dummy: equal to 1 if household head has formal education
	PRIMEDU	Dummy: equal to 1 if household head has primary education
	SECEDU	Dummy: equal to 1 if household head has secondary education
	TERTEDU	Dummy: equal to 1 if household head has tertiary education
Sex of head	HHMALE	Dummy: equal to 1 if household is headed by a male
Formal employment	FORMNF	Dummy: equal to 1 if household head has formal employment
Trade	TRADE	Dummy: equal to 1 if household head is engaged in trade
Informal employment	INFNF	Dummy: equal to 1 if household head is engaged in informal employment
Self employment	SELFNF	Dummy: equal to 1 if household head is self employed
Age of household head	HHAGE	Age of household head
Association membership	ASSOC	Dummy: equal to 1 if household is a member to at least one pineapple farmer association
Pineapple experience	PINEXP	Total number of years spent in producing pineapples

Source: Author's Field Survey, April 2009.

Appendix 4: Regression Results - ANOVA

ANOVA ^e						
Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	523.002	1	523.002	200.942	.000 ^a
	Residual	234.248	90	2.603		
	Total	757.250	91			
2	Regression	547.428	2	273.714	116.101	.000 ^b
	Residual	209.822	89	2.358		
	Total	757.250	91			
3	Regression	560.335	3	186.778	83.470	.000 ^c
	Residual	196.915	88	2.238		
	Total	757.250	91			
4	Regression	573.326	4	143.332	67.799	.000 ^d
	Residual	183.924	87	2.114		
	Total	757.250	91			
a. Predictors: (Constant), NETINCOME						
b. Predictors: (Constant), NETINCOME, POKROM						
c. Predictors: (Constant), NETINCOME, POKROM, NFINCOME						
d. Predictors: (Constant), NETINCOME, POKROM, NFINCOME, FORMEMPL						
e. Dependent Variable: FERTILIZER						

Source: Author’s Field Survey, April 2009.

Appendix 5: Entered and Removed Variables

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	NETINCOME		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	POKROM		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	NFINCOME		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	FORMEMPL		Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: FERTILIZER

Source: Author’s Field Survey, April 2009.



Appendix 6: Excluded Variables

Excluded Variables ^a								
Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	POKROM	-.183 ^a	-3.219	.002	-.323	.964	1.037	.964
	AMANFRO	.034 ^a	.579	.564	.061	.982	1.018	.982
	FOTOBI	.129 ^a	2.249	.027	.232	.993	1.007	.993
	HHAGE	.017 ^a	.295	.769	.031	.989	1.011	.989
	SEX	-.001 ^a	-.023	.981	-.002	.989	1.011	.989
	EDU	-.056 ^a	-.955	.342	-.101	.999	1.001	.999
	PREDU	-.033 ^a	-.531	.597	-.056	.922	1.085	.922
	TERTEDU	.117 ^a	1.750	.084	.182	.756	1.323	.756
	SECEDU	.008 ^a	.126	.900	.013	.839	1.191	.839
	HH SIZE	-.090 ^a	-1.546	.126	-.162	.999	1.001	.999
	PINEXP	-.092 ^a	-1.560	.122	-.163	.982	1.019	.982
	PINEAREA	.125 ^a	1.990	.050	.206	.837	1.195	.837
	SELFEMPL	-.043 ^a	-.726	.470	-.077	.984	1.016	.984
	FORMEMPL	.133 ^a	2.023	.046	.210	.766	1.305	.766
	INFOEMPL	.004 ^a	.071	.944	.007	.995	1.005	.995
	TRADE	-.029 ^a	-.499	.619	-.053	.998	1.002	.998
	NFINCOME	.127 ^a	1.620	.109	.169	.547	1.829	.547
	ASSOC	-.056 ^a	-.953	.343	-.100	.997	1.003	.997
	PINEPRICE	.046 ^a	.779	.438	.082	.993	1.007	.993
2	AMANFRO	-.037 ^b	-.609	.544	-.065	.851	1.176	.835
	FOTOBI	.015 ^b	.202	.841	.022	.545	1.833	.529
	HHAGE	.010 ^b	.185	.853	.020	.987	1.013	.955
	SEX	.012 ^b	.211	.834	.022	.983	1.017	.956
	EDU	-.075 ^b	-1.334	.186	-.141	.989	1.011	.955
	PREDU	-.031 ^b	-.529	.598	-.056	.922	1.085	.891
	TERTEDU	.132 ^b	2.097	.039	.218	.752	1.330	.726
	SECEDU	-.013 ^b	-.219	.827	-.023	.829	1.206	.800
	HH SIZE	-.103 ^b	-1.858	.067	-.194	.994	1.006	.960
	PINEXP	-.068 ^b	-1.201	.233	-.127	.963	1.038	.946
	PINEAREA	.101 ^b	1.649	.103	.173	.821	1.217	.821
	SELFEMPL	-.038 ^b	-.670	.505	-.071	.983	1.017	.948
	FORMEMPL	.121 ^b	1.918	.058	.200	.763	1.310	.752
	INFOEMPL	-.010 ^b	-.176	.860	-.019	.989	1.011	.958
	TRADE	-.003 ^b	-.059	.953	-.006	.977	1.024	.944
	NFINCOME	.180 ^b	2.402	.018	.248	.527	1.897	.508
	ASSOC	-.062 ^b	-1.109	.270	-.117	.996	1.004	.961
	PINEPRICE	.031 ^b	.544	.588	.058	.986	1.014	.955

