ASSESSING PERFORMANCE OF MICRO AND SMALL SCALE AGRIBUSINESSES IN NORTHERN GHANA: NON-FINANCIAL AND STOCHASTIC FRONTIER ANALYSIS

by

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DECLARATION

I, BIDZAKIN KANBURI JOHN, author of this thesis titled "Assessing Performance of Micro and Small Scale Agribusinesses in Northern Region of Ghana: Non-Financial and Stochastic Frontier analysis", do hereby declare that apart from the references of other people's work which has been duly acknowledged, the research work presented in this thesis was done entirely by me in the Department of Agricultural Economics and Agribusiness, Kwame Nkrumah University of Science and Technology, from August 2005 to August 2008.

This work has never been presented in whole or in part for any other degree in this university or elsewhere.

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DEDICATION

This work is dedicated to my family and friends, especially my father Mr. Samuel K. Bidzakin and mother Esther N. Fant. Their commitment of giving each child good education has gotten me this far. God bless you.

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TO GOD ALMIGHTY IS THE GLORY.

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ABSTRACT

The need for the reduction in poverty status of rural people through the development of agribusiness is of paramount concern to most governments. Agribusiness in Africa is considered the catalyst for economic growth and poverty reduction. It is a business solution to rural poverty if redistribution mechanisms work. From literature reviewed, the importance of agribusiness to the development of Ghana is quiet clear however much is not being done to develop agribusiness. The broad question is whether, they are doing well. The main objective of this study is to assess the financial and non-financial performance of micro and small agribusinesses in Ghana. This study analysed the performance of micro and small agribusiness. Performance was assessed in two dimensions; through the non-financial method and profit efficiency using the stochastic efficiency frontier model. With the non-financial method, it was clear that the entrepreneurs achieved most of the objectives that were identified. Each objective scored below 50%, hence the level of satisfaction was fairly distributed and not concentrated on some few objectives. The level of success was low. The average measure of profit efficiency of 60.0 percent was recorded in the area. This suggests that an average of about 60 percent of potential maximum profit is gained due to production efficiency, while the remaining short fall of discrepancy between observed profit and the frontier profit can be attributed to both technical and allocative inefficiencies. The variables in the inefficiency model that have negative coefficients, meaning that as these variables (educational level, farming experience, and household size) increase the profit efficiency of the farmer increases. Whiles the variables (sex of proprietor and age) are positive and hence vice versa. The positive coefficient of age is in agreement with the work of

Abdulai and Huffman (1988) while the negative coefficient of educational level was in conformity with Kumbhakar and Bhattacharya (1992b), Ali and Flin (1989), Abdulail and Huffman (1988) and Huffman (1974). The result of this study has clearly shown that employing the stochastic profit frontier model allows a detailed analysis of the determinant of specific farm efficiency. The average profit efficiency of 0.601 suggests that considerable amount of profit is gained among maize producers in the sampled area.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

The agricultural sector is the dominant sector in the Ghanaian economy in terms of its share of GDP, employment and foreign exchange earnings. For example, the sector employs about 55% of the labor force, contributes about 35% to Gross Domestic Product (GDP), United States Central Intelligence Agency World Fact Book (2009). It also contributes about 45% of all export earnings and 12% of tax revenue. In addition, it is an important source of raw materials for manufacturing, and finally the agriculturally dependent rural households (which form about 80% of the population), (Dapaah, 1995). Women account for about 70% of the total food production in Ghana, The agricultural sector is made up of 5 sub-sectors in Ghana namely, crops other than cocoa (63% of Agricultural GDP), cocoa (14%), livestock (5%), fisheries (7%) and forestry (11%) (Dapaah, 1995).

Over the past decade, Africa and other developing regions have been in the midst of tremendous changes. Market liberalization and governmental decentralization policies have interfaced with globalization and urbanization trends to dramatically transform social, political, economic and cultural lives. In this context of rapid change, agriculture can no longer remain behind serving only to meet subsistence food needs. Agriculture has to become a dynamic and integral part of the market economy. If African agriculture is by-passed by the economic transformation going on world wide, then large numbers of Africans and perhaps all of Africa will remain poor and food insecure.

The fundamental purpose behind the Food and Agriculture Organization (FAO) initiative to promote and support agribusiness development with a particular focus on strengthening farm-agribusiness linkages is to help transform the agricultural sector in order to accelerate productivity growth, increase income and employment generation, improve food security, and increase competitiveness in regional and international trade (FAO, 2004).

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Agribusiness has been defined to include "all participants in a commodity vertical structure, from farm suppliers, farmers, assemblers, processors, and distributors to ultimate domestic and international consumers. The system also includes coordinating machinery that holds it together, including markets, future markets, contractual integration, domestic and international farm cooperatives, governmental programs, marketing boards, trade associations, voluntary agency programs, and a variety of private, cooperative, and governmental joint ventures and long-term agreements and arrangements" (Goldberg, 1988).

FAO's interest and commitment in promoting and supporting agribusiness development and linkages originates from a few rather simple observations. First, it has become clear worldwide that the most rapid growth in agriculture has for quite some time been occurring in post-production activities. This is in large part being driven by the growing number of middle-income consumers, even in lower income countries and their demands for better quality, value-added products.

Second, agri-food systems worldwide are increasingly being dominated by vertically linked, if not vertically integrated, organizations. High concentration and vertical co-ordination of agri-food systems is already a reality in high-income countries. The same patterns are emerging rapidly in parts of the developing world, particularly in South America and Southeast Asia (FAO, 2004).

Third, the near absence of agro-industry and agribusiness resulting in low value added in agricultural transformation has been one of the main causes for stagnation in rural incomes. Conversely, when looked across countries and regions, substantial agribusiness sectors, generating high value addition to the outflow of goods, correlate with higher levels of agricultural GDP and rural incomes, (FAO, 2004).

Pertaining to Africa specifically, agribusiness development can provide part of the answers to the collapse in support services, which occurred in most African countries following structural adjustment. In many instances, agribusiness firms provide marketing, finance, input supply and advisory services to producers or serve as intermediaries for improving producer access to services. In brief, agribusiness development is inevitable. The real issues are not whether, rather they are how to accelerate, how to ensure that maximum benefits are realized, and how to address equity and ensure fairness in the changes that will be taking place (FAO, 2004).

Recent reports in Africa show that the productivity of agriculture on the continent has not satisfied the requirement for food, fibre and other raw materials despite efforts by governments to develop agriculture (Okorley and Kwarten, 2006). Many studies in Africa

show that the poor achievement of the agricultural goals on the continent in terms of efficiency, sustainability and equity is due to the predominant practice of directing training and resources to men only (FAO, 1993). This realization has brought about a growing concern about gender issues in recent times.

The focus of many African governments now is to increase the productivity of the Agricultural Sector by improving the condition of women especially those in the rural and semi-urban areas. In Ghana's Medium Term Agricultural Development Strategy (MTADS) and the Vision 2020 Development Plan, the strategies were: 1) bring services physically closer to women; 2) involve women in the formation and management of programmes affecting them; 3) make women (individuals or groups) the contact point in the delivery of services directly to the beneficiaries and to receive feedback (Ministry of Food and Agriculture, 1990).

With the present trend of high population growth (about 3% in Ghana) which far exceeds food production (about 2% in Ghana) the role of women in food production, processing and marketing has become more important in ensuring that people on the continent are not underfed and do not suffer from malnutrition (Okorley and Kwarten, 2006). With respect to quality protein needs, the two main sources available in Ghana and many African countries are livestock and fish. The productivity of the livestock industry in Ghana is woefully inadequate. This is attributed to inconsistent government policies concerning the industry, high cost and sometimes unavailability of livestock feed, poor management practices, and disease outbreak, among others (Okorley and Kwarten, 2006).

Currently there is a growing concern that priority should be given to agribusiness (the food processing industry) in Ghana. The fact is that export earnings from this industry are substantial. Since women are generally more involved in processing of agricultural products than men in many countries in Africa it is the belief that if women in Africa are given the opportunity, they will contribute substantially to the development of agribusiness (the food processing industry) and solve the persistent problem of malnutrition and poverty in the rural and semi-urban communities (Okorley and Kwarten, 2006).

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1.2 Problem Statement:

The small business sector is recognized as an integral component of economic development and a crucial element in the effort to lift countries out of poverty (Wolfenson, 2001). The dynamic role of small and medium enterprises (SMEs) in developing countries as engines through which the growth objectives of developing countries can be achieved has long been recognized. It is estimated that SMEs employ 22% of the adult population in developing countries (Daniels & Ngwira, 1992; Daniels & Fisseha, 1992; Fisseha, 1992; Fisseha & McPherson, 1991; Gallagher & Robson, 1993). The sector employs about 15.5% and 14.09% of the labour force in Ghana and Malawi respectively (Parker et al, 1994). SMEs have experienced higher employment growth than micro and large-scale enterprises (5% in Ghana). In Ghana, the sector's output as a percentage of GDP was 6% in 1998. Hence there is a great potential for the sector to increase its contribution to GDP if the sector is well developed.

Agribusiness in Africa is considered the catalyst for economic growth and poverty reduction. It is a business solution to rural poverty if redistribution mechanisms work. The agribusiness initiative is both a strategy to accelerate development and a business solution to rural poverty. The vision of the Food and Agriculture Organization is to make agribusiness a more profitable business entity (FAO, 2004). The importance of agribusiness development to the development of Ghana's economy cannot be overemphasized as government makes it a major priority in the Millennium Challenge Compact (MCC), which was signed with the United States of America in 2006.

With specific reference to Ghana the questions that come to mind are: what is the nature and forms of micro and small agribusinesses in Ghana? How are micro and small agribusinesses performing with respect to their objectives and challenges? What is their profit efficiency? What are the determinants of profit? Are there any linkages between micro and small-scale agribusinesses? And what is the source of funding to these businesses? What is their business registration, saving, record keeping and business account holding status? It is therefore not far-fetching that seeking answers to these questions becomes very important in this study.

1.3 Objectives:

1.3.1 Main Objective

The main objective of this study is to assess the financial and non-financial performance of micro and small agribusinesses in Ghana.

1.3.2 Specific Objectives:

1. To assess the nature and forms of micro and small agribusinesses in Ghana and the relative involvement of women and men.
2. To identify the objectives and challenges of micro and small agribusinesses and to rank them in order of importance.
3. To identify the forms and types of linkages that exists among micro and small agribusinesses.
4. Assess the sources of capital to micro and small agribusinesses.
5. Assess their status with regard to business registration, savings, record keeping and business account holding.
6. Assess the profit efficiency of micro and small agribusinesses (maize producers)
7. Determine the factors that influence profit efficiency of micro and small agribusinesses (maize producers)

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1.4 Justification of the Study:

Agribusiness in Ghana is still rudimentary and artesian with little growth or development over the last three decades (FAO, 2004). It is difficult to analyze the performance of the agribusiness sector in Ghana due to the lack of comprehensive data on agribusiness enterprises and their activities in Ghana. The sector is not classified into sub-sectors and the last industrial survey was conducted in 1995 but covered only medium and large-scale industries.

The development of agribusiness in Ghana has the potential to accelerate productivity growth, increase income and employment generation, improve food security, and increase competitiveness in regional and international trade (FAO, 2004). The dynamic role of small and medium scale enterprises (SMEs) in developing countries have been highly emphasized. These enterprises have been identified as the means through which the rapid industrialization and other developmental goals of Ghana can be realized. Agribusiness development is inevitable. The real issues are not whether agribusiness is important or not, rather they are how to accelerate, how to ensure that maximum benefits are realized, and how to address equity and ensure fairness in the changes that will be taking place (FAO, 2004), the question then is why is the sector still rudimentary and artesian with little growth or development over the last three decades? Hence, these give the need to assess the performance of the agribusiness industry in Ghana, specifically in the Northern Region. Specific analysis of maize production is done due to the fact that it is the major crop that is mainly cultivated in the study area and also the major farm produce that is retailed.

This study will help provide information on the state of micro and small agribusinesses (maize production) profit efficiency, their motivation for being in business and their challenges in Northern Ghana, which can be used by policy makers, entrepreneurs and the general society to help develop the agribusiness sector and hence the general economy of Ghana.

1.5 Organization of the Study:

Chapter 1 deals with the background of the study, the problem statement, objectives of the study, justification of the study and organization of the study.

Chapter 2 reviews literature on small and medium scale enterprises and agribusinesses and on the contribution of women to economic development.

Chapter 3 introduces the study area and describes the methodologies used to analyze the problems stated. It includes the methods used for data collection, model specification and procedure for data analysis.

Chapter 4 is devoted to presentation and discussion of results. Summary statistics of the variables used in the study are presented and discussed.

Chapter 5 winds up this study drawing conclusions, their policy implications. Suggestions for future research based on the findings are made.

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CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction:

This chapter reviews works on small and medium enterprises in the world, Africa and Ghana. The state of agribusiness in Ghana was reviewed. Works on performance and determinants of performance were also reviewed. A section in this chapter assesses the various methods of measuring performance. This is to help understand the state of agribusiness in general, and Ghana in particular; and hence enables a synthesis of the results of this study in order to draw meaningful conclusions.

2.2 Definitions and Concepts

There is no single, uniformly acceptable, definition of a small firm (Storey, 1994). Firms differ in their levels of capitalization, sales and employment. Hence, definitions that employ measures of size (number of employees, turnover, profitability, net worth, etc.) when applied to one sector could lead to all firms being classified as small, while the same size definition when applied to a different sector could lead to a different result.

The first attempt to overcome this definition problem was by the Bolton Committee (1971) when they formulated an “economic” and a “statistical” definition. Under the economic definition, a firm is regarded as small if it meets the following three criteria:

i. It has a relatively small share of their market place;
ii. It is managed by owners or part owners in a personalized way, and not through the medium of a formalized management structure;

iii. It is independent, in the sense of not forming part of a large enterprise.

The Committee also devised a "statistical" definition to be used in three main areas:

a. Quantifying the size of the small firm sector and its contribution to GDP, employment, exports, etc.;
b. Comparing the extent to which the small firm sector's economic contribution has changed over time;
c. Applying the statistical definition in a cross-country comparison of the small firms' economic contribution.

Thus, the Bolton Committee employed different definitions of the small firm to different sectors.

2.2.1 Criticism of the Bolton Committee's "Economic" Definition

A number of weaknesses were identified with the Bolton Committee's "economic" and `statistical' definitions. First, the economic definition which states that a small business is managed by its owners or part owners in a personalized way, and not through the medium of a formal management structure, is incompatible with its statistical definition of small manufacturing firms which could have up to 200 employees.

As firm size increases, owners no longer make principal decisions but devolve responsibility to a team of managers. For example, it is unlikely for a firm with hundred employees to be managed in a personalized way, suggesting that the `economic' and `statistical' definitions are incompatible.

Another shortcoming of the Bolton Committee's economic definition is that it considers small firms to be operating in a perfectly competitive market. However, the idea of perfect competition may not apply here; many small firms occupy `niches' and provide a highly specialized service or product in a geographically isolated area and do not perceive any clear competition (Wynarczyk et al, 1993; Storey, 1994).

Alternatively, Wynarczyk et al (1993) identified the characteristics of the small firm other than size. They argued that there are three ways of differentiating between small and large firms. The small firm has to deal with:

(a) Uncertainty associated with being a price taker;

(b) Limited customer and product base;

(c) Uncertainty associated with greater diversity of objectives as compared with large firms.

As Storey (1994) stated, there are three key distinguishing features between large and small firms. Firstly, the greater external uncertainty of the environment in which the small firm operates and the greater internal consistency of its motivations and actions. Secondly, they have a different role in innovation. Small firms are able to produce something marginally different, in terms of product or service, which differs from the standardized product or service provided by large firms. A third area of distinction between small and large firms is the greater likelihood of evolution and change in the smaller firm; small firms that become large undergo a number of stage changes.

2.2.2 Criticism of the Bolton Committee's "Statistical" Definition:

(i) No single definition or criteria was used for "smallness", (number of employees, turnover, ownership and assets were used instead)

(ii) Three different upper limits of turnover were specified for the different sectors and two different upper limits were identified for number of employees.

(iii) Comparing monetary units over time requires construction of index numbers to take account of price changes. Moreover, currency fluctuations make international comparison more difficult.

(iv) The definition considered the small firm sector to be homogeneous; however, firms may grow from small to medium and in some cases to large.

It was against this background that the European Commission (EC) coined the term `Small and Medium Enterprises (SME)'. The SME sector is made up of three components:

(i) Firms with 0 to 9 employees - micro enterprises

(ii) 10 to 99 employees - small enterprises

(iii) 100 to 499 employees - medium enterprises.

Thus, the SME sector is comprised of enterprises, which employ less than 500 workers. In effect, the EC definitions are based solely on employment rather than a multiplicity of criteria. Secondly, the use of 100 employees as the small firm's upper limit is more

appropriate given the increase in productivity over the last two decades (Storey, 1994). Finally, the EC definition did not assume the SME group is homogenous, that is, the definition makes a distinction between micro, small, and medium-sized enterprises.

However, the EC definition is too all embracing for a number of countries. Researchers would have to use definitions for small firms that are more appropriate to their particular `target' group (an operational definition). It must be emphasized that debates on definitions turn out to be sterile unless size is a factor that influences performance. For instance, the relationship between size and performance matters when assessing the impact of a credit programme on a targeted group (also refer to Storey, 1994).

2.2.3 Alternative Definitions:

World Bank since 1976 - Firms with fixed assets (excluding land) less than US$ 250,000 in value are Small Scale Enterprises.