3	AMANFRO	-.080 ^c	-1.310	.194	-.139	.792	1.263	.491
	FOTOB	.059 ^c	.782	.436	.084	.516	1.937	.499
	HHAGE	.018 ^c	.318	.751	.034	.984	1.016	.503
	SEX	.027 ^c	.489	.626	.052	.971	1.030	.508
	EDU	-.078 ^c	-1.439	.154	-.152	.988	1.012	.508
	PREDU	-.023 ^c	-.399	.691	-.043	.919	1.089	.478
	TERTEDU	.067 ^c	.859	.393	.092	.490	2.042	.343
	SECEDU	.000 ^c	-.009	.993	.000	.823	1.216	.474
	HH SIZE	-.095 ^c	-1.765	.081	-.186	.991	1.009	.507
	PINEXP	-.062 ^c	-1.122	.265	-.119	.961	1.040	.507
	PINEAREA	.114 ^c	1.920	.058	.202	.815	1.226	.450
	SELFEMPL	-.026 ^c	-.468	.641	-.050	.975	1.026	.496
	FORMEMPL	.152 ^c	2.479	.015	.257	.739	1.353	.401
	INFOEMPL	-.026 ^c	-.471	.639	-.050	.975	1.026	.507
	TRADE	-.055 ^c	-.944	.348	-.101	.861	1.161	.465
	ASSOC	-.053 ^c	-.966	.337	-.103	.991	1.009	.508
	PINEPRICE	.020 ^c	.354	.724	.038	.979	1.022	.500
4	AMANFRO	-.065 ^d	-1.099	.275	-.118	.784	1.276	.399
	FOTOB	.038 ^d	.518	.606	.056	.509	1.964	.400
	HHAGE	-.011 ^d	-.193	.847	-.021	.941	1.062	.401
	SEX	.038 ^d	.706	.482	.076	.965	1.037	.400
	EDU	-.084 ^d	-1.586	.116	-.169	.987	1.014	.401
	PREDU	-.023 ^d	-.420	.675	-.045	.919	1.089	.382
	TERTEDU	.036 ^d	.472	.638	.051	.476	2.101	.323
	SECEDU	-.025 ^d	-.415	.679	-.045	.801	1.248	.365
	HH SIZE	-.085 ^d	-1.604	.112	-.170	.984	1.017	.398
	PINEXP	-.058 ^d	-1.086	.281	-.116	.960	1.041	.401
	PINEAREA	.067 ^d	1.043	.300	.112	.685	1.459	.392
	SELFEMPL	-.004 ^d	-.067	.947	-.007	.947	1.056	.382
	INFOEMPL	-.007 ^d	-.124	.902	-.013	.954	1.048	.401
	TRADE	-.031 ^d	-.540	.591	-.058	.834	1.199	.391
	ASSOC	-.047 ^d	-.880	.381	-.094	.989	1.012	.401
	PINEPRICE	.004 ^d	.082	.934	.009	.966	1.035	.390

a. Predictors in the Model: (Constant), NETINCOME

b. Predictors in the Model: (Constant), NETINCOME, POKROM

c. Predictors in the Model: (Constant), NETINCOME, POKROM, NFINCOME

d. Predictors in the Model: (Constant), NETINCOME, POKROM, NFINCOME, FORMEMPL

e. Dependent Variable: FERTILIZER

Source: Author's Field Survey, April 2009.

Appendix 7: Household Questionnaire

INTERVIEW SCHEDULE FOR PINEAPPLE FARMERS

Name of Enumerator.....

Community: Date of Interview:

A: BACKGROUND INFORMATION

1. Name of interviewee (household head).....
2. Age:
3. Sex: Male ☐ Female ☐
4. Marital status
- (i) Married ☐ (ii) Single ☐ (iii) Widowed ☐ (iv) Divorced ☐ (v) Separated ☐
- (vi) Others ☐ (specify).....
5. What is your level of education?
- (i) None ☐ (ii) Primary ☐ (iii) Secondary ☐ (iv) Polytechnic ☐
- (vi) University ☐ (vii) Others ☐ (specify).....
6. How many members are you in this household? Please fill the following table

Age group	Population		
	Male	Female	Travelled/schooling
0 - 14			
15 – 24			
25 - 44			
45 – 65			
Above 65			

B: ECONOMIC ACTIVITIES

7. What is the main occupation of the household head?
- (i) Farming ☐ (ii) Livestock keeping ☐ (iii) Trade ☐ (iv) Employed ☐
- (v) Others ☐ specify.....
8. How many members of the household engage in income generating activities? Please fill the following table.

S/N	HH Member	Activity	Weekly income	Monthly income	Remarks
1					
2					
3					
4					
5					

9. From Qn. 7 above, (if farming), do you produce pineapples? Yes [] No []
10. If yes, what are the reasons that you decided to engage in pineapple production and not other crops?

When did you start producing pineapple?year/month

11. What income generating activities do you engage during the off-season?
- (i) Labourer []
- (ii) Trade []
- (iii) Others [] Please specify.....
12. What are the reasons to engage in activities mentioned in Qn.12 above?

What is your daily/weekly/monthly income from this/these activity/ies?

S/N	Activity	Weekly income	Monthly income (G¢)	Remarks
1				
2				
3				

13. Have these activities changed in the past 3years? Yes [] No []
14. If yes, what were the major changes in activities during this time?
15. How do you intend to cope with the changes stated in Qn. 16 above?

C: ACCESS TO PHYSICAL ASSETS

i) NATURAL CAPITAL

16. Do you own land? Yes [] No []
17. If No, how do get access to land?

If Yes, how did you acquire the land?

- (i) Buying [] (ii) Leasing [] (iii) Inheritance [] (iv) Shared tenancy []
(v) Others [] specify.....

18. If you are leasing, how do you pay the rent (from Qn. 23 (ii) above)?

- (i) Cash [] (ii) Labour [] (iii) Share of crops [] (iv) Others []
specify.....

19. What size of land do you own?

- (i) Less than 1 acre []
(ii) 1 - 3 acres []
(iii) 4 - 6 acres []
(iv) Above 6 acres [] specify

20. What crops are cultivated on the land?

S/N	Crop	Land size
1		
2		
3		
4		

21. Do you rent out land or lease land to other people? Yes [] No []

22. If Yes, for what purpose do you rent out the land for?

.....
.....

If No, why not?

.....
.....

Do you need additional land for pineapple farming? Yes [] No []

23. If Yes, how many additional hectares or acres of land would you use?

.....

24. How would you acquire this additional land?

- (i) Family [] (ii) Purchase [] (iii) Renting [] (iv) Others []
specify.....

25. Where would you get this additional land

26. Has the land size used for pineapple production increased/reduced since you start
producing pineapple? Yes [] No []

27. If yes, how much?

(i) Less than 1 acre [] (ii) 1 - 2 acres []

(iii) 3 - 4 acres [] (iv) Above 4 acres []

28. What are the reasons for its increase or reduction?

.....

.....

PHYSICAL ASSETS

29. Do you own the house you are living? Yes [] No []

30. If no, do you rent it? Yes [] No []

31. What other occupancy arrangements exist?

.....

Do you own a shop? Yes [] No []

32. If yes, where?

.....

Why did you decide to open/run a shop?

.....

.....

Do you use part of the income generated in a shop to finance pineapple farming?

Yes [] No []

33. Do you borrow/rent any equipment for your farm? Yes [] No []

34. If yes, which ones and from who?

S/N	Equipment	Source/Lender	Cost (Cedis)	Remarks
1				
2				
3				
4				

35. What is the source of your labour on the pineapple farms?

(i) Family [] (ii) Shared cropping [] (iii) Hiring [] (iv) Others []

specify

36. If family, how many people do help you on the farm?

.....

How many days/months do you and the others put into the cultivation of pineapple per season?

S/N	HH member	Days	Months	Seasons	Remarks
1					
2					
3					

37. In case you hire labour, how do you pay them?

Payment type	Amount/Rate	Remarks
Cash		
In kind		
Others (specify)		

38. What was the source of your initial investments for pineapple cultivation?

(i) Own capital [] (ii) Loan [](iii) Remittances [] (iv) Others []
specify.....