Grindle et al (1988) - Small scale enterprises are firms with less than or equal to 25 permanent members and with fixed assets (excluding land) worth up to US$ 50,000.

USAID in the 1990s - Firms with less than 50 employees and at least half the output is sold (also refer to Mead, 1984).

UNIDO's Definition for Developing Countries:

Large - firms with 100+ workers

Medium - firms with 20 - 99 workers

Small - firms with 5 - 19 workers

Micro - firms with < 5 workers

UNIDO's Definition for Industrialized Countries:

Large - firms with 500+ workers

Medium - firms with 100 - 499 workers

Small - firms with ≤99 workers

From the various definitions above, it can be said that there is no unique definition for a small and medium scale enterprise thus, an operational definition is required.

2.2.4 Country Definitions

Small Scale enterprises have been variously defined, but the most commonly used criterion is the number of employees of the enterprise. In applying this definition, confusion often arises in respect of the arbitrariness and cut off points used by the various official sources. As contained in its Industrial Statistics, The Ghana Statistical Service (GSS) considers firms with less than 10 employees as Small Scale Enterprises and their counterparts with more than 10 employees as Medium and Large-Sized Enterprises. Ironically, The GSS in its national accounts considered companies with up to 9 employees as Small and Medium Enterprises (Kayanula and Quartey, 2000).

An alternate criterion used in defining small and medium enterprises is the value of fixed assets in the organization. However, the National Board of Small Scale Industries (NBSSI) in Ghana applies both the `fixed asset and number of employees' criteria. It defines a Small Scale Enterprise as one with not more than 9 workers, has plant and machinery (excluding land, buildings and vehicles) not exceeding 10 million Cedis (US$ 9506, using 1994 exchange rate) (Kayanula and Quartey, 2000). The Ghana Enterprise

Development Commission (GEDC) on the other hand uses a 10 million Cedis upper limit definition for plant and machinery. A point of caution is that the process of valuing fixed assets in itself poses a problem. Secondly, the continuous depreciation in the exchange rate often makes such definitions out-dated (Kayanula and Quartey, 2000).

Steel and Webster (1990), Osei et al (1993) in defining Small Scale Enterprises in Ghana used an employment cut off point of 30 employees to indicate Small Scale Enterprises. The latter however dis-aggregated small scale enterprises into 3 categories: (i) micro - employing less than 6 people; (ii) very small, those employing 6-9 people; (iii) small - between 10 and 29 employees. Steel and Webster (1990), Osei et al (1993) definitions were adopted for this study of micro and small agribusinesses.

2.3 Why Small and Medium Scale Enterprises?

The choice of small and medium scale enterprises within the industrial sector for this study is based on the following propositions (Kayanula and Quartey, 2000).

(a) Large Scale Industry

(i) Have not been an engine of growth and a good provider of employment;

(ii) Already receive enormous support through general trade, finance, tax policy and direct subsidies;

(b) Small and Medium Scale Enterprises

(i) Mobilize funds which otherwise would have been idle;

(ii) Have been recognized as a seed-bed for indigenous entrepreneurship;

(iii) Are labour intensive, employing more labour per unit of capital than large enterprises;

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(iv) Promote indigenous technological know-how;

(vii) Are able to compete (but behind protective barriers);

(viii) Use mainly local resources, thus have less foreign exchange requirements;

(ix) Cater for the needs of the poor and;

(x) Adapt easily to customer requirements (flexible specialization), (Kayanula and Quartey, 2000).

2.4 The Role and Characteristics of SMEs

2.4.1 Role of SMEs in Developing Countries

Small-scale rural and urban enterprises have been one of the major areas of concern to many policy makers in an attempt to accelerate the rate of growth in low income countries. These enterprises have been recognized as the engines through which the

growth objectives of developing countries can be achieved. They are potential sources of employment and income in many developing countries. It is estimated that SMEs employ 22% of the adult population in developing countries (Daniels & Ngwira, 1992; Daniels & Fisseha, 1993; Fisseha, 1992; Fisseha & McPherson, 1991; Gallagher & Robson, 1995).

However, some authors have contended that the job creating impact of small scale enterprises is a statistical flaw; it does not take into account offsetting factors that make the net impact more modest (Biggs, Grindle & Snodgrass, 1988). It is argued that increases in employment of Small and Medium Enterprises are not always associated with increases in productivity. Nevertheless, the important role performed by these enterprises cannot be overlooked. Small firms have some advantages over their large-scale competitors. They are able to adapt more easily to market conditions given their broadly skilled technologies. However, narrowing the analysis down to developing countries raises the following puzzle: Do small-scale enterprises have a dynamic economic role?

Due to their flexible nature, SMEs are able to withstand adverse economic conditions. They are more labour intensive than larger firms and therefore, have lower capital costs associated with job creation (Anheier & Seibel, 1987; Liedholm & Mead, 1987; Schmitz, 1995). Small-scale enterprises (SSEs) perform useful roles in ensuring income stability, growth and employment. Since SMEs are labour intensive, they are more likely to succeed in smaller urban centres and rural areas, where they can contribute to the more even distribution of economic activity in a region and can help to slow the flow of

migration to large cities. Because of their regional dispersion and their labour intensity, it is argued that small-scale production units can promote a more equitable distribution of income than large firms. They also improve the efficiency of domestic markets and make productive use of scarce resources, thus, facilitating long term economic growth.

2.4.2 Characteristics of SMEs in Ghana

A distinguishing feature of SMEs from larger firms is that the latter have direct access to international and local capital markets whereas the former are excluded because of the higher intermediation costs of smaller projects. In addition, SMEs face the same fixed cost as Large Scale Enterprises (LSEs) in complying with regulations but have limited capacity to market products abroad.

SMEs in Ghana can be categorised into urban and rural enterprises. The former can be sub-divided into `organised' and `unorganised' enterprises. The organised ones tend to have paid employees with a registered office whereas the unorganised category is mainly made up of artisans who work in open spaces, temporary wooden structures, or at home and employ little or in some cases no salaried workers. They rely mostly on family members or apprentices. Rural enterprises are largely made up of family groups, individual artisans, women engaged in food production of local crops. The major activities within this sector include:- soap and detergents, fabrics, clothing and tailoring, textile and leather, village blacksmiths, tin-smithing, ceramics, timber and mining, beverages, food processing, bakeries, wood furniture, electronic assembly, agro processing, chemical based products and mechanics (Liedholm & Mead, 1987; Osei et al, 1993, World Bank, 1992).

It is interesting to note that small-scale enterprises make better use of scarce resources than large-scale enterprises. Research in Ghana and many other countries have shown that capital productivity is often higher in SMEs than is the case with LSEs (Steel, 1977). The reason for this is not difficult to see, SMEs are labour intensive with very small amount of capital invested. Thus, they tend to witness high capital productivity, which is an economically sound investment. Thus, it has been argued that promoting the SME sector in developing countries will create more employment opportunities, lead to a more equitable distribution of income, and will ensure increased productivity with better technology (Steel & Webster, 1990).

2.5 Constraints to SME Development

Despite the wide-ranging economic reforms instituted in the region, SMEs face a variety of constraints owing to the difficulty of absorbing large fixed costs, the absence of economies of scale and scope in key factors of production, and the higher unit costs of providing services to smaller firms (Schmitz, 1982; Liedholm & Mead, 1987; Steel & Webster, 1990). A set of constraints identified with the sector is presented below.

2.5.1 Input Constraints:

SMEs face a variety of constraints in factor markets (Levy, 1993). However, factor availability and cost were the most common constraints. The specific problems differs by country, but many of them are related, varying according to whether the business perceived that their access, availability or cost was the most important problem and whether they were based primarily on imported or domestic inputs (World Bank, 1993;

Parker et al, 1995). SMEs in Ghana emphasised the high cost of obtaining local raw materials; this may stem from their poor cash flows (Parker et al, 1995). Aryeetey et al (1994) found that 5% of their sample cited the input constraint as a problem. However, Daniels & Ngwira (1993) reported that about a third of Malawian SMEs reported input problems. This can also be contrasted with only 8.2%, 7.5% and 6.3% of proprietors in Botswana, Swaziland and Lesotho, respectively. It was also found that input constraints vary with firm size.

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2.5.2 Finance:

Access to finance remained a dominant constraint to small-scale enterprises in Ghana. Credit constraints pertaining to working capital and raw materials, were cited by respondents (between 24% and 52% in Parker et al, 1995). Aryeetey et al (1994) reported that 38% of the SMEs surveyed mentioned credit as a constraint, in the case of Malawi, it accounted for 17.5% of the total sample (Daniels & Ngwira, 1993:30-31). This stems from the fact that SMEs have limited access to capital markets, locally and internationally, in part because of the perception of higher risk, informational barriers, and the higher costs of intermediation for smaller firms. As a result, SMEs often cannot obtain long-term finance in the form of debt and equity.

2.5.3 Labour Market:

This seems a less important constraint to SMEs considering the widespread unemployment or underemployment in developing countries. SMEs generally use simple technology, which does not require highly skilled workers. However, where skilled workers are required, an insufficient supply of skilled workers can limit the specialisation

opportunities, raise costs, and reduce flexibility in managing operations. Aryeetey et al (1994) found that 7% of their respondents indicated that they had problems finding skilled labour, and 2% had similar problems with unskilled labour.

2.5.4 Equipment & Technology:

SMEs have difficulties in gaining access to appropriate technologies and information on available techniques. This limits innovation and SME competitiveness. Besides, other constraints on capital, and labour, as well as uncertainty surrounding new technologies, restrict incentives to innovation. From the firms sampled, 18% of them in Aryeetey et al (1994) mentioned old equipment as one of the four most significant constraints to expansion (18.2% in Parker et al, 1995).

2.5.5 Domestic Demand:

From the sample data 5% of Ghanaian proprietors indicated they had marketing constraints, (Aryeetey et al, 1994; Daniels & Ngwira, 1993). The business environment varied markedly among SMEs in Ghana reflecting different demand constraints after adjustment. There were varying levels of uncertainty caused by macroeconomic instability and different levels of government commitment to private sector development. Recent economic policies have led to a decline in the role of the state in productive activity but a renewed private investment has created new opportunities for SMEs. Nonetheless, limited access to public contracts and subcontracts, arising from cumbersome bidding procedures and/or lack of information, inhibit SME participation in these markets. Also, inefficient distribution channels often dominated by larger firms

pose important limitations to market access for SMEs. As noted in the case of Ghana, demand constraints limited the growth of SMEs (Parker et al, 1995).

2.5.6 International Markets:

Previously insulated from international competition, many SMEs are now faced with greater external competition and the need to expand market share. However, this problem was mostly identified in medium-sized enterprises in Ghana (12.5% in Aryeetey et al, 1994:13), less than 1% of the total sample complained there were too many imported substitutes coming into the country. Daniels & Ngwira (1993) also reported a similar figure for Malawi (0.9%). However, Riedel et al (1988), reported that Tailors in Techiman (Ghana) who used to make several pairs of trousers in a month went without any orders with the coming into effect of trade liberalisation. Limited international marketing experience, poor quality control and product standardisation and little access to international partners, impede expansion into international markets. It is reported that only 1.7% of firms in Ghana export their output (Aryeetey et al, 1994).

2.5.7 Regulatory Constraints

Although wide ranging structural reforms have improved, prospects for enterprise development remain to be addressed at the firm-level.

- **Legal**

High start-up costs for firms, including licensing and registration requirements, can impose excessive and unnecessary burdens on SMEs. The high cost of settling legal claims and excessive delays in court proceedings adversely affect SME operations. In

Malawi, prohibitive laws like The Business Licensing Act, The Electricity Act, The Control of Goods Act, and The Export Incentives Act, have severely constrained SME development. From the sample data, 5.3% of proprietors in Malawi mentioned this as a constraint (Daniels & Ngwira, 1993). In the case of Ghana, the cumbersome procedure for registering and commencing business are key issues often cited. However, Aryeetey et al (1994) found that this accounted for less than 1% of their sample. Meanwhile, the absence of antitrust legislation favours larger firms, while the lack of protection for property rights limits SME access to foreign technologies.

2.5.8 Managerial Constraints:

- **Lack of Entrepreneurial & Business Management Skills**:

Lack of managerial know-how places significant constraints on SME development. Even though SMEs tend to attract motivated managers, they can hardly compete with larger firms. The scarcity of management talent, prevalent in most countries in Africa, has a magnified impact on SMEs. The lack of support services or their relatively higher unit cost can hamper SME efforts to improve their management because consulting firms often are not equipped with appropriate cost effective management solutions for SMEs. Furthermore, absence of information and/or time to take advantage of existing services results in weak demand for them.

Despite the numerous institutions providing training and advisory services, there is still a skills gap among the SME sector as a whole. According to Daniels & Ngwira (1993), about 88% of Malawian SMEs desired training in various skills but as at 1992, less than

6% have actually received it. In Ghana, a lot has actually been achieved in this regard, though there is still room for improvement.

2.5.9 Institutional Constraints:

The lack of cohesiveness and the wide range of SME interests limit their capacity to defend their collective interests and their effective participation in civil society.

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- **Associations and collective action**:

Associations providing a voice for the interests of SMEs in the policy-making process have had a limited role compared to those of larger firms. Many of the entrepreneurs associations have yet to complete the transition of their goals from protectionism to competitiveness (World Bank, 1993). Additionally, the potential economies of collaborative arrangements in production and sales among SMEs have not been adequately explored. There are very few forward linkages. However, backward linkages were common with 71% of enterprises procuring unprocessed, semi-processed or finished products.

The dependence of the SME sector in Ghana on large-scale enterprises as purchasers of output, either for sale, as final goods or to be used as intermediate inputs, is very limited. Only 13% of firms produce any item for or component for larger firms. Interdependence among SMEs is very minimal. As reported in Osei et al (1993), only 17.6% of firms with growing output and 8.4% of those whose output stagnated have other SSEs as customers.

2.6 Policies for Promoting SMEs in Ghana

Small-scale enterprise promotion in Ghana was not impressive in the 1960s. Dr. Nkrumah (President of the First Republic) in his modernization efforts emphasized state participation but did not encourage the domestic indigenous sector. The local entrepreneurship was seen as a potential political threat. To worsen the situation, the deterioration in the Balance of Payments in the 1980s and the overvaluation of the exchange rate led to reduce capacity utilization in the import dependent large-scale sector. Rising inflation and falling real wages also forced many formal sector employees into secondary self-employment in an attempt to earn a decent income. As the economy declined, large-scale manufacturing employment stagnated (Kayanula and Quartey, 2000). According to Steel and Webster (1991), small scale and self-employment grew by 2.9% per annum (ten times as many jobs as large scale employment) but their activities accounted for only a third of the value added.

It was in the light of the above that the government of Ghana started promoting small-scale enterprises. They were viewed as the mechanism through which a transition from state-led economy to a private oriented developmental strategy could be achieved. Thus the SME sector's role was re-defined to include the following (Kayanula and Quartey, 2000):

(i) Assisting the state in reducing its involvement in direct production

(ii) Absorbing labour from the state sector, given the relatively labour intensive nature of small scale enterprises, and;

(iii) Developing indigenous entrepreneurial and managerial skills needed for sustained industrialization.

2.6.1 Government and Institutional Support to SMEs

To enable the sector perform its role effectively, the following technical, institutional and financial supports were put in place by government.

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(i) Government

Government, in an attempt to strengthen the response of the private sector to economic reforms undertook a number of measures in 1992. Prominent among them is the setting up of the Private Sector Advisory Group and the abolition of the Manufacturing Industries Act, 1971 (Act 356) that repealed a number of price control laws, and The Investment Code of 1985 (PNDC Law 116), which seeks to promote joint ventures between foreign and local investors. In addition to the above, a Legislative Instrument on Immigrant Quota, which grants automatic immigrant quota for investors, has been enacted. Besides, certain Technology Transfer Regulations have been introduced.

Government also provided equipment leasing, an alternative and flexible source of long term financing of plant and equipment for enterprises that cannot afford their own. A Mutual Credit Guarantee Scheme was also set up for entrepreneurs who have inadequate or no collateral and has limited access to bank credit. To complement these efforts, a Rural Finance Project aimed at providing long-term credit to small-scale farmers and artisans was set up.

In 1997, government proposed the establishment of an Export Development and Investment Fund (EDIF), operational under the Exim Guarantee Company Scheme of the Bank of Ghana. This was in aid of industrial and export services within the first quarter of 1998. To further improve the industrial sector, according to the 1998 Budget Statement, specific attention was to be given to the following industries for support in accessing the EDIF for rehabilitation and retooling: Textiles/Garments; Wood and Wood Processing; Food and Food Processing and Packaging.

It was also highlighted that government would support industries with export potential to overcome any supply-based difficulty by accessing EDIF and rationalize the tariff regime in a bid to improve their export competitiveness. In addition, a special monitoring mechanism has been developed at the Ministry of Trade and Industries.

In a bid to improve trade and investment, particularly in the industrial sector, trade and investment facilitating measures were put in place. Visas for all categories of investors and tourists were issued on arrival at the ports of entry while the Customs Excise and Preventive Service at the ports were made proactive, operating 7-days a week.

The government continued supporting programmes aimed at skills training, registration and placement of job seekers, training and re-training of redeployees. This resulted in a 5% rise in enrolment in the various training institutes such as The National Vocational and Training Institute (NVTI), Opportunity Industrialization Centres (OIC), etc. As at the end of 1997, 65,830 out of 72,000 redeployees who were re-trained under master craftsmen have been provided with tools and have become self-employed.

(ii) Institutions

The idea of SME promotion has been in existence since 1970 though very little was done at the time. Key institutions were set up to assist SMEs and prominent among them was The Office of Business Promotion, now the present Ghana Enterprise Development Commission (GEDC). It aims at assisting Ghanaian businessmen to enter into fields where foreigners mainly operated but which became available to Ghanaians after the 'Alliance Compliance Order' in 1970. GEDC also had packages for strengthening small-scale industry in general, both technically and financially.

The Economic Recovery Programme instituted in 1983 has broadened the institutional support for SMEs. The National Board for Small Scale Industries (NBSSI) has been established within the then Ministry of Industry, Science and Technology now (Ministry of Science and Technology) to address the needs of small businesses. The NBSSI established an Entrepreneurial Development Programme, intended to train and assist persons with entrepreneurial abilities into self-employment. In 1987, the industrial sector also witnessed the coming into operation of the Ghana Appropriate Technology Industrial Service (GRATIS). It was to supervise the operations of Intermediate Technology Transfer Units (ITTUs) in the country. GRATIS aims at upgrading small scale industrial concerns by transferring appropriate technology to small scale and informal industries at the grass root level.

ITTUs in the regions are intended to develop the engineering abilities of small scale manufacturing and service industries engaged in vehicle repairs and other related trades.

They are also to address the needs of non-engineering industries. So far, 6 ITTUs have been set up in Cape Coast, Ho, Kumasi, Sunyani, Tamale and Tema.

(iii) Financial Assistance

Access to credit has been one of the main bottlenecks to SME development. Most SMEs lack the necessary collateral to obtain bank loans. To address this issue, the Central Bank of Ghana has established a credit guarantee scheme to underwrite loans made by Commercial Banks to small-scale enterprises. Unfortunately, the scheme did not work out as expected. It was against this background that the Bank of Ghana obtained a US$ 28 million credit from the International Development Association (IDA) of the World Bank for the establishment of a Fund for Small and Medium Enterprises Development (FUSMED).

Under the Programme of Action to Mitigate the Social Cost of Adjustment (PAMSCAD), a revolving fund of US$ 2 million was set aside to assist SMEs. This aspect is too scanty in the midst of the abundant information, especially with reference to Ghana.

2.7 The Concept of Small Business Performance

Performance has been the subject of extensive and increasing empirical and conceptual investigation in the small business literature (Chandler & Hanks, 1993; Jarvis, Curran, Kitching, & Lightfoot, 2000; Lachman & Wolfe, 1997; March & Sutton, 1997; Murphy, Trailer, & Hill, 1996; Rodsutti & Swierczek, 2002; Watson, Newby, & Woodliff, 2000). Whilst it is generally agreed that performance should be viewed in relation to one or more goals (Etzioni, 1964) the issues that remain unresolved are the goals against which

performance should be assessed and from whose perspective the goals should be established. Organizational theories and the accounting literature, driven by classical economic theory emphasize profit maximization as the central goal of the firm (Jarvis, Kitching, Curran, & Lightfoot, 1996). These theories, modeled on large enterprises, generalize the concept of performance and fail to take account of differences in goals between firms of varying sizes (LeCornu, McMahon, Forsaith, & Stanger, 1996). The separation of ownership and control from management in large firms and the agency relationship gives rise to profit maximization as a performance goal, measured by indicators such as return on assets and return on investment (Jarvis et al., 2000).

The situation is different in small businesses where ownership and control as well as management of the firm are usually vested in one key person (the owner-manager). The owner-manager does not only dictate the goals of the firm but also exerts a powerful influence on the way the firm pursues these goals (Glancey, 1998; LeCornu et al., 1996; Verheul, Risseeuw, & Bartelse, 2002; Watson et al., 2000). Consequently, researchers have challenged the application of the conventional goal of profit maximization to the assessment of performance in small firms, advocating instead non-financial goals that portray the 'big picture' of the small firm (Ryan, 1995). The major goals of the small firm must be first understood before its performance can be assessed (Birley & Westhead, 1990; Jarvis et al., 1996; LeCornu et al., 1996; Watson et al., 2000).

Owner-managers pursue a range of goals, emphasizing in particular survival and stability of the firm (Jarvis et al., 2000; Tsai, MacMillan, & Low, 1991). Other goals pursued

include efficiency, market share, liquidity, size, leverage, growth, customer satisfaction, quality of products, contribution to community development, and employment of family members (Glancey, 1998; Murphy et al., 1996). Assessment of performance in small firms must therefore take account of a range of goals, both financial and non-financial. Since research interest in the small business sector derives from its contribution to economic development, performance of individual firms in the sector can be assessed by the extent to which they add value to the economy (Kotey & Meredith, 1997).

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2.7.1 Gender and Small Business Performance

Until more recently gender differences in small business performance remained largely unaddressed by social scientists (Greene, Hart, Gatewood, Brush, & Carter, 2003). The majority of studies either disregarded gender as a variable of interest or excluded female subjects from their design (Du Rietz & Henrekson, 2000). However, it is generally accepted that male and female owner-managers behave differently and that these behavioral differences influence their performance (Brush, 1992), but these differences have been recognized but not fully explained (Brush & Hisrich 2000).

A comparison of performance of male and female owner-managers in Java, Indonesia showed that female-owned businesses tend to be less oriented towards growth compared to male-owned businesses (Singh, Reynolds, & Muhammad, 2001). Boden & Nucci (2000) investigated start-ups in the retail and service industries and found that the mean survival rate for male owned businesses was four to six percent higher than for female owned businesses.

Loscocco, Robinson, Hall & Allen (1991) in their study of small businesses in the New England region of the USA found that both sales volume and income levels were lower for female- than for male-owned businesses. In a longitudinal study of 298 small firms in the United Kingdom (UK), of which 67 were female owned, Johnson & Storey (1994) observed that whilst female owner-managers had more stable enterprises than their male counterparts, on average the sales turnover for female owners were lower than for male owners. Brush (1992) suggests that women perform less on quantitative financial measures such as jobs created, sales turnover and profitability because they pursue intrinsic goals such as independence, and the flexibility to combine family and work commitments rather than financial gain.

In contrast to the above findings, Du Rietz and Henrekson (2000) reported that female-owned businesses were just as successful as their male counterparts when size and sector are controlled. In his study of small and medium firms in Australia, Watson (2002), after controlling for the effect of industry sector, age of the business, and the number of days of operation, also reported no significant differences in performance between the male-controlled and female-controlled firms.

2.7.2 Determinants of Small Business Performance

The factors that influence performance of small firms can be classified into two main areas: those that emanate from the firm's internal environment (labeled micro-level factors) and those associated with the external environment (i.e. the macro-level factors)

(Kalleberg & Leicht, 1991; Keats & Bracker, 1988). The micro-level determinants include the psychology and demographics of the owner-manager, the resources of the firm, and the strategies adopted (Kalleberg & Leicht, 1991; Keats & Bracker, 1988), while the macro level determinants cover markets, economic, financial, technological, legal and political conditions as well as the socio- cultural context in which the firm operates (Kalleberg & Leicht, 1991; Keats & Bracker, 1988; Wiklund, 2003). Researchers have examined small business performance using various theories associated with these micro and macro level factors. The population ecology theory is the main macro-level theory whilst at the micro level, performance has been examined using the resource-based and strategic adaptation theories as well as in relation to the demographics and psychology of the owner-manager.

- **Population Ecology Theory**

The basic argument underlying the population ecology theory is that the environment largely determines the survival of organizations (Bruderl, Preisendorfer, & Ziegler, 1992; Schindehutte & Morris, 2001). Opponents of the population ecology theory argue that it proposes a relatively deterministic view of organizational design and performance outcomes and that by emphasizing only the external constraints on a firm's performance the theory neglects those constraints that are internal to the firm and imposed by the owner-manager's motivations (Keats & Bracker, 1988). Advocates of the micro level determinants of organizational performance argue that small business performance depends on their ability to adjust their internal structures to the contingencies imposed by their task environment (Iakovleva; Kalleberg & Leicht, 1991). These researchers contend

that, the better performing firms are those that best adapt to fit the opportunities provided and constraints imposed by their environments. This adaptation depends however, on the choices and actions of owner-managers and the resources at the firm's disposal (Lerner & Almor, 2002). These micro level factors have led to the resource- based and strategic adaptation theories as well as theories based on owner- manager's psychology and demographics.

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Psychology and Demographics of the Owner-manager

Begley & Boyd (1986), Kalleberg & Leicht (1991) and Verheul et al., (2002) observed that differences among owner-managers in psychological traits, experiences and skills needed to accomplish positively associated with performance in small firms include creativity, courage, aggressiveness, risk-taking (Stevenson & Gumpert, 1985), need for achievement (Kalleberg & Leicht, 1991), and internal locus of control (Brockhaus, 1980). In addition, Bauer schmidt & Hofer (1998) showed that the more skills and experience the owner-manager brings to the business the more successful the business is likely to be. Cooper (1998) cautioned that on their own these psychological and demographic characteristics do not directly influence performance but do so through other variables such as strategy and environmental characteristics.

- **Resource-Based Theory**

The resource-based theory of performance accentuates both the structural characteristics of the firm and the environment in explaining performance (Bruderl et al., 1992). Hadjimanolis (2000) noted that the resource-based view seeks to bridge the gap between

the theories of internal capability of the firm on one hand and external competitive strategies on the other. It treats organizations as potential creators of valued capabilities and postulates that the assets and resources of the firm have to be viewed from a knowledge-based perspective (Caldeira & Ward, 2003). Iakovleva; Kalleberg & Leicht, (1991) criticized the resource-based theory on the basis that it is difficult to identify which of the several resources of a firm account for its success. In addition, she argued that the resource-based theory does not differentiate between performance factors associated with the resources of the firm and those related to the characteristics of the owner-manager. To overcome this limitation both the characteristics of the owner-manager and his/her resources should be examined separately in assessing small business performance.

- **Strategic Adaptation Theory**

The strategic adaptation theory postulates that the environment influences performance through the strategic choices of owner-managers (Covin & Slevin, 1989; Keats & Bracker, 1988). In emphasizing the role of strategic choice to business performance, the theory accentuates the influence of the owner-manager on the firm. It suggests that the key to business success lies in the decisions of the owner-manager who identifies opportunities, develops strategies, assembles resources and takes initiative (Lerner & Almor, 2002).

Since the major deficiency of each of the above theories is its neglect of the other determinants of performance, an inclusive theory is proposed that encompasses both

macro- level factors (environmental factors) and micro-level variables (psychological and demographic characteristics of the owner-manager, the firm's resource and strategies). Psychological and demographic characteristics of the owner-manager and the environment determine resources available to the firm and these three variables influence strategic choices, which then determine performance. Thus, the relationships between resources, the psychology and demographics of the owner manager, the environment and performance are mediated by the strategic choices made. The above conceptual framework is developed further to include the impact of performance.

2.7.3 Gender and the Determinants of Small Business performance

Performance differences between the genders have been ascribed to several factors (Lerner, Brush, & Hisrich, 1997). Various researchers have reported that gender influences business performance as a result of its close association with decision-making, business management, strategy formulation and the functional areas emphasised (Carter, Williams, & Reynolds,1997; Fielden et al., 2003; Mukhtar, 2002). Two theoretical orientations have emerged that seek to explain performance differences between male and female owner-managers in terms of the determinants of performance presented above. They are the liberal feminist and social feminist theories (Liou & Aldrich, 1995). Fischer et al., (1993) noted that the liberal feminist theory is rooted in liberal political philosophy, which encompasses basic beliefs in the equality of all beings, and in human beings as essentially rational, self-interest-seeking agents. The liberal feminist theory attributes gender-based differences to the variations in power and opportunity accorded men and women in society (Beasley, 1999), that is the structural positions women and

men occupy in society (Fischer et al., 1993). Thus, differences in the achievements of men and women are ascribed to the inability of women to realize their full potential because they are denied equal access to opportunities in the labour markets and to resources. This in turn has hindered women from acquiring the skills and capabilities necessary to compete on equal basis with men. According to the liberal feminist theory, once equal access to resources is ensured, gender differences in performance seemingly disappear (Carter et al., 1997).

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In contrast to the liberal feminist theory, the social feminist theory, which emanates from the social learning theory and psychoanalysis, holds that differences between men and women exist from their earliest moments in life and result in fundamentally different ways of viewing the world (Beasley, 1999; Fischer et al., 1993; Kutanis & Bayraktaroglu, 2003). These differences are seen in the way women and men construct and interpret reality and how these influence the formation of their values and intentions (Carter et al., 1997). Men and women are inherently different because of differences in their socialization, training and experiences encountered prior to entry into particular work positions. Differences in nurturing result in different self-perceptions, motivations and belief structures. As a consequence, women adopt different approaches to work which may, or may not be as equally effective as those adopted by men (Fischer et al., 1993).

Drawing on these two feminist theories and research on the factors that influence Performance of firms, this study proposes a conceptual framework to guide the examination of gender differences in small business performance in Ghana.

2.8 The Concept of Efficiency

Technical Efficiency: Conventionally, the performance of a firm is judged utilizing the concept of economic efficiency, which is made up of two components - technical efficiency and allocative efficiency (Kalarijan and Shand, 1999). According to Vensher (2001) a firm is said to be technically efficient when it produces as much output as possible with a given amount of inputs or produces a given output with the minimum possible quantity of inputs. Similarly, Ellis (1988) defines technical efficiency as the maximum possible level of outputs obtainable from a given set of inputs, given a range of alternative technologies available.

Classical textbook exposition views a technically efficient firm as producing on the isoquant/production possibility frontier (Mc Guire, 1987). These mainstream definitions have been criticized by Ellis (1988) for associating technical efficiency only with input quantities and not with input cost monetary terms.

Though technical efficiency is as old as neoclassical economics, its measurement is not. Probably this is explained by the fact that neoclassical economics assumes full technical efficiency. Two main reasons justify the measurement of technical efficiency (Kalarijan and Shad, 1999). First, a gap exists between realized efficiency and theoretical assumption of full technical efficiency. It has been observed by Kalarijan and Shad (1999) that where technical inefficiency exists, it will exert a negative influence on allocative efficiency with a resultant effect on economic efficiency.

The issue of technological efficiency has also caught the attention of researchers. Technological change occurs through processes, which can yield more output for the same or less quantity of input than older processes. Some researchers argue that the introduction of such a new process can be thought of as rendering all previous processes technically inefficient (Ellis, 1988). According to Meier (1995), under this view, ' technology' comprises the series of all known techniques for producing a particular output – though the invention of a new technology does not guarantee its availability to all producers. It should therefore be realized that there is a difference between inefficiency due to operating off the isoquant for a given technology as opposed to inefficiency due to failure to move to a different isoquant made possible by a new technology (Ellis, 1988). The former can be exemplified by a situation in which the same output of maize can be obtained by using a lesser quantity of the input. An example of the latter will be a situation in which a new technology is introduced and the firm is unable to use it for various reasons.

Ellis (1988) notes two forms of technological change; the first is process innovation, which improves the production of existing products; the second is product innovation, which develops sustainable improved outputs. While technological change represents innovation, improving technical efficiency under a given technology is essentially about catching up with what is technologically possible (Fare et al, 1997). The basic concept underlying the estimation of technical efficiency lies in the description of a production technology. Production technologies are usually represented by isoquants, production functions, costs functions or profit functions.

Allocative Efficiency (Price Efficiency): Several authors have given their views as to the definition of allocative efficiency. Farell (1957) defines allocative efficiency as the ability to choose optimal input levels given factor prices. According to Kalarijan and Shand (1999), the willingness and ability of an economic unit to equate its specific marginal value product to its marginal cost is referred to as allocative efficiency. In effect, allocative efficiency refers to the adjustment of inputs and outputs to reflect relative prices (price efficiency) under a given technology (Ellis, 1988).

Unlike technical efficiency concepts, which only consider the process of production, allocative efficiency concepts pertain to the idea that society is concerned with not only how an output is produced but also with outputs and balance of output are produced (Hensher, 2001).

2.9 Methodological Issues

Several studies have attempted to estimate the efficiency of agricultural production (Xu and Jeffrey, 1998; Khem et al, 1999, Gavian and Ehui, 1999). According to Xu and Jeffrey (1998) empirical studies of production efficiency have employed a variety of modeling approaches including deterministic versus stochastic; parametric versus nonparametric; and programming methods versus statistical methods. On very broad basis, these techniques can be categorized into stochastic frontier production approaches and nonparametric mathematical programming approaches (Khem et al, 1999).

A review of the strengths and weakness of these approaches has been done by Ceolli (1995). The main strengths of the stochastic frontier approaches are that they deal with factors beyond the researcher's control and measurement errors (stochastic noise) and allow for statistical test of hypotheses that pertain to production structure and the degree of inefficiency. The weaknesses of this approach include the need to impose an explicit parametric form for the underlying technology and an explicit distributional assumption for the inefficiency term. The main strengths of the nonparametric approaches (also called Data Envelopment analysis, DEA) are that they avoid parametric specification of technology and the distributional assumption of the inefficiency term. Weaknesses of the DEA are that it is deterministic and attributes all deviations from the frontier to inefficiencies thereby rendering the model liable to measurement errors or other errors in the data set.

In the developing world, most of the studies that examine efficiency have focused on technical efficiency (Bravo-Ureta and Pinhiero, 1993). Without understating the importance of technical efficiency, improvement in economic efficiency will lead to greater production efficiency. Only few studies have examined the effects of technical change of efficiency (Xu and Jeffrey, 1998; Pierani and Rizz, 2003). Given the variety of empirical tools available the choice of the 'best' method is ambiguous (Xu and Jeffrey, 1998). In their view, to a certain degree, the choice between alternative modelling techniques is somewhat arbitrary since the ordinal efficiency ranking of farms obtained for alternative models are comparable.