39. If own capital, how did you raise the money?

(i) Sell of farm products/crops [] (ii) Wage []
(ii) Business/trade [] (iv) Others [] specify

40. What did you use if for? Please fill the table below

S/N	Item	Cost (Cedis)	Distance **	Remarks (affordable/expensive)
1	Land			
2	Labour			
3	Fertilizer			
4	Seeds			
5	Pesticides			
6	Transport			
7	Extension services			
8	Others (specify)			

** If applicable

41. Do you rely sorely (stability and reliability) on the money coming from pineapple?

Yes [] No []

42. If no, what other sources of income do you have?

S/N	Activity	Weekly income	Monthly income	Remarks
1				
2				
3				

43. Are there other sources of income you think can contribute to your pineapple farming finances?

Yes [] No []

44. If yes, which ones

.....

.....

What factors determines the decision to use these other sources of income to finance pineapple production?

.....

.....

Are you a member of any pineapple producers' organisation/cooperatives? Yes [] No []

45. If yes, which one/s?

S/N	Name of organisation	Membership	Benefits
1			
2			
3			

46. What price do you sell your products? (last harvest)

Selling centre	Price	Quantity	Distance
Farm gate			
Pineapple purchasing centre			
Factory			
Others (specify)			

47. Household Expenditure Pattern

Items	Description	Expenses (Cedis)				Remarks
		Daily	Weekly	Monthly	Annual/Year	
Food and beverages	Food					
	Drinks					
	Clothing					
	Footwear					
Housing	Housing/rent					
	Water					
	Electricity					
	Gas					
	Paraffin					
	Charcoal/firewood					
Health	Hospital services					
	Drugs					
	Transport (health)					
Transport	Transport fare					
	Fuel					
	Operation of transport equipment					
Communication	Telephone					
	Internet					
	Newspapers					
Education	Pre-primary & primary					
	Secondary					
	Tertiary					
	Others					
Miscellaneous	Credit					
	Donation/contributions					
	Others					

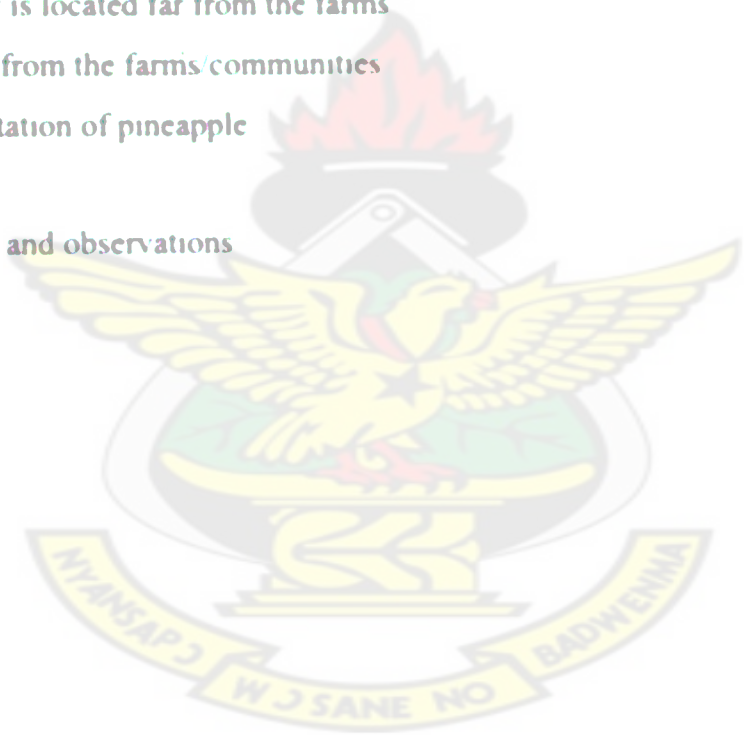
Appendix 8: Interview Guide for Pineapple Buyers

INTERVIEW GUIDE FOR PINEAPPLE BUYERS

Name of the Buyer: Date of Interview

Location:

1. What is your catchment area? (geographical locations area)
2. What type of farmers do you serve? (Any specific potential pineapple producers?)
3. What standards do the farmers have to fulfil?
4. What measures do you put in place to assist farmers to attain the set standards?
5. Are there situations where you reject pineapples from the farmers?
6. If yes, what would be the reasons?
7. What price do you buy the products? How often do these prices change?
8. In case the buyer is located far from the farms
 - Distance from the farms/communities
 - Transportation of pineapple
 - Storage
9. Other comments and observations