In the stochastic frontier approach, the technical relationship between inputs and outputs of a production process is described by a production function which establishes the maximum level of output attainable from a given vector of input. As a result it is called the production frontier. Production frontier efficiency can be traced back to the seminal work of Farrell (1957). The Stochastic Production Frontier (SPF) was however developed independently by Aiger, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977).

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It is necessary to review specific methodologies used by earlier researchers. Both Khem et al (1999) and Xu and Jeffrey (1998) have used a dual stochastic frontier efficiency decomposition model though the Khem et al (1999) went a step further by comparing the stochastic approach to a nonparametric method using the same data set. The common stochastic frontier function used by both studies is given as:

$Y=f(X,\beta)^{v-u}$

Where Y is output, X is input vector and β the vector of production function parameters, V is a random error term with zero mean, and U, a nonnegative one-sided error term which gives a measure of inefficiency. Both writers used the Cobb-Douglas functional form, which though less flexible compared to the translog functional form is self-dual and has been used in many empirical studies.

Pierani and Rizz (2003) used the short-term specification of the Symmetric Generalised McFadden (SGM) cost function that is capable of accommodating quasi-fixed inputs and variable returns to scale. This method allows for the analysis of spatial equilibrium and

scale economics while maintaining the consistency of the estimated model with economic theory and approximation properties. Also, no distributional assumption is required on efficiency since a fixed effect model is considered. The defect of the model is the problem of degree of freedom and high data requirements (Pierani and Rizz, 2003).

Gavian and Ehui (1999) used interspatial measures of factor productivity based on the Divisia index to estimate the relative productive efficiency of alternative land tenure contracts in Ethiopia. This approach has several advantages. Detailed multi-input and multi-output data can be used irrespective of the number of observation over time. There is no degrees of freedom problem and it avoids input –output separation assumptions. However, the method imposes an implicit structure on the aggregate production technology. A major difficulty of this method is the derivation of aggregate output and input demand measures that represent the numerous outputs and inputs involved in the production process (Gavian and Ehui, 1999).

2.10 Empirical Studies: Estimation of Efficiency and Inefficiency Equations

Estimation methods exist for the estimation of efficiency and inefficiency equations. These are: the maximum likelihood procedure, the corrected Ordinary Least Square method (COLS) (Jaforullah and Premachendra, 2003) and Zellner's Seemingly Unrelated Regressions (SURE) approach. In stochastic efficiency estimation the use of OLS results in parameter estimates which are less efficient (especially the intercept) compared to maximum likelihood estimates (Greene, 1980).

Since the stochastic frontier model is nonlinear, a nonlinear estimation procedure produces consistent and efficient estimates (Greene, 1980). According to Greene (1980), while OLS provides best linear unbiased estimates of the slope and the computed standard errors, it provides a downwardly biased estimate of the intercept. Consequently, he suggests that the OLS estimates of the intercept be adjusted by the largest positive OLS residual. This two-step procedure is what is called the Corrected Ordinary Least Squares (COLS) method.

Estimation of the factors that cause inefficiency has generated considerable debate in frontier studies. According to Khem et al (1998) the most popular procedure is to first estimate efficiency scores and regress them against a set of firm - specific factors or to use nonparametric or analysis of variance (ANOVA). Whilst Kalirajan (1991) and Ray (1988) defend this two step procedure, Kumbhakar et al (1991), Battese and Coelli (1995) challenge this approach by arguing that firm specific factors should be incorporated directly in the estimation of the production frontier because such factors have a direct impact on efficiency. Notwithstanding this criticism, the two-step procedure is still quite popular investigating the relationship between efficiency and firm – specific variables (Khem et al, 1998). Existing studies aiming to incorporate firm – specific effects directly into the frontier model are limited to the parametric approach (Kumbhakar et al, 1991; Battese and Coelli, 1995)

Similarly, Reifschneider and Stevenson (1991) suggest the expression of the inefficiency effects as an explicit function of a variable vector and a random perturbation, as well as

the estimation of all the parameters in a single-stage maximum-likelihood procedure. Likewise, Bonilla et al (undated) present a model for a stochastic production function, in which the technical inefficiency effects are specified to be a function of some firm – specific factors, together with their interactions with the input variables of a production frontier.

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2.11 Causes of Inefficiency

According to Kalirajan (1981), variables such as credit, education, experience, extension contact and family size may affect efficiency. These factors have a negative relationship with technical inefficiency. There are four main conceptual sources of technical and economic inefficiency (Hensher, 2001).

- Failing to minimize the physical input used (that is, operating within the production possibility frontier).
- Failing to use the least cost combination of inputs (that is, failing to operate at the point of tangency between the isocost curve and the isoquant).
- Operating at the wrong point on the short-run average cost curve.
- Operating at the wrong point on the long-run average cost curve.

2.12 The Concept of Profit in Accounting and Economics

In general, the term, profit stands for the difference between revenue and costs. However, for one and the same activity, profit does not necessarily have to be the same number under different points of view. Different accounting standards or special regulations for

taxation make organizations display different profits in financial statements for different purposes (Dagmar R, 2001). On top of that, profit from the accountant's point of view is not equal to profit from the economist's point of view. This difference is not based on different principles on what to evaluate, but is fundamentally different understandings of costs and profits (Dagmar R, 2001).

Generally in accounting and economics profit can be defined as:

Profit = Total Revenue – Total Costs

The methodology that is used for this study is based on the literature reviewed. the methodology for non-financial analysis of performance, will be based on the work of Buttner and Moore (1997, p.34), Naffziger, Hornsby et al., (1994), Stanworth and Curran, (1976), and Brush (1992). With regard to the profit efficiency analysis the model used by Joforullah and Premachandra, (2003) was considered.

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CHAPTER THREE

3.0 STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter presents the study area and deals with the theoretical and analytical framework. The methods used for data collection are explained. It also describes model specification and the methodological steps used to analyze the data and other information obtained from the field survey.

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3.2 The Study Area

This study forms part of a wider national investigation. Specifically this research is restricted to the northern part of the country which is mainly savannah. The dry land savannah zone of the Northern Region of Ghana occupies 40% of the country. It comprises sub−humid to semi−arid guinea and sudan savannah. Although there are many constraints to farming, there are considerable opportunities too. Farmers have succeeded in intensifying land use significantly. To continue this increase in food production for the exploding population is an enormous challenge.

Agriculture is the predominant livelihood strategy for people in this area. The crops grown include Guinea corn, maize, yams, groundnuts and soybeans. Farm sizes are small. Livestock (cattle, sheep and goats) are owned mainly for subsistence purposes.

There are hardly any employment opportunities in the rural communities, and there is little social infrastructure apart from some primary schools clinics and health posts.

Although desertification is not visibly severe in these areas, poverty is. People suffer a very low standard of living and are often unable to clothe or feed themselves adequately hence the choice of the study area

3.3 How Should SME's Performance be Measured?

The lack of separation of ownership and management of a business enterprise is believed to allow the goals of the owner to become the goals of the firm (Naffziger, Hornsby et al. 1994), given the significant freedom 'being your own boss' has in the pursuit of objectives (LeCornu, McMahon et al. 1996). Further, it has been reported that many of the stated reasons for entering a small business are non-financial in nature (Stanworth and Curran 1976). For this reason, Brush (1992, p.22) argued that, the 'assessment of business performance for women owned businesses should include not only financial measures, but should incorporate other measures such as employee satisfaction, social contributions, goal achievement, and effectiveness'.

Buttner and Moore (1997, p.34) supported this view noting that the entrepreneurs in their study measured success in terms of 'self-fulfillment and goal achievement. Profits and business growth, while important, were less substantial measures of their success.' Similarly, Kuratko, Hornsby and Naffziger (1997, p.31) argued that the intrinsic goal set suggested by their study emphasized that 'entrepreneurial success should not be solely measured in financial terms'. However, despite this ready acceptance of the importance on non-financial objectives, research seems to have concentrated on traditional economic measures of performance.

Studies on entrepreneurs have adopted a limited view of success, focusing almost exclusively on their business success as indexed by 'hard' measures of firm performance. With limited exceptions, these studies have generally ignored the 'softer' more personally defined criteria of success that reflect the internal career (Parasuraman, Purohit et al. 1996, p.276)

As noted by Murphy, Trailer and Hill (1996) one approach to measuring effectiveness is to relate performance to organizational goals. It would appear that this approach might be particularly appropriate for SMEs, where the goals of the organization and of the owner are generally one and the same.

The need for a proper understanding of SME owner objectives prior to assessing SME performance is summed up in the following quote by Cooper (1993, p.241):

> ‘many entrepreneurs pursue personal goals, some of which are noneconomic in nature. Thus, decisions about whether to found ventures, about how vigorously to grow them, or about whether or not to close down marginal businesses are all influenced by the personal values of entrepreneurs’.

Cooper (1993, p.249) suggested that the confusing and somewhat conflicting results from some prior studies (which had reported older entrepreneurs as being more likely to survive but less likely to grow) might be explained by the entrepreneurs’ alternative employment opportunities and their attitudes to risk, and how these factors impact on

enterprise outcomes. For example, older entrepreneurs may be 'less likely to invest (and risk) the time and money needed to grow. However, they may be less inclined to close down marginal businesses because they perceive fewer employment alternatives.'

Similarly, adopting goals based approach to assessing performance may help to explain why businesses run by women perform relatively poorly on quantitative financial measures, even after controlling for confounding variables such as industry and age of proprietor (Rosa, Carter et al. 1996; Fasci and Valdez 1998). In their study of accounting practices, Fasci and Valdez (1998, p.5) found that businesses 'established to attain flexibility (presumably to balance family and professional responsibilities) had significantly lower profit ratios' and 95 percent of such businesses were owned by women. The implication from the above is that before we can assess the performance of an SME we must first have an understanding of the major objectives of the owner(s) of the business. We must also recognize that each entrepreneur may have a unique set of goals related to their individual situation (Naffziger, Hornsby et al. 1994). Having identified an owner's objectives, SME performance can then be assessed in relation to those specific objectives. Hence this is adopted for the non-financial analyis of the study.

It is also imperative that where economic measures (such as earnings) are used to assess performance, they should be related to the input of the owner(s). Fasci and Valdez (1998, p.5) noted that 'Hours dedicated to the business on a weekly basis, a measure of input to the business, contributed significantly to the earnings ratio.' As noted by Murphy, Trailer and Hill (1996, p.22) 'failure to address the critical control variables will likely lead to

results that are difficult to interpret. In such cases, conflicting and confusing results are likely to abound'.

'A common human failing is the desire for simple answers to difficult questions.' (Sharpe 1975, p.29) Sharpe noted that this applied particularly to performance measurement, as most people wanted the answer provided in the form of a single unambiguous number. Research into SME performance has tended to focus on returns as noted earlier (sales and/or profit; or growth in sales and/or profit) as the single most important number; without any explicit control for risk (see, for example, Kalleberg and Leicht 1991; Fischer, Reuber et al. 1993; Cooper, Gimeno-Gascon et al. 1994; Rosa, Carter et al. 1996; Fasci and Valdez 1998; Du Rietz and Henrekson 2000). However, we know that 'there is risk in the world, and that investors generally dislike it.'

While there is no doubting the importance of sales and profit to a business, it is equally important to explicitly relate these return measures to the underlying risks involved in the business (Sharpe 1975, p.29). This may be particularly relevant when comparing the performances of male and female controlled SMEs because the available evidence to date suggests that females, as a group, may be more risk averse than males (Sexton and Bowman-Upton, 1990; Powell and Ansic, 1997; Jianakoplos and Bernasek 1998; Barber and Odean, 2001). This being the case, we might expect systematic differences in the way male and female controlled SMEs are operated. For example, these researchers suggested that female entrepreneurs are more likely to establish maximum business size thresholds beyond which they would prefer not to expand, and that these thresholds are

smaller than those set by their male counterparts. Female entrepreneurs also seem to be more concerned than male entrepreneurs about the risks of fast-paced growth and tend to deliberately adopt a slow and steady rate of expansion.

Sharpe (1975) suggested the reward-to-variability ratio as an appropriate unambiguous measure of performance that controls for risk. 'The reward-to-variability ratio is simply the ratio of reward (which is good) to variability (which is bad).' Other things being equal, the higher the ratio, the better the performance.

3.4 Methodology

3.4.1 Sampling Procedure and Sample Size.

The data collected covered the whole country, including the southern, middle and the northern zones. Six districts were purposively selected, two from each zone. The clients were randomly selected and interviewed irrespective of type of enterprise (within the defined group). The study population includes male and female proprietors who were randomly interviewed. The interviewers were trained on how to administer the questionnaires. A total of five hundred and eighty two questionnaires were administered.

For the purpose of this study only the data from the Northern part of the country was used. These include 328 questionnaires, which were administered within Tamale Municipality and West Mamprusi Districts. For profit efficiency analysis, data was collected from farmers in West Mamprusi district. A total of 150 supplementary structured questionnaires were administered for profit efficiency analysis.

3.4.2 Types and Sources of Data

The main data for the study is primary data, which was collected using structured questionnaires. Key informants interview were also conducted with the heads of the regional and districts National Board for Small Scale Industries (NBSSI). Direct observations were also made on the field.

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3.4.3 Analytical Framework

Descriptive statistics including means, percentages, frequencies, and standard deviations were used to discuss the data. The data analysis was done using qualitative and quantitative approaches. The Statistical Package for Social Science (SPSS software) has been used for most of the quantitative analysis and LIMited DEPendent variables (LIMDEP) for the profit efficiency analysis of maize farmers.

3.4.3.1 Non-Financial Analysis of Agribusiness Performance

Employee satisfaction, challenges, social contributions, goal achievement, and effectiveness' have been used to assess performance (non financial) Brush (1992, p.22), (Buttner and Moore, 1997, p.34), (Rosa, Carter et al. 1996; Fasci and Valdez 1998). Success has been measured based on goal/objective achievement (Buttner and Moore, 1997, p.34). Profit efficiency analysis and its determinants were carried out and compared with the non-financial method of performance analysis.

As noted by Murphy, Trailer and Hill (1996), performance was measured by relating performance to organizational objectives. This approach is particularly appropriate for

SMEs, where the goals of the organization and of the owner are generally one and the same. The objectives at the start of business and during operation of business were identified. Objectives satisfied were identified and compared with objectives of the enterprise identified and ranked according to importance. The challenges were also identified and ranked using the Kendall's coefficient of concordance.

The level of success was assessed based on the level of satisfaction. The higher the percentage scores the higher the level of success. If the percentage is 50 and above then we say the businesses are successful below 50% then it is not successful.

3.4.3.2 The Kendall's Coefficient of Concordance

The Kendall's concordance analysis was used to identify and rank the objectives and constraints of agribusinesses. It establishes the extent of disagreements and agreements among responses.

The Kendall's coefficient of concordance (W) is the measure of the degree of agreement among ***m*** set of ***n*** ranks. ***W*** is an index that measures the ratio of the observed variance of the sum of ranks to the maximum possible variance of sum of ranks. The idea behind this index is to find the sum of ranks for each thing being ranked and then to examine the variability of this sum. If the rankings are in perfect agreement, the variability among sums will be a maximum (Mattson, 1986).

This is a statistical procedure, which is used to identify and rank a given set of objectives into the most pressing one up to the least pressing one, and then measures the degree of

agreement/concordance between these constraints and objectives. The identified constraints and objective are ranked according to the most pressing to the least pressing using numerals; 1,2,3,4…n, in that order. Computing the total rank score for each constraint and objective, the constraint and objective with the least score is ranked as the most pressing whilst the one with the highest score is ranked as the least pressing. The total rank score computed is then used to calculate for the coefficient of concordance (***W***), to measure the degree of agreement in the rankings (Allen Edwards, 1964). The limits for ***W*** cannot exceed **1.00** and cannot be negative. That is, it can only be positive in sign and ranges from **0** to **1**. It will be **1** when the ranks assigned by each judge (entrepreneur) are exactly the same as those assigned by other judges (entrepreneurs). If we let ***T*** represent the sum of ranks for each thing being ranked, the variance of the sum of ranks is found by the formula:

$$\text{var}_T = \frac{\sum T^2 - (\sum T)^2 / n}{n} \quad \text{..... (1)}$$

the maximum variance of ***T*** is then given by:

$$\text{VarT (max)} = \frac{m^2 (n^2 - 1)}{12} \quad \text{..... (2)}$$

the formula for the coefficient of concordance **W** is then given by:

$$W = \frac{(\sum T^2 - (\sum T)^2 / n) / n}{m^2 (n^2 - 1)/12} \quad \text{..... (3)}$$

W is simplified as:

$$W = \frac{12\left|\sum T^2 - \left(\sum T\right)^2 / n\right|}{\mathrm{nm}^2\ (\mathrm{n}^2\ \text{-1}\ )} \quad \text{…..……. (4)}$$

where; **T** =sum of ranks for each thing being ranked.

m = number of rankings (entrepreneur) and

n = number of things (factors) being ranked.

Hypothesis and Significance test for W: (F-Test)

H_o: there is no agreement among the objectives identified by each entrepreneur in micro and small agribusinesses.

H_1: there is agreement among the objectives identified by each entrepreneur in micro and small agribusinesses.

H_o: there is no agreement among the challenges identified by each entrepreneur in micro and small agribusinesses.

H_1: there is agreement among the challenges identified by each entrepreneur in micro and small agribusinesses.

The Coefficient of concordance ***W*** is tested for significance using the **F** distribution.

The F ratio is given by: **[(m-1)W]/(1-W),** with **(n-1)-2/m**, degrees of freedom for the numerator and **m-1[(n-1)-2/m],** degrees of freedom for the denominator (Allen Edwards, 1964).

3.4.3.3 Assessing the Profit Efficiency of Maize Producers

This Section presents the theoretical framework as well as the empirical model for estimating the profit efficiencies of maize producers. This addresses the estimation procedure for the sixth and seventh objectives of the study.

3.4.3.4 The Stochastic Profit Frontier (SPF)

The SPF method of analyzing efficiency is chosen for this study. The justification is that, unlike other methods (for example the Data Envelopment Analysis, DEA) the SPF allows for the sensitivity of the model to random shocks by including a conventional random error term in the estimation of the profit frontier such that only deviations caused by controllable decisions are attributed to inefficiency (Joforullah and Premachandra, 2003). Inefficiency is assumed to be part of the error term consisting of two parts-a random error term which is normally distributed [N (0, σ^2)] and represents random shocks and statistical errors, and the inefficiency term which is one – sided (non-negative). The inefficiency error term is assumed to have a half normal distribution. The SPF is expressed as

$$\pi_i = f(X_i, \beta)\, e^{v-u} \quad \text{..... (5)}$$

In logarithmic terms the SPF is expressed as

$$\text{Ln}\ \pi_i = \text{Ln}f\ (X_i, \beta) + V_i - U_i \quad \text{..... (6)}$$

Where Π_i is the output vector, $\mathbf{X_i}$ is the input vector, $\boldsymbol{\beta}$ is an unknown parameter vector, **Vi** is the random error term assumed to be **iid N (0, σ^2),** $\mathbf{U_i}$ is the inefficiency term independently distributed from $\mathbf{V_i}$.

There is disagreement among econometricians as to the distribution of $\mathbf{U_i}$ (Jaforullah and Premachandra, 2003). Previous studies have used several distributions including single parameter, half-normal distribution, exponential and truncated normal distributions and two-parameter gamma distribution (Jaforullah and Dewin, 1996; Bravo-ureta and Reiger, 1990; and Sharma et al, 1991). In this study the half normal distribution used by Jaforullah and Premachandra (2003) in a cross sectional data similar to this study is adopted. The half-normal distribution assumption for $\mathbf{U_i}$ for this study for the ith processing unit is:

$$\frac{\sigma_u\sigma_v}{\sigma}\left[\frac{\frac{1}{2\pi^e}^{-\frac{1}{2}\left\langle \varepsilon_i \frac{\sigma_u/\sigma_v}{\sqrt{\sigma_u^2+\sigma_v^2}}\right\rangle^2}}{1-F\left\langle \varepsilon_i \frac{\sigma_u/\sigma_v}{\sqrt{\sigma_u^2+\sigma_v^2}}\right\rangle} - \varepsilon_i \frac{\sigma_u/\sigma_v}{\sqrt{\sigma_u^2+\sigma_v^2}}\right] \quad \text{..... (7)}$$

Where $\boldsymbol{\sigma^2_u}$ and $\boldsymbol{\sigma^2_v}$ are variances of **U** and **V** respectively. $\boldsymbol{\sigma_u}$ and $\boldsymbol{\sigma_v}$ are the standard deviations, $\boldsymbol{\varepsilon}$ is the error term while F is the standard normal distribution function. The total variance of output σ^2 is given by:

$$\sigma^2 = \sigma^2 u + \sigma^2 v \quad \text{..... (8)}$$

Following Jandrow et al (1982), the total deviation of output from the frontier attributable to inefficiency can be expressed as:

$$\lambda = \frac{\sigma_u}{\sigma_v} \quad \text{..... (9)}$$

The expressions above are necessary since they permit the estimation of the technical efficiency for each farmer in the sample. The technical efficiency measure (U_i) is computed given ε_i using the following expression:

$$E[u/\varepsilon] = \frac{\sigma\lambda}{1+\lambda^2}\left[\frac{\phi(z)}{1-\phi(z)} - z\right] \quad \text{..... (10)}$$

where $Z = \frac{\varepsilon\lambda}{\delta}, \phi$ is read from the normal distribution table.

After estimating the $\mathbf{U_i^s}$, firm-specific technical efficiency, **(TE)** is then calculated using the formula:

$$TE = \exp(-u_i) = e^{-u_i} \quad \text{..... (11)}$$

The SPF requires the specification of a functional form. Most efficiency studies have used the Cobb-Douglas production function on the basis of its simplicity (in terms of analysis and interpretation), its ability to handle multiple inputs in its generalized form. Even in the case of imperfections in the market it does not introduce distortions of its own. Unconstrained Cobb-Douglas production function further increases its potentialities to handle different scales of production. Various econometric problems such as serial correlation, hetroscidasticity, and multicolinearity can be handled adequately and easily. Most of its criticisms is focused on its inflexibility and admits that except for one obvious

assumption all other assumptions can be relaxed. It further argued that it facilitates computation and has the properties of explicit representability, uniformity, parsimony and flexibility. Even the problem of simultaneity can be overcomed, Lan Lawrence J., (1986).

Two profit functions can be distinguished, depending on either or not market forces are taken into account; these are the standard profit function and the alternative profit functions. The standard profit function assumes that markets for outputs and inputs are perfectly competitive. Given the input **(W)** and output price vectors **(P),** the firm maximizes profits by adjusting the amount of inputs and output. Thus, the profit function can be expressed implicitly as

$\pi a = f$ (P, W; V, U) and in logarithmic terms:

$$ln(\pi + \theta) = lnf(P, W) + (v - u) \quad \text{..... (12)}$$

where **θ** is a constant added to the profit of each firm in order to attain positive values, enabling them to be treated logarithmically. The exogenous nature of prices in this concept of profit efficiency assumes that there is no market power on the firms'/farmers side. If instead of taking price as given, the firms/farmers assume the possibility of imperfect competition, given only the output vector and not that of price. Thus, alternative profit function is defined as: **πa =πa(Y, W, V, U)** in which the quantity of output **(Y)** produced replaces the price of output **(P)** in the standard profit function.

Economic applications of stochastic profit frontier model for production efficiency analysis include: Adesina and Djato (1996) who applied the technique in a study of efficiency of rice farmers in Cote d'Ivoire. Beger and Mester (1997) applied the

technique to U.S. Banking Institute, Maudos *et al* (2002) applied the technique to European banks, and Ogundari Kolawole (2006) applied the technique in the study of determinants of profit efficiency among small scale rice farmers in Nigeria.

3.4.3.5 The Stochastic Profit Frontier Model Specifications

Profit efficiency in this study is defined as profit gain from operating on the profit frontier, taking into consideration farm-specific prices and factors. Considering a farm that maximizes profit subject to perfectly competitive input and output markets and a singular output technology that is quasi-concave in the (n x 1) vector of variable inputs, and the (m x 1) vector of fixed factors, Z.

Profit efficiency in this study is defined as profit gain from operating on the profit frontier, taking into consideration farm-specific prices and factors

$$\pi=\sum(TR-TVC)=\sum(PQ-WX_i) \quad \text{……..(13)}$$

To normalize the profit function, **(π)** is divided on both sides of the equation above by (**P)** which is the market price of the output (maize). That is:

$$\frac{\pi(p,z)}{p} = \pi\frac{(PQ-WXi)}{p} = Q - \frac{WXi}{p} = f(Xi,Z) - \sum piXi \quad \text{……(14)}$$

where: TR represents total revenue, TVC represents total variable cost, P represents price of output (Q), X represents the quantity of optimized input used, Z represents price of fixed inputs used, $\mathbf{p_i = W/P}$ which represents normalized price of input X_i while $f(X_i,Z)$ represents production function.

The Cobb-Douglas profit function in implicit form, which specifies production efficiency of the farmers, is expressed as follows:

$$\pi_i = f(P_i, z)\exp(v_i - u_i) \quad \ldots\ldots\ldots\

Douglas functional form for the maize farmers in the study area is therefore specified as follows:

$$ln\pi_i = ln\beta_0 + \beta_1 lnZ_{1i} + \beta_2 lnP_{1i} + \beta_3 lnP_{2i} + \beta_4 lnP_{3i} + \beta_5 lnZ_{2i} + (V_i - U_i) \text{ .. (18)}$$

where: Π_i represents normalized profit computed as total revenue less variable cost divided by farm specific maize price; Z_1 represents Farm size (ha); P_1 represents average cost per man day of labour; P_2 represents average price per kg of fertilizer; P_3 represents average price per kg of seed; Z_2 represents average price of farm tools.

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Hypothesis and Significance Test

The following hypotheses were tested using the't' test:

H_{01}: Farm size is not related to profit ($\beta_1 = 0$).

H_{11}: Farm size is related to profit ($\beta_1 \neq 0$).

H_{02}: Average cost per man day of labour is not related to profit ($\beta_2 = 0$).

H_{12}: Average cost per man day of labour is related to profit ($\beta_2 \neq 0$).

H_{03}: Average price per kg of fertilizer is not related to profit ($\beta_3 = 0$).

H_{13}: Average price per kg of fertilizer is related to profit ($\beta_3 \neq 0$).

H_{04}: Average price per kg of seed is not related to profit ($\beta_4 = 0$).

H_{14}: Average price per kg of seed is related to profit ($\beta_4 \neq 0$).

H_{05}: Average price of farm tools is not related to profit ($\beta_5 = 0$).

H_{15}: Average price of farm tools is related to profit ($\beta_5 \neq 0$).

The inefficiency model **(U_i)** is defined by:

$$U_i = \alpha_0 + \alpha_1 M_{1i} + \alpha_2 M_{2i} + \alpha_3 M_{3i} + \alpha_4 M_{4i} + \alpha_5 D \text{ ..... (19)}$$

where: $\mathbf{M_1}$, $\mathbf{M_2}$, $\mathbf{M_3}$, $\mathbf{M_4}$ and **D** represent age, educational level, farming experience, household size and sex of proprietor, respectively. This inefficiency differs slightly from that of Ogundari Kolawole (2006) by the introduction of sex variable.

Sex of proprietor **D** that is a dummy variable is defined as,

D_1=0 female

D_2=1 male

These socio-economic variables are included in the model to indicate their possible influence on the profit efficiencies of the maize farmers (determinant of profit efficiency). The variance of the random errors,$\sigma^2\mathbf{v}$ and that of the profit inefficiency effect $\boldsymbol{\sigma^2 u}$ and overall variance of the model σ^2 are related thus:

$$\sigma^2 = \sigma^2 u + \sigma^2 v \quad \text{.....(20)}$$

measure the total variation of profit from the frontier which can be attributed to profit inefficiency (Battese and Corra, 1977). Battese and Coelli (1993) provided log likelihood function after replacing $\boldsymbol{\sigma^2 v}$ and $\boldsymbol{\sigma^2 u}$ with $\boldsymbol{\sigma^2 = \sigma^2 v + \sigma^2 u}$ and thus estimating gamma **(λ)** as: $\boldsymbol{\lambda = \frac{\sigma^2 u}{\sigma^2 u + \sigma^2 v}}$

The parameter λ represents the share of inefficiency in the overall residual variance with values in interval **0** and **1**. A value of **1** suggests the existence of a deterministic frontier, whereas a value of **0** can be seen as evidence in the favour of OLS estimation. The estimate for all parameters of the stochastic frontier profit function and the inefficiency model are simultaneously obtained using the program LIMited DEPendent variables (LIMDEP). A three-step estimation method is used in obtaining the final maximum likelihood estimation. The likelihood maximization procedure uses Davidson Fletcher

Powel Quassi Newton algorithm. And, for this study, two different models were estimated in the final MLE. Model 1 is the traditional response function OLS in which the efficiency effects are not present **($U_i = 0$)**. It is a special form of the stochastic frontier production function model in which the total variation of output due to technical inefficiency is zero, that is, $\gamma = 0$. Model 2 is the general model where there is no restriction and thus $\gamma \neq 0$. The two models were compared for the presence of profit inefficiency effects using the gamma **(γ)** test of significance.

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Hypothesis and Significance Test

The following null hypothesis is tested using the gamma test:

H_{06}: there is no inefficiency of profit **($\gamma = 0$)**.

H_{16}: there is no inefficiency of profit **($\gamma \neq 0$)**.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion on the non-financial measure of agribusiness performance and profit efficiency of maize farmers. Results on the factors that affect profit efficiency are also presented and discussed.

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4.2 The Nature and Forms of Micro and Small Scale Agribusinesses

For the first objective, analysis of the data regarding the nature and forms of micro and small scale agribusinesses in Northern Ghana and relative involvement of male and female yielded the information presented in Table 4.1, Table 4.2 and Table 4.3

Table 4.1: Male and Female Involvement in Micro and Small Agribusiness

Sex	**Frequency**	**Percentages**
Male	76	44.97%
Female	93	55.03%
Total	**169**	**100.00%**

Source: field survey October 2006

From the results above, males form about 45% and females 55% of small and micro agribusinesses. Males are somewhat less involved than their female's counterparts in agribusinesses.

The study revealed the pattern of ownership of agribusinesses shown in Table 4.2

Table 4.2: Ownership Types of Micro and Small Agribusinesses Identified

Type of ownership	Frequency	Percentage
Sole proprietor	155	96%
Partnership	7	4%
Total	162	100%

Source: field survey October, 2006

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There are two main forms of ownership of agribusinesses identified in this study; these include sole proprietorship, which forms about 96%, and partnership, which is 4%. It is quite clear from the results above that sole proprietorship is the main type of ownership of micro and small agribusinesses in Northern Region. The study identified the agribusiness activities listed in Table 4.3 below,

Table 4.3: Agribusiness Activities Identified for Micro and Small Agribusinesses

Agribusiness activity	Frequency	Percentage
Crop Farming	19	10.0
Agriculture services	4	2.1
Fish farming	1	0.5
Livestock farming	11	5.7
Hunting/Trapping/Game	1	0.5
Food manufacturing/Processing	46	24.1
Beverage manufacturing/Processing	3	1.6
Tobacco manufacturing/Processing	1	0.5
Retail of farm produce	105	55.0
Total	191	100

Source: field survey October, 2006

The results indicate that, retail of farm produce is the major activity carried out by many agribusiness entrepreneurs. This as in table 4.3 above represents about 55% of the activities identified. Food manufacturing/processing and crop farming form about 24% and 10% respectively, the rest are below 10%.

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4.3 Objectives and Challenges of Micro and Small Agribusinesses.

The second objective of this study is to identify the objectives and challenges of micro and small agribusinesses and to rank them in order of importance. To achieve this objective the views of the entrepreneurs were sought. Table 4.4, 4.5 and 4.6 contain summaries of the objectives and constraints, specifying the ranks of respondents.

4.3.1 Objectives of Micro and Small Agribusinesses.

Concerning the non-financial measure of performance, the objectives of proprietors identified before the start of business are shown in table 4.4.

Table 4.4: Ranking of Objectives of Proprietors Identified Before Starting the Business

Objectives	**Sum of Ranks**	**Ranking**
Increasing security of household income	257	1
Increasing level of household income	298	2
Continue a family tradition/business	649	3
Satisfaction from running own business	709	4
To operate own business	872	5
To fully employ one self	883	6
Improving status in community	908	7
Limited income from other sources	1124	8
Achieving a flow of money quickly	1131	9
Investing in another business	1210	10
Limited other ways to earn income	1322	11

Source: field survey October, 2006

The objectives are ranked in order of importance from the most important (Increasing security of household income is ranked 1) to the least important (Limited other ways to earn income ranked 11). This is ranked using Kendall's coefficient of concordance sum of ranks for each objective. This approach is explained in section 3.5.2 of Chapter Three.

The satisfaction of the entrepreneur with regard to his or her objectives set was determined by the survey. This is shown in Table 4.5 (a summary of appendix C). A score of 50% and above is considered the pass mark for all the columns. Those ones are bolded in Table 4.5.

Table 4.5: The Measure of Satisfaction of Entrepreneurs' Initial Business Objectives

Objectives	Satisfied (%)	Dissatisfied (%)	Neither Satisfied Nor Dissatisfied (%)
To increase level of household income:	**62.9**	18.5	16.9
To increase security of household income:	**62.4**	18.5	17.4
To expand business:	36	19.1	42.1
To enter new markets:	19.1	15.2	**54.5**
To start another business:	10.7	11.8	**64**
To enhance quality of products:	20.3	8.4	**53.9**
To improve status in community:	33.2	2.2	**56.2**
To increase share of existing markets:	35.9	10.1	46.6
To enhance business profitability:	**50**	21.9	23
To develop new products:	9	14.6	**50.6**
To invest in new equipment/tools:	5.1	19.1	45.5
To invest in new business facility:	10.7	18	**52.2**
To build the business:	38.7	14.1	40.5
To be an entrepreneur:	42.1	7.3	39.4
Free up time for leisure:	21.9	9	43.8
To understand consumer demand better:	25.3	5.6	**55.6**
To add value to things already produce:	19.6	12.4	**55.1**
To invest in another business:	15.2	12.9	**60.1**
Better fit with other business activities:	24.7	10.1	**50**
Satisfaction from running own business:	**73.6**	7.9	14.6

Source: field survey October, 2006

The study showed that some of the objectives set by proprietors of agribusinesses were achieved as shown in Table 4.5 above. From a list of twenty objectives the study asked proprietors to identify the objectives they were satisfied with. This was reorganized into four main categories. These include satisfied (Very Satisfied and Satisfied), Dissatisfied (Very Dissatisfied and Dissatisfied), and Neither Satisfied nor Dissatisfied. Each category is scored in percentages. Out of the twenty objectives that were listed, the study revealed

that, only four objectives had a percentage score of 50% and above which the respondents are satisfied with. These are:

1. Satisfaction from running own business 73.6%
2. To increase level of household income 62.9%
3. To increase security of household income 62.4%
4. To enhance business profitability 50.0%

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Comparing these objectives to those identified and ranked during the start of business and objectives identified during operation of business (appendix B), it is clear that three out of the four topmost objectives were the same ones that entrepreneurs were satisfied with. Out of the twenty objectives, entrepreneurs were not certain with ten objectives as to whether they were satisfied with them or not. For the Dissatisfied column, none of the objectives scored up to the 50% mark. It is evident from the study that the entrepreneurs were generally satisfied with their performance since they were not dissatisfied with any of them. That is, no objective scored a pass mark under the dissatisfied column.