Appendix 9: Interview Guide for Fertilizer and Seed Suppliers

INTERVIEW GUIDE FOR FERTILIZER AND SEED SUPPLIERS

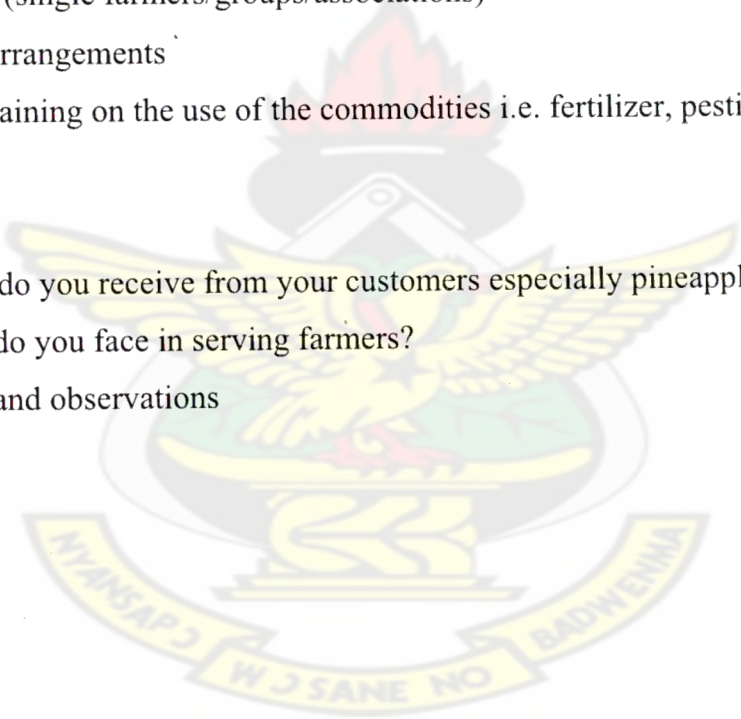
Name of the Supplier: Date of Interview:

Location:

Activities of the supplier:
.....

What commodities do you sell?

1. Who are the potential buyers?
2. Do you sell your commodities through credit?
3. If yes, how?
 - Accessibility arrangements
 - Eligibility (single farmers/groups/associations)
 - Payment arrangements
4. Do you provide training on the use of the commodities i.e. fertilizer, pesticides?
5. If yes, how?
6. If no, why?
7. What complaints do you receive from your customers especially pineapple farmers?
8. What challenges do you face in serving farmers?
9. Other comments and observations



Appendix 10: Interview Guide for Municipal Agriculture Development Unit

**INTERVIEW GUIDE FOR MUNICIPAL AGRICULTURAL DEVELOPMENT UNIT
(MADU)**

Name of the Official: Date of Interview:
Designation: Department:

1. Please provide information on the following headings with reference to the activities of the pineapple farmers?
 - Characteristics of pineapple farmers
 - Land size, production, productivity
 - Source, supply of inputs
 - Access and utilization of technology
 - Capital base and opportunities for increased capitalization
 - Marketing (prices, markets)
 - Collaboration
2. What form of support is extended to pineapple farmers/associations? (training, advisory and counselling, coverage)
3. What is the state of the non-farm income activities in the municipality?
 - Share in the economy
 - Determinants
 - Programmes to support non-farm income activities
 - Type of activities pineapple farmers engage
 - Reasons to engage in such activities
4. What are the problems reported by pineapple farmers/associations?
5. What are MADU targeted programmes for supporting pineapple farmers/associations?
6. Do you think that it is possible to use non-farm income to finance agriculture?
7. If yes, what are the factors that affect the decision of farmers to use non-farm income to finance agriculture?
8. What should be done to enhance the use of non-farm income to finance agriculture?
9. Other comments and observations

Appendix 11: Interview Guide for Pineapple Farmers Association

INTERVIEW GUIDE FOR PINEAPPLE FARMERS ASSOCIATION

Name of the Association: Date of Interview:

Location/Community:

1. When was the association formed and who facilitated the formation
2. Reasons for forming the association
3. Membership and modalities for recruiting members
 - Characteristics of the members
 - Conditions for membership (fees, registrations etc)
4. Management structure
5. Benefits of the association to the members
 - Activities
 - Input access
 - Market access
 - Pineapple production developing services
6. What other income generating activities do pineapple farmer engage in?
7. What factors affects these activities and the income from them?
8. Any programmes that encourage farmers to invest their non-farm generated money into pineapple farming. If no programmes exist, what should be done to encourage farmers to use non-farm income to finance pineapple production.
9. Support from government, private/business enterprises
10. Cooperation with other entities (associations, input suppliers, buyers)
11. Other comments and observations