4.3.2 Challenges of Micro and Small Enterprises

Challenges affecting performance of entrepreneurs are identified and listed. They are ranked in order of importance.

Table 4.6: Challenges that Affect Entrepreneurs Performance and their Ranking

Challenge	Sum of Ranks	Ranking
Access to working capital	282	1
Access to credit	395	2
Cost of credit	519	3
Financial obligation to family	544	4
Financial obligation to community	736	5
Consequences should the business fail	828	6
Keeping reliable records	927	7
Financial resources within business	1126	8
Access to business sport services	1173	9
Access to training courses	1277	10

Source: field survey October, 2006

From Table 4.6 above, the results show that access to working capital, credit and cost of credit are the three topmost challenges to micro and small agribusinesses, with access to training courses being the least in terms of their ranking. Using the Kendall's coefficient of concordance, the sum of their ranks is used to rank them as explained under section 3.4.3.2 (Chapter 3). Rank 1 means the most important challenge to the least being ranked 10. Hence access to working capital, access to credit, and cost of credit are the most important challenges with access to training courses being the least important.

Validation of Hypothesis

The Kendall's coefficient of Concordance (W) was used to test the stated hypotheses (in section 3.4.3.2):

H_o: there is no agreement among the objectives identified by each entrepreneur in micro and small agribusinesses.

H_1: there is agreement among the objectives identified by each entrepreneur in micro and small agribusinesses.

H_o: there is no agreement among the challenges identified by each entrepreneur in micro and small agribusinesses.

H_1: there is agreement among the challenges identified by each entrepreneur in micro and small agribusinesses.

For the first hypothesis, the F-statistic calculated is 174.88 compared to F-statistic ($F_{(10,132)}$) from the table which is 2.32 at 1% level of significance. Hence the null hypothesis is rejected in favor of the alternative hypothesis. This implies there is agreement among the objectives identified by entrepreneurs in micro and small agribusinesses.

For the second hypothesis, the F-statistic calculated is 252.24 compared to F-statistic ($F_{(9,133)}$) from the table which is 2.41 at 1% level of significance. Hence the null hypothesis is rejected in favor of the alternative hypothesis. This implies there is agreement among the challenges identified by each entrepreneur in micro and small agribusinesses.

4.4 Linkages between Micro and Small Agribusinesses.

The types of linkages that were identified between micro and small Agribusinesses are listed in table 4.7, whiles the forms of linkage agreement are presented in table 4.8.

Table 4.7: Types of linkages between Micro and Small Agribusinesses

Linkage type	**Frequency**	**Percentage**
Joint production of inputs	5	7.58
Joint procurement of inputs	1	1.52
Joint marketing of products	12	18.18
Savings	1	1.52
Sharing of equipments	4	6.06
Sharing of transportation	16	24.24
Obtaining credit	12	18.18
Contract supply	9	13.64
Sharing of storage facility	6	9.09
Total	66	100.

Source: field survey October, 2006

Out of the businesses sampled only 66 of them, forming about 37% were involved in some form of linkages. Majority of them were not involved in any form of linkages. Sharing of transportation has the highest score of 24% followed by joint marketing of inputs and obtaining credit with scores of 18%. Joint production of inputs and Savings has the lowest scores of about 1.5%. In each case the nature of linkage agreements is presented in table 4.8

Table 4.8 Forms of Linkage Agreements between Micro and Small Agribusinesses

Form	**Frequency**	**Percentage**
Informal agreements	41	87.23
Cooperatives	1	2.13
Associations	5	10.64
Total	47	100

Source: field survey October, 2006

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The linkages identified rank "informal agreements" highest with about 87%, Cooperatives 2%, and Associations 11%. This means that most agribusiness linkage agreements take informal forms. (i.e., are informal).

4.5 Sources of Capital for Micro and Small Agribusinesses.

The study identified sources of start up capital for micro and small agribusinesses as shown in Table 4.9 below. This is to identify the main source of start up capital to micro and small agribusinesses.

Table 4.9 Sources of Start up Capital for Micro and Small Agribusinesses

Source	**Frequency**	**Percent**
Loan/credit	14	8.24
Household savings	136	80
Proceeds from family farm	6	3.5
Proceeds from non-farm business	4	2.35
Gift from friends/family	10	5.88
Total	170	100

Source: field survey October, 2006

Household savings is a major source of start up capital for most micro and small agribusinesses forming about 80%. Those who had access to credit accounted for about 8% of respondents. Hence credit is a big constraint to micro and small agribusinesses as reported by Parker *et al*, (1995) and Aryeetey *et al* (1994).

Again, the sources of working capital to the businesses were identified and shown in Table 4.10. This was to identify the main source of working capital to micro and small agribusinesses.

Table 4.10 Sources of Working Capital for Micro and Small Agribusinesses

Source	**Frequency**	**Percent**
Proceeds from business	137	84.05
Friends/Relatives	2	1.23
Loan from rural or community bank	12	7.36
Loan from money-lender	1	0.61
Suppliers	8	4.91
NGO support	1	0.61

Source: field survey October, 2006

Majority of agribusinesses obtain their working capital from proceeds of the business they are currently operating. It forms about 84% of the sources identified. The others form less than 10% of those sampled as shown in Table 4.10. Hence proceeds from the business are the major source of working capital to micro and small agribusinesses.

4.6 The Status of Agribusinesses With Regard to Registration, Savings, Record Keeping and Business Account Holding

The status of micro and small agribusinesses with regard to registration, savings, record keeping and business account holding was established. Every business is expected to be registered. This is to help in the smooth running of the business. Table 4.11 below shows the status of businesses with regards to registration.

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Table 4.11 Business Registration Status of Micro and Small Agribusinesses

Registered Status	**Frequency**	**Percent**
Not registered	105	59
Registered with Registrar General	0	0
Registered with district assembly	70	39.3
Not Applicable	3	1.7

Source: field survey October, 2006

Most micro and small agribusinesses that is about (59%) of the sampled SMEs are not registered, with just a few (39%) registered with the District Assemblies. None was registered with the Registrar General as shown in Table 4.11. The implication is that since micro and small scale agribusinesses are not formally registered they are unable to access credit (see Parker *et al*, 1995, and Aryeetey *et al*, 1994).

It is expected that every good business should have a Business account. This is to help in the prudent management of business funds. *Table 4.12* Business Account Status of micro and small agribusinesses.

Table 4.12 Business Account Status of Micro and Small Agribusinesses

Account status	**Frequency**	**Percent**
No bank account	108	60.7
Business bank account	15	8.4
Use personal bank account for business	54	30.3

Source: field survey October, 2006

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Most of the businesses operate without a business account (about 61%). Personal bank accounts are mostly used for business and this forms about 30% of SMEs sampled as shown in Table 4.12 above. Their inability to access bank loans could be attributed partly to the fact that most of them have no business bank accounts.

It is expected that every good business should have a Business account where it saves. This is to help the business raise funds for expansion and other activities as explained above.

Table4.13 Business Savings Status of Micro and Small

	Frequency	**Percent**
No	95	53.4
Yes	83	46.6

Source: field survey October, 2006

Out of the businesses surveyed, the result indicates that, about 47% of them save, implying that a majority (about 53%) of them do not save. This can be attributed to their inability to access credit for expansion hence their earnings are very small to save.

Record keeping is an important activity in operating a business. The study sought to assess the extent to which micro and small agribusinesses are involved in keeping records.

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Table 4.14 Record Keeping Status of Micro and Small Agribusinesses

	Frequency	**Percent**
YES	43	24.7
NO	131	75.3
Total	174	100

Source: field survey October, 2006

Out of the businesses surveyed about 25 percent of them keep records of their activities and about 75 percent of them do not keep records. Lack of data regarding the operation of the business does not encourage financial institutions to advance credit to them. The records help in monitoring and tracking the activities of the business. These can even help in planning of the business.

4.7 Profit Efficiency of Maize Producers

The result from the data analysis shows that the mean yield of 600 kg/ha of bagged maize (shelled maize) was recorded over the sample area with a standard deviation of 230 kg/ha (source: field data). The variability as measured by standard deviation revealed that majority of the farmers recorded average yield of maize that varied greatly from the average yield recorded in the sample area (source: field data). Also, an average of GH¢ 0.158 per kg of maize was recorded in the sample area as price of output. Table 4.15 gives the summary statistics of variables for the estimation of the stochastic profit frontier model. The mean profit of GH¢ 948.00, a minimum profit of GH¢ 14.00, a maximum profit of GH¢ 4,125 .00 and standard deviation of GH¢ 810.06 were obtained. The greater variability indicates that farmers cultivate different sizes (hectare) of farmland with the majority of the maize farmers having average profit very close to that recorded in the sample area (source: field data).

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Table 4.15: Summary statistics of variables for the estimation of stochastic frontier Model.

Variables	Minimum	Maximum	Mean	Std. deviation
Profit (GH¢)	14.00	4,125.00	948.0	810.06
Farm size (ha)	2	41	8.8	6.4
A ave. cost of labour per man day (GH¢)	0.50	1.00	0.86	0.129
Ave.price of fertilizer per kg(GH¢)	12	25	20.57	1.245
Ave.price of seed per kg(GH¢)	0.4	0.8	0.487	0.057
Ave. cost of farm tools(GH¢)	17.00	14,400.00	506.28	1,829.28
Age (Yrs)	24	72	44.12	10.9
Educational level (Yrs)	3	6	3.86	1.66
Farming experience (Yrs)	3	48	18.08	10.79
Household size (Yrs)	1	18	6	3.74

Source: field survey October, 2006

4.7.1 Maximum Likelihood Estimates of the Parameters of the Stochastic Profit Frontier

The maximum likelihood estimates of the parameters of the stochastic profit frontier model are presented in appendix D. Table 4.16 below show that apart from the cost of farm tools the estimated coefficients of the parameters of the normalized profit function based on the assumption of competitive market are positive. The positive coefficient of cost per man day of labour is against expected sign. This may be due to the fact that maize production is labour intensive as most operations are done manually, which resulted in increase in the cost of labour since hired labour are frequently used by the farmers in an attempt to meet their production plans. An increase in the variables in the

normalized profit model which have positive coefficients, (farm size, cost of labour, seed price and fertilizer price) will result in and increase the normalized profit of the farmer, whiles the variable (price of farm tools) is negative and hence vice versa

Table 4.16: Maximum Likelihood Estimates of the Stochastic Profit Frontier Function

Variables	**Parameters**	**Model 1 (OLSE)**	**Model 2(MLE)**
General Model			
Constant	β_0	0.795 ***(5.39)	1.488 ***(8.33)
Farm size (ha)	β_1	0.6215 ***(6.21)	0.585 ***(5.08)
Ave. cost per man days of labour GH ¢	β_2	0.0419 **(2.19)	0.0241 (0.975)
Ave. price of fertilizer per kg GH ¢	β_3	0.0812 ***(3.19)	0.0837 ***(2.80)
Ave. price of seed per kg GH ¢	β_4	0.0213 (0.94)	0.0172 (0.87)
Ave. price of farm tools GH ¢	β_5	-0.0128 **(-2.15)	-0.0077* (-1.88)
Inefficiency Model			
Constant	∂_0	0	-0.980 (0.250)
Sex	∂_1	0	0.082 (0.120)
Age (Yrs)	∂_2	0	0.0142 (0.0074)
Household size (Yrs)	∂_3	0	-0.0153 (-0.0126)
Educational level (Yrs)	∂_4	0	-0.00715 (-0.0187)
Farming experience (Yrs)	∂_5	0	-0.011 (-0.0074)
Variance			
Sigma square	$\sigma^2 = \sigma_U^2 + \sigma_V^2$	0.43	0.703 ***(15.79))
Gamma	$\gamma = \sigma_U^2 / \sigma_U^2 + \sigma_V^2$	0	0.87 ***(3.87)
Log likelihood	Llf	-88.27	-80.17

Dependent variable = Log Normalized profit (π)

Figures in parentheses are‘t’ ratios, *estimate is significant at 10% level

**estimate is significant at 5% level, ***estimate is significant at 1% level, N=141

Validation of Hypotheses and Significance Test

The following null hypotheses of the profit function were tested using the t-ratio:

For H_{01}: Farm size is not related to profit ($\beta_1 = 0$):

H_{11}: Farm size is related to profit ($\beta_1 \neq 0$):

t-calculated = 5.08 whiles t-value from table at (1% significance level) =2.326

Decision: we reject H_{01}

This implies output and size of farm are related.

For H_{02}: Average cost per man day of labour is not related to profit ($\beta_2 = 0$):

H_{12}: Average cost per man day of labour is related to profit ($\beta_2 \neq 0$):

t-calculated =0.975 whiles t-value from table at (10% level of significance)=1.282

Decision: we do not reject H_0

Cost of labour is not related to profit.

For H_{03}: Average price per kg of fertilizer is not related to profit ($\beta_3 = 0$):

H_{13}: Average price per kg of fertilizer is related to profit ($\beta_3 \neq 0$):

t-calculated =2.80 whiles t-value from table at (1% significance level) =2.326

Decision: we reject H_0

Cost of fertilizer is related to profit.

For H_{04}: Average price per kg of seed is not related to profit ($\beta_4 = 0$):

H_{04}: Average price per kg of seed is related to profit ($\beta_4 \neq 0$):

t-calculated= 0.87 whiles t-value from table at 10% significance level = 1.282

Decision: we do not reject H_0

Cost of seed is not related to profit.

For H_{05}: Average price of farm tools is not related to profit ($\beta_5 = 0$):

H_{15}: Average price of farm tools is related to profit ($\beta_5 \neq 0$):

t-calculated =1.88 whiles t-value from table at 10% significance level=1.282

Decision: we reject H_0

Cost of farm tools is related to profit

The following hypothesis was tested using the gamma test:

H_0: there is profit inefficiency (**γ=0)**.

H_1: there is profit efficiency (**$\gamma \neq$0)**.

For H_0: **γ=0** t-calculated =3.87 whiles t-value from table=1.960

Decision: we reject H_0

This means that there was profit inefficiency among maize farmers in the study area as confirmed by the significance of the gamma (γ) estimate. The estimated gamma parameter (γ) of model 2 (MLE) of 0.87 in Table 4.16 was highly significant at 1 percent level of significance. This implies one-sided random inefficiency component strongly dominates the measurements error and other random disturbance. This means that about 87 percent of the variation in actual profit from maximum profit (profit frontier) between farms mainly arose from differences in farmers' practices rather than random variability.

4.7.2 Distribution of Profit Efficiencies of the Maize Farmers

Distribution of profit efficiencies of the maize farmers in the sample area is presented in Table 4.17. Table 4.17 revealed that average measure of profit efficiency of 60.0 percent was recorded in the area. This suggest that an average of about 60 percent of potential maximum profit is gained due to production efficiency while the remaining short fall of discrepancy between observed profit and the frontier profit can be attributed to both technical and allocative inefficiencies as had earlier been confirmed by the gamma test. Table 4.17 further shows that about 45.4 percent of the farmers had **profit efficiency** from 0.61 and above (refer to appendix A), indicating that comparatively less than half of the farms under assumption of the perfect competition market used for the analysis were fairly efficient in allocating their cost structure in the course of maize production.

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Table 4.17: Distribution of Profit Efficiencies of Maize farmers

Efficiency	Frequency	Relative Frequency
0.11-0.20	3	2.3
0.21-0.30	9	7.0
0.31-0.40	12	9.4
0.41-0.50	1 9	14.8
0.51-0.60	27	21.1
0.61-0.70	19	14.8
0.71-0.80	13	10.2
0.81-0.90	8	6.3
0.91-1.00	18	14.1
TOTAL	**128**	**100.0**
Minimum	0.12	
Maximum	1.00	
Mean	0.6	
Std. Deviation	0.22	

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4.8 Determinants of Profit Efficiency of Maize Producers

The parameters estimates for determinants of profit efficiency using the stochastic Cobb-Douglass profit function are presented in the lower part of Table 4.16. However, the analysis of inefficiency models shows that the signs and significance of the estimated coefficient in the inefficiency model have important implication on the profit efficiency of the farmer. Based on this, the variables in the inefficiency model which have negative coefficient, meaning that as these variables (educational level, farming experience, and household size) increase the profit efficiency of the farmer increases, hence increase in profit. Whiles the variables (sex of proprietor and age) are positive and hence vise versa.

The positive coefficient of age is in agreement with the work of Abdulai and Huffman (1988) while the negative coefficient of educational level was in conformity with Kumbhakar and Bhattacharya (1992b), Ali and Flin (1989), Abdulai and Huffman (1988) and Huffman (1974).

Results from both the non-financial and stochastic profit frontier analysis has shown that entrepreneurs were generally happy about their businesses and wished more could be done to develop the micro and small agribusiness sector.

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CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.1 Summary

The study examined the performance of micro and small agribusinesses in Northern Ghana. Seven objectives were set and these include; To assess the nature and forms of micro and small agribusinesses in Ghana and the relative involvement of women and men; to identify the objectives and challenges of micro and small agribusinesses and to rank them in order of importance; to identify the forms and types of linkages that exist between micro and small agribusinesses; assess the sources of capital to micro and small agribusinesses; assess their business registration, saving, record keeping and business account holding status; assess the profit efficiency of micro and small agribusinesses (maize producers); and determine the factors that influence profit efficiency. For the non-financial analysis, statistical tools like frequency and percentages were used to assess them and the Kendall's coefficient of concordance was used to rank the objectives. The stochastic profit frontier analysis was used to assess the profit efficiency of maize farmers.

The study showed that more females are involved in micro and small agribusiness than men. The form of ownership is mainly sole proprietorship (96%); just a few are in to partnerships (4%). The non-financial performance was assessed with regard to the level of success achieved in terms of the objectives entrepreneurs set out to achieve and have achieved. The objectives identified were in two categories, being objectives identified when starting the business and objectives identified during the operation of the

businesses. Out of the twenty objectives that were listed, only four objectives have a percentage score of 50% and above, indicating satisfaction. These are, to increase level of household income (62.9%), to increase security of household income (62.4%), to enhance business profitability (50.0%) and Satisfaction from running own business (73.6%). Comparing these objectives to those identified and ranked during the start of business, it is clear that the topmost objectives were the same ones that entrepreneurs were satisfied with. Out of the twenty objectives that entrepreneurs were asked to identify as objectives they were satisfied with or not, entrepreneurs were not certain with ten objectives as to whether they were satisfied with them or not. For the dissatisfied and the non-applicable columns, none of them scored up to the 50% mark. It is evident from the study that the entrepreneurs were generally satisfied with their performance since they were not dissatisfied with any of them.

The challenges identified to have effects on the performance of agribusinesses are ranked in order of priority from top to bottom with access to working capital being the greatest problem, and access to training courses being the least among them. The forms of linkages that were identified include sharing of transportation which has the highest score of 24%, followed by joint marketing of inputs and obtaining credit with score of 18%. Joint procurement of inputs and Savings has the lowest score of 1.5%. Most of these linkages were in the form of informal agreements.

Household savings is a major source of start up capital for most micro and small agribusinesses (about 76%) with loans being about 8%. Majority of agribusinesses obtain

their running capital from proceeds from business. It forms about 85% of the sources identified.

Most businesses are not registered; only 39% were registered with the District Assemblies. Most of the businesses operate without a business account. Personal bank accounts are mostly used for businesses. This forms about 30% of people surveyed. Out of the businesses surveyed, about 47% of them save; implying that a majority of them do not save. Only about 24.7% of businesses surveyed kept records.

Determinants of profit efficiency among the small-scale maize farmers were identified using stochastic Cobb-Douglas profit frontier model. The parameters estimated using the Cobb-Douglas profit frontier indicate that all the inputs have positive signs on the profitability of maize farming in Northern Ghana except the unit cost of farm tools. The negative sign of cost of farm tools may be due to the high cost of fuel leading to excessive cost of the use of such equipments by the farmers, thus leading to extra cost incurred on the part of the farmers. Deciles profit efficiency distributions has shown that maize farmers were fairly efficient in their resource allocation, judged by the fact that less than half of the farmers having profit efficiency of 0.60 and above with an average profit efficiency of 0.60 suggesting that considerable amount of profit is gained due to the relative level of efficiency observed in the sample area.

5.2 Conclusions and Policy Recommendations

The following conclusions and policy recommendations are made based on the results of the study.

From the non-financial analysis, women are more involved in micro and small agribusinesses than men. Du Rietz and Henrekson (2000) reported that female-owned businesses were just as successful as their male counterparts when size and sector are controlled.

There are two main forms of ownership of agribusinesses identified in this study; these include sole proprietorship, which forms about 96%, and partnership, which is 4%. It is quite clear from the results above that sole proprietorship is the main type of ownership of micro and small agribusinesses in Northern Ghana. However, it is recommended that government should formulate and recommend policies that will encourage partnership because of its enormous advantages.

The result shows that the four most important objectives of the entrepreneurs were achieved. These include: To increase the level of household income (62.9%); To increase security of household income (62.4%); To enhance business profitability (50.0%); and Satisfaction from running own business (73.6%). The most important challenges identified are, working capital, Access to credit, and Cost of credit. The result also shows that there are a number of linkages that exists in micro and small agribusiness. These mostly take the form of cooperatives, associations and informal agreements. It is evident in this study that entrepreneurs do not go into business solely because of financial reward.

The main source of startup capital to these businesses is household savings, as access to finance remained a dominant constraint to small-scale enterprises in Northern Ghana (Aryeetey et al, 1994). Proceeds from business are the main source of working capital for the businesses. Majority of businesses surveyed were not registered, they do not save, do not keep records and had no bank account. The businesses should be encouraged to register with the Registrar General, keep business records, open business accounts and cultivate the habit of saving. These will help improve the efficiency of the farmers and can help them to raise loans from banks.

The results from the stochastic profit frontier analysis showed that their profit efficiency was positively influenced by age, educational level, farming experiences and household size. These findings have important policy implications in improving production efficiency among farmers in Northern Ghana. Nevertheless, government should make it a priority to encourage both men and women to go into maize farming in an attempt to bridge the gap between them. The investments in rural education through effective extension delivery programs in the current political and economic environment in Ghana will provide farmers with skills essential to increase efficiency.

In conclusion, the result of this study has clearly shown that employing the stochastic profit frontier allows a detailed analysis of the determinants of specific farm efficiency. The profit efficiency of 0.60 suggests that considerable amount of profit is gained among maize producers in the sample area. The inefficiency associated with controllable decisions is about 87%, hence government through MOFA should educate farmers on

how to reduce controllable inefficiency in their production. Farmers need to be educated and young men and women should be encouraged to get involved in farming.

5.3 Recommendation for Future Research

Further work is, however, required to capture the effects of farm extension, accessibility to credit and soil conditions when examining the determinants of profit efficiencies. On the non-financial measures of performance more detailed analysis should be done to compare the performance of men and women entrepreneurs.

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APPENDICES

APPENDIX A

Technical Efficiency Estimates of Individual Production Units

0.12	0.52	0.72
0.17	0.52	0.73
0.19	0.53	0.73
0.22	0.53	0.73
0.24	0.53	0.76
0.25	0.53	0.77
0.25	0.53	0.79
0.26	0.54	0.79
0.26	0.54	0.80
0.26	0.55	0.80
0.28	0.55	0.82
0.30	0.56	0.85
0.31	0.56	0.85
0.32	0.56	0.86
0.32	0.56	0.86
0.32	0.57	0.88
0.33	0.58	0.88
0.35	0.58	0.90
0.35	0.58	0.91
0.36	0.58	0.91
0.37	0.58	0.92
0.39	0.59	0.94
0.39	0.59	0.94
0.39	0.59	0.95
0.41	0.61	0.96
0.42	0.61	0.96
0.42	0.61	0.97
0.42	0.62	0.98
0.42	0.64	0.98
0.42	0.65	0.99
0.43	0.65	0.99
0.44	0.66	0.99
0.45	0.67	1.00
0.45	0.68	1.00
0.45	0.68	1.00
0.45	0.68	1.00
0.46	0.68	
0.47	0.68	
0.47	0.68	
0.48	0.69	

0.49	0.69	
0.49	0.70	
0.49	0.70	
0.51	0.71	
0.51	0.71	
0.52	0.72	

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APPENDIX B

Objectives of Proprietors Identified When Operating the Business

Objectives	Frequency	Percentage
Increasing security of household income	129	72.47
Enhancing business profitability	89	50.00
Expanding business	74	41.57
Running own business	65	36.52
Increasing share of existing market	62	34.83
Building the business	54	30.34
Improving status in community	43	24.16
To become an entrepreneur	42	23.60
Starting another business	37	20.79
Entering new markets	31	17.42

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APPENDIX C

Measure of Satisfaction of Business Objectives

To what extent are you satisfied with your business' performance with respect to each of these objectives?

To what extent are you satisfied with your business' performance with increasing level of household income?					
C		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	.6	.6	.6
	Dissatisfied	32	18.0	18.0	18.5
	Neither satisfied nor dissatisfied	30	16.9	16.9	35.4
	Satisfied	97	54.5	54.5	89.9
	Very satisfied	15	8.4	8.4	98.3
	N/A	3	1.7	1.7	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with increasing security of household income?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	.6	.6	.6
	Dissatisfied	32	18.0	18.0	18.5
	Neither satisfied nor dissatisfied	31	17.4	17.4	36.0
	Satisfied	97	54.5	54.5	90.4
	Very satisfied	14	7.9	7.9	98.3
	N/A	3	1.7	1.7	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with expanding the business?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	34	19.1	19.1	19.1
	Neither satisfied nor dissatisfied	75	42.1	42.1	61.2
	Satisfied	61	34.3	34.3	95.5
	Very satisfied	3	1.7	1.7	97.2
	N/A	5	2.8	2.8	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with entering new markets?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	27	15.2	15.2	15.2
	Neither satisfied nor dissatisfied	97	54.5	54.5	69.7
	Satisfied	33	18.5	18.5	88.2
	Very satisfied	1	.6	.6	88.8
	N/A	20	11.2	11.2	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with starting another business?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	21	11.8	11.8	11.8
	Neither satisfied nor dissatisfied	114	64.0	64.0	75.8
	Satisfied	17	9.6	9.6	85.4
	Very satisfied	2	1.1	1.1	86.5
	N/A	24	13.5	13.5	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with improving your status in community?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	4	2.2	2.2	2.2
	Neither satisfied nor dissatisfied	100	56.2	56.2	58.4
	Satisfied	48	27.0	27.0	85.4
	Very satisfied	11	6.2	6.2	91.6
	N/A	15	8.4	8.4	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with enhancing quality of products?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	15	8.4	8.4	8.4
	Neither satisfied nor dissatisfied	96	53.9	53.9	62.4
	Satisfied	30	16.9	16.9	79.2
	Very satisfied	6	3.4	3.4	82.6
	N/A	31	17.4	17.4	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with increasing share of existing markets?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	18	10.1	10.1	10.1
	Neither satisfied nor dissatisfied	83	46.6	46.6	56.7
	Satisfied	60	33.7	33.7	90.4
	Very satisfied	4	2.2	2.2	92.7
	N/A	13	7.3	7.3	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with enhancing business profitability?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	39	21.9	21.9	21.9
	Neither satisfied nor dissatisfied	41	23.0	23.0	44.9
	Satisfied	76	42.7	42.7	87.6
	Very satisfied	13	7.3	7.3	94.9
	N/A	9	5.1	5.1	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with developing new products?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	3	1.7	1.7	1.7
	Dissatisfied	22	12.4	12.4	14.0
	Neither satisfied nor dissatisfied	90	50.6	50.6	64.6
	Satisfied	14	7.9	7.9	72.5
	Very satisfied	2	1.1	1.1	73.6
	22.00	1	.6	.6	74.2
	N/A	46	25.8	25.8	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with investing in new equipment/tools?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	4	2.2	2.2	2.2
	Dissatisfied	30	16.9	16.9	19.1
	Neither satisfied nor dissatisfied	81	45.5	45.5	64.6
	Satisfied	9	5.1	5.1	69.7
	N/A	54	30.3	30.3	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with investing in new business facility?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	3	1.7	1.7	1.7
	Dissatisfied	29	16.3	16.3	18.0
	Neither satisfied nor dissatisfied	93	52.2	52.2	70.2
	Satisfied	19	10.7	10.7	80.9
	N/A	34	19.1	19.1	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with building the business?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	.6	.6	.6
	Dissatisfied	24	13.5	13.5	14.0
	Neither satisfied nor dissatisfied	72	40.4	40.4	54.5
	Satisfied	57	32.0	32.0	86.5
	Very satisfied	12	6.7	6.7	93.3
	N/A	12	6.7	6.7	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with becoming an entrepreneur?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	.6	.6	.6
	Dissatisfied	12	6.7	6.7	7.3
	Neither satisfied nor dissatisfied	70	39.3	39.3	46.6
	Satisfied	60	33.7	33.7	80.3
	Very satisfied	15	8.4	8.4	88.8
	N/A	20	11.2	11.2	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with getting free up time for leisure?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	16	9.0	9.0	9.0
	Neither satisfied nor dissatisfied	78	43.8	43.8	52.8
	Satisfied	32	18.0	18.0	70.8
	Very satisfied	7	3.9	3.9	74.7
	N/A	45	25.3	25.3	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with understanding consumer demand better?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	10	5.6	5.6	5.6
	Neither satisfied nor dissatisfied	99	55.6	55.6	61.2
	Satisfied	42	23.6	23.6	84.8
	Very satisfied	3	1.7	1.7	86.5
	N/A	24	13.5	13.5	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with adding value to things already produced?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very dissatisfied	1	.6	.6	.6
	Dissatisfied	21	11.8	11.8	12.4
	Neither satisfied nor dissatisfied	98	55.1	55.1	67.4
	Satisfied	25	14.0	14.0	81.5
	Very satisfied	10	5.6	5.6	87.1
	N/A	23	12.9	12.9	100.0
	Total	178	100.0	100.0	

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To what extent are you satisfied with your business' performance with investing in another business?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	23	12.9	12.9	12.9
	Neither satisfied nor dissatisfied	107	60.1	60.1	73.0
	Satisfied	21	11.8	11.8	84.8
	Very satisfied	6	3.4	3.4	88.2
	N/A	21	11.8	11.8	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance being better fit with other business activities?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	18	10.1	10.1	10.1
	Neither satisfied nor dissatisfied	89	50.0	50.0	60.1
	Satisfied	41	23.0	23.0	83.1
	Very satisfied	3	1.7	1.7	84.8
	N/A	27	15.2	15.2	100.0
	Total	178	100.0	100.0	

To what extent are you satisfied with your business' performance with regards to satisfaction from running own business?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Dissatisfied	14	7.9	7.9	7.9
	Neither satisfied nor dissatisfied	25	14.0	14.0	21.9
	Satisfied	102	57.3	57.3	79.2
	Very satisfied	29	16.3	16.3	95.5
	74.00	1	.6	.6	96.1
	N/A	7	3.9	3.9	100.0
	Total	178	100.0	100.0	

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APPENDIX D

Frontier Analysis Results

OLS Estimates of the stochastic profit frontier
Dependent variable = Log Normalized profit (π)
Diagnostic: Log-L = -88.2749

Variable	Coefficient	Standard Error	t-ratio	P[|Z|>z]
Constant	.7947545136	.14753068	5.387	.0000
Z1	.6214553554	.10008311	6.209	.0000
P1	.4187803423E-01	.19116863E-01	2.191	.0285
P2	.8115999985E-01	.25451663E-01	3.189	.0014
P3	.2131921998E-01	.22680846E-01	.940	.3472
Z2	-.1279681464E-01	.59559218E-02	-2.149	.0317

Mean of (π) = 3.04, mean of (Z1) =2.07, mean of (P1)= 7.80
Mean of (P2) =7.22, Mean of (P3) =6.91, mean of (Z2)= 7.43
N=141, R^2 =0.70

Maximum Likelihood Estimates
Dependent variable = Log Normalized profit (π)

Variable	Coefficient	Standard Error	t-ratio	P[|Z|>z]
Constant	1.487542484	.17863932	8.327	.0000
X2	.5852087928	.11514381	5.082	.0000
X3	.2414369862E-01	.24773715E-01	.975	.3298
X4	.8367540505E-01	.29925582E-01	2.796	.0052
X5	.1717165711E-01	.19703116E-01	.872	.3835
X6	-.7697933888E-02	.41063876E-02	-1.875	.0608
Variance parameters for compound error				
Lambda	2.589397879	.66849436	3.873	.0001
Sigma	.7032555827	.44519348E-01	15.797	.0000

Mean of (π) = 3.04, mean of (Z1) =2.07, mean of (P1) = 7.80
Mean of (P2) =7.22, Mean of (P3) =6.91, mean of (Z2) = 7.43
N=141, R^2 =0.70

APPENDIX E

Questionnaire

Assessing the Performance of Micro and Small Scale Agribusinesses in Northern Ghana: Non-Financial and Stochastic Frontier Analysis

Micro and Small Enterprise Field Survey

PART ONE: Non-Financial

1. Can you describe the activities that the business is engaged in whether related to agribusiness or not? (*Write below. PROBE to ensure you have all activities. Check if major activities relate to agribusiness*)

   a. _____
   b. _____
   c. _____
   d. _____
   e. _____

2. To confirm, in which of the following is your business involved? (*Circle one per line*):

	Yes	No
Crop farming:	1	0
Livestock or poultry production:	1	0
Agricultural services:	1	0
Hunting, trapping and game:	1	0
Fishing:	1	0
Food manufacturing/processing:	1	0
Beverage manufacturing/processing:	1	0
Tobacco manufacturing/processing:	1	0
Retail trade in food, beverages, fish, meat or live animals:	1	0

3. Which of the following activities does the business engage in? (*Circle one per line*)

	Yes	No
Production:	1	0
Input suppliers to other businesses:	1	0
Processing:	1	0
Retailing/trading to consumers:	1	0
Service provider:	1	0
Other (*Specify*): _____		

4. If engaged in crop, livestock or poultry production, what proportion of your output do you sell?

_____%

5. What is the most important raw material to the business? (*Circle one*)

Cassava:	1
Maize:	2
Rice:	3
Vegetables:	4
Fruit:	5
Groundnuts:	6
Milk:	7
Fish:	8
Meat:	9
Chicken:	10
Shea nuts:	11
Palm nuts:	12
Cow pea/beans:	13
Plantain:	14
Vegetable oils:	15
Other (*Specify*): _____	

6. If business undertakes processing, which of the following activities are undertaken (*Circle one per line*)?

	Yes	No
Drying:	1	0
Canning:	1	0
Frying:	1	0
Baking:	1	0
Roasting:	1	0
Cutting/Grating:	1	0
Cooking:	1	0
Bottling:	1	0
Grinding/Milling:	1	0
Bagging:	1	0
Brewing:	1	0
Distilling:	1	0
Other (*Specify*):_____		

7. How many proprietors work in the business on a regular basis now? What about five years ago?

Now: _____
Five years ago/2001: _____

8. How many hours per week do you personally work in the business? What about five years ago?

Now: _____
Five years ago/2001: _____

9. How many unpaid family members work in the business on a regular basis now? What about five years ago?

Now: _____
Five years ago/2001: _____

10. How many paid workers, whether members of your family or not, work in the business on a regular basis now? What about five years ago?

Now: _____
Five years ago/2001: _____

11. How many apprentices work in the business on a regular basis now? What about five years ago?

Now: _____
Five years ago/2001: _____

12. Of the total number of people who work in the business, whether paid or not paid and including you, how many are women? What about five years ago?

Now: _____
Five years ago/2001: _____

13. Of the total number of people who work in the business, whether paid or not paid and including you, how many are less than 15 years old? What about five years ago?

Now: _____
Five years ago/2001: _____

14. Of the total number of people who work in the business, whether paid or not paid and including you, how many work less than 30 hours per week? What about five years ago?

Now: _____
Five years ago/2001: _____

15. Excluding yourself, on average how many hours does each of your employees work in the business per week?

_____ hours

16. How much is the highest paid person employed in your business paid? (*Write Cedi amount and period in hours. If paid per day, ask how many hours are normally worked per day. If paid per piece, calculate with respondent how many pieces are normally produced per day)*

Amount:	_____
Period (Hours/Days/Pieces):	_____
If days, how many hours are normally worked per day?	_____
If pieces, how many are normally produced per day?	_____

17. What was the largest number of people that have ever worked in your business including yourself?

Proprietors:	_____
Unpaid family members:	_____
Paid workers:	_____
Apprentices:	_____

18. In which year was this?

_____

19. What proportion of your total household's cash income is provided by the business taking account of employment income from other household members, remittances from household members living away, other business income, income from farming and gifts of money? What about five years ago?

Now:	_____ %
Five years ago:	_____%

Objectives:

I would now like to ask you about your objectives in running the business.

20. Thinking back, how important was each of the following to you as personal objectives or reasons to start/acquire the business? (*Circle one per line)*

	Very Important	Important	Neither Important nor Unimportant	Unimportant	Very Unimportant
To increase level of household income:	5	4	3	2	1

To increase security of household income:	5	4	3	2	1
To challenge yourself:	5	4	3	2	1
To improve status in community:	5	4	3	2	1
To get greater freedom over your life:	5	4	3	2	1
Limited other ways to earn income:	5	4	3	2	1
To achieve a flow of money quickly:	5	4	3	2	1
To improve working conditions:	5	4	3	2	1
To invest in another business:	5	4	3	2	1
Had little or no choice:	5	4	3	2	1
Wanted to be self-employed:	5	4	3	2	1
To make full use of your skills:	5	4	3	2	1
Able to develop the business in small steps:	5	4	3	2	1
Had lost my previous job:	5	4	3	2	1
Costs of entering the business were low:	5	4	3	2	1
To make full use of the assets you had:	5	4	3	2	1
Costs of getting out of the business were low:	5	4	3	2	1
To fully employ myself:	5	4	3	2	1
More flexibility in choosing what I do:	5	4	3	2	1
To operate your own business:	5	4	3	2	1
To exploit a business opportunity you had seen:	5	4	3	2	1
To empower yourself:	5	4	3	2	1
Risks were small:	5	4	3	2	1
More flexibility to choose how long to work:	5	4	3	2	1
Limited income from other opportunities:	5	4	3	2	1
To be an entrepreneur:	5	4	3	2	1
To continue a family tradition/business:	5	4	3	2	1
Add value to things already produce:	5	4	3	2	1
Better fit with other business activities:	5	4	3	2	1
Greater satisfaction from running own business:	5	4	3	2	1

21. Overall, how easy is it for a new business such as your own to start? (*Circle one*)

Very easy:	1
Easy:	2
Neither easy nor difficult:	3
Difficult:	4
Very difficult:	5

22. Overall, how easy is it for a business such as your own to move into a new line of business? (*Circle one*)

Very easy:	1
Easy:	2
Neither easy nor difficult:	3
Difficult:	4
Very difficult:	5

23. Now that you are operating your business, how important are each of the following as objectives in operating the business? (*Circle one per line)*

	Very Important	Important	Neither Important nor Unimportant	Unimportant	Very Unimportant
To increase level of household income:	5	4	3	2	1
To increase security of household income:	5	4	3	2	1
To expand the business:	5	4	3	2	1
To enter new markets:	5	4	3	2	1
To start another business:	5	4	3	2	1
To enhance quality of products:	5	4	3	2	1
To improve status in community:	5	4	3	2	1
To increase share of existing markets:	5	4	3	2	1
To enhance business profitability:	5	4	3	2	1
To develop new products:	5	4	3	2	1
To invest in new equipment/tools:	5	4	3	2	1
To invest in new business facility:	5	4	3	2	1
To build the business:	5	4	3	2	1
To be an entrepreneur:	5	4	3	2	1
Free up time for leisure:	5	4	3	2	1
To understand consumer demand better:	5	4	3	2	1
To add value to things already produce:	5	4	3	2	1
To invest in another business:	5	4	3	2	1
Better fit with other business activities:	5	4	3	2	1
Satisfaction from running own business:	5	4	3	2	1

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24. To what extent are you satisfied with your business' performance with respect to each of these objectives? (*Circle one per line)*

	Very Satisfied	Satisfied	Neither satisfied nor	Dissatisfied	Very Dissatisfied
To increase level of household income:	5	4	3	2	1
To increase security of household income:	5	4	3	2	1
To expand business:	5	4	3	2	1
To enter new markets:	5	4	3	2	1
To start another business:	5	4	3	2	1
To enhance quality of products:	5	4	3	2	1
To improve status in community:	5	4	3	2	1
To increase share of existing markets:	5	4	3	2	1
To enhance business profitability:	5	4	3	2	1
To develop new products:	5	4	3	2	1
To invest in new equipment/tools:	5	4	3	2	1
To invest in new business facility:	5	4	3	2	1
To build the business:	5	4	3	2	1
To be an entrepreneur:	5	4	3	2	1
Free up time for leisure:	5	4	3	2	1
To understand consumer demand better:	5	4	3	2	1
To add value to things already produce:	5	4	3	2	1
To invest in another business:	5	4	3	2	1
Better fit with other business activities:	5	4	3	2	1
Satisfaction from running own business:	5	4	3	2	1

25. How much of a problem or constraint was each of the following to you when first starting or acquiring the business? (*Circle one per line*)

	Very Major Problem	Major Problem	Moderate Problem	Minor Problem	Not a Problem at all
Access to credit:	5	4	3	2	1
Cost of credit:	5	4	3	2	1
Financial resources within business:	5	4	3	2	1
Managerial skills:	5	4	3	2	1
Quality of business location:	5	4	3	2	1
Quality of business facility:	5	4	3	2	1
Quality of equipment/tools:	5	4	3	2	1
Keeping reliable records:	5	4	3	2	1
General business skills:	5	4	3	2	1

Technical skills:	5	4	3	2	1
Quality of transportation facilities:	5	4	3	2	1
Marketing products:	5	4	3	2	1
Reputation among customers:	5	4	3	2	1
Quality of storage facilities:	5	4	3	2	1
Access to appropriate business location:	5	4	3	2	1
Access to required labour:	5	4	3	2	1
Access to apprentices:	5	4	3	2	1
Access to electricity:	5	4	3	2	1
Access to water:	5	4	3	2	1
Access to drainage/sewage:	5	4	3	2	1
Crime/corruption:	5	4	3	2	1
Access to markets:	5	4	3	2	1
Access to training courses:	5	4	3	2	1
Access to business support services:	5	4	3	2	1
Telephone and other communications:	5	4	3	2	1
Access to raw materials:	5	4	3	2	1
Access to packaging materials:	5	4	3	2	1
Ability to comply with regulations:	5	4	3	2	1
Ability to get business permit/licence:	5	4	3	2	1
Overall economic conditions:	5	4	3	2	1
Access to public/private transportation:	5	4	3	2	1
Controlling quality of products/services:	5	4	3	2	1
Quality of roads:	5	4	3	2	1
Security of business facilities:	5	4	3	2	1
Access to equipment, tools, etc:	5	4	3	2	1
Ability to get legal ownership of business:	5	4	3	2	1
Costs of production:	5	4	3	2	1
Access to internet:	5	4	3	2	1
Disposal of waste:	5	4	3	2	1
Management of environment:	5	4	3	2	1
Ability to get food and drugs licence:	5	4	3	2	1
Access to working capital:	5	4	3	2	1
Ability to register business:	5	4	3	2	1
Competition from other businesses:	5	4	3	2	1
Financial obligations in community:	5	4	3	2	1
Financial obligations to family:	5	4	3	2	1
Costs or consequences should anything fail:	5	4	3	2	1

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26. How much of a problem or constraint is each of the following to you in running your business now? (*Circle one per line*)

	Very Major Problem	Major Problem	Moderate Problem	Minor Problem	Not a Problem at all
Access to credit:	5	4	3	2	1
Cost of credit:	5	4	3	2	1
Financial resources within business:	5	4	3	2	1
Managerial skills:	5	4	3	2	1
Quality of business location:	5	4	3	2	1
Quality of business facility:	5	4	3	2	1
Quality of equipment/tools:	5	4	3	2	1
Keeping reliable records:	5	4	3	2	1
General business skills:	5	4	3	2	1
Technical skills:	5	4	3	2	1
Quality of transportation facilities:	5	4	3	2	1
Marketing products:	5	4	3	2	1
Reputation among customers:	5	4	3	2	1
Quality of storage facilities:	5	4	3	2	1
Access to appropriate business location:	5	4	3	2	1
Access to required labour:	5	4	3	2	1
Access to apprentices:	5	4	3	2	1
Access to electricity:	5	4	3	2	1
Access to water:	5	4	3	2	1
Access to drainage/sewage:	5	4	3	2	1
Crime/corruption:	5	4	3	2	1
Access to markets:	5	4	3	2	1
Access to training courses:	5	4	3	2	1
Access to business support services:	5	4	3	2	1
Telephone and other communications:	5	4	3	2	1
Access to raw materials:	5	4	3	2	1
Access to packaging materials:	5	4	3	2	1
Ability to comply with regulations:	5	4	3	2	1
Ability to get business permit/licence:	5	4	3	2	1
Overall economic conditions:	5	4	3	2	1
Access to public/private transportation:	5	4	3	2	1
Controlling quality of products/services:	5	4	3	2	1
Quality of roads:	5	4	3	2	1
Security of business facilities:	5	4	3	2	1
Access to equipment, tools, etc:	5	4	3	2	1
Ability to get legal ownership of business:	5	4	3	2	1
Costs of production:	5	4	3	2	1
Access to internet:	5	4	3	2	1
Disposal of waste:	5	4	3	2	1
Management of environment:	5	4	3	2	1
Ability to get food and drugs licence:	5	4	3	2	1
Access to working capital:	5	4	3	2	1

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Ability to register business:	5	4	3	2	1
Competition from other businesses:	5	4	3	2	1
Financial obligations in community:	5	4	3	2	1
Financial obligations to family:	5	4	3	2	1
Costs or consequences should anything fail:	5	4	3	2	

27. What linkages do you have with other businesses? (*Circle one per line*)

	Yes	No
Joint production of inputs:	1	0
Joint procurement of inputs:	1	0
Joint marketing of products:	1	0
Savings:	1	0
Sharing equipment/tools:	1	0
Sharing transportation:	1	0
Sharing storage:	1	0
Obtaining credit:	1	0
Contract supply:	1	0
Other (*Specify*): _____		

28. What form do these linkages take? (*Circle one per line*)

	Yes	No
Informal agreement:	1	0
Cooperative:	1	0
Association:	1	0
Contract:	1	0
Partnership:	1	0
Other (*Specify*): _____		

29. What types of business do you have linkages with? (*Circle one per line*)

	Yes	No
Informal micro and small enterprises:	1	0
Formal micro and small companies:	1	0
Large companies:	1	0
Public corporations:	1	0
Other (*Specify*): _____		

30. What relationship do these businesses have with you? (*Circle all that apply*)

	Yes	No
Businesses engaged in same activity:	1	0
Customers:	1	0

Suppliers:	1	0
Other (*Specify*): _____		

Finance and Credit:
I would now like to ask you some questions about finance and access to credit.

31. What was the principle source of the money used to start or acquire the business? (*Circle one*)

Loan	1
Household savings:	2
Remittances from abroad	3
Proceeds from family farm:	4
Proceeds from non-farm business:	5
Income from family property:	6
Gift from friends/family:	7
NGO support:	8
Church assistance:	9
Government support:	10
Other (*Specify*): _____	

32. Did you take out a loan to start the business? (*Circle one*)

Yes:	1	*Proceed directly to Question 33*
No:	0	*Proceed directly to Question 35*

33. How much was the loan?

Cedi _____

34. Where did you get the loan? (*Circle one per line*)

Friends/relatives:	1	0
Rural or community bank:	1	0
Savings and loan company:	1	0
Commercial bank:	1	0
Money-lender:	1	0
Susu/savings scheme:	1	0
Suppliers:	1	0
Customers:	1	0
Government:	1	0
NGO:	1	0
Church:	1	0
PAMSCAD/NBSSI:	1	0
FUSMED:	1	0
Other (*Specify*): _____		

35. What is the principle source of credit used to run the business - that is your working capital? (*Circle one*)

No credit used;		1
Proceeds from business:	2	
Proceeds from another business you operate:	3	
Personal/household savings:		4
Friends/Relatives:		5
Loan from rural or community bank:		6
Loan from Savings and Loans Company:		7
Loan from commercial banks:		8
Loan from money-lender:		9
Susu/savings scheme:		10
Cooperative:		11
Suppliers:		12
Customers:		13
Government support:		14
NGO support:		15
PAMSCAD/NBSSI:		16
FUSMED:		17

Other (*Specify*): _____

36. Is the business registered? (*Circle one*)

Not registered:	1	*Proceed directly to Question 37*
Registered with district assembly:	2	*Proceed directly to Question 37*
Registered with Registrar General:	3	*Proceed directly to Question 41*

37. What is the main reason the business is not registered with the Registrar General?

_____
_____
_____
_____

38. Would you like to register the business with the Registrar General? (*Circle one*)

Yes:	1
No:	0

39. What do you see as the potential benefits of registering the business with the Registrar General?

_____
_____
_____
_____

40. What is the likelihood that the business will be registered in the next five years? (*Circle one*)

Very Likely	Likely	Neither Likely nor Unlikely	Unlikely	Very Unlikely
5	4	3	2	1

Proceed directly to Question 58

41. In which years was the business registered?

_____

42. If the business processes foods and/or beverages, is the business currently licensed by the Food and Drugs Board? (*Circle one*)

Yes: 1
No: 0

43. Do you keep written business records? (*Circle one*)

Yes: 1 *Proceed directly to Question 61*
No: 0 *Proceed directly to Question 60*

44. What is the main reason you do not keep written business records?

_____
_____
_____
_____

45. Does your business have a bank account or do you have you have a personal bank account that is used for the business? (*Circle one*)

No bank account: 1
Business bank account: 2
Use personal bank account for business: 0

46. Do you currently have any savings? (*Circle one*)

Yes:	1	*Proceed directly to Question 48*
No:	0	*Proceed directly to Question 47*

47. Why do you not currently save? (*Record verbatim*)

_____
_____
_____
_____

Proceed directly to Question 51:

48. Approximately, what is the value of your savings at the current time?

Cedi _____

49. Where are your savings held? (*Circle one per line*)

	Yes	No
Cash at home/hand:	1	0
Physical assets:	1	0
Rural and Community Bank:	1	0
Savings and Loan Company:	1	0
Commercial bank:	1	0
Susu/savings scheme:	1	0
Other (*Specify*): _____		

51. How important do you consider each of the following to the performance of your business? (*Circle one per line*)

	Very Important	Important	Neither Important nor Unimportant	Unimportant	Very Unimportant
Access to credit:	5	4	3	2	1
Cost of credit:	5	4	3	2	1
Financial resources within business:	5	4	3	2	1
Managerial skills:	5	4	3	2	1
Quality of business location:	5	4	3	2	1
Quality of business facility:	5	4	3	2	1
Quality of equipment/tools:	5	4	3	2	1
Keeping reliable records:	5	4	3	2	1
General business skills:	5	4	3	2	1
Technical skills:	5	4	3	2	1
Quality of transportation facilities:	5	4	3	2	1
Marketing products:	5	4	3	2	1
Reputation among customers:	5	4	3	2	1
Quality of storage facilities:	5	4	3	2	1
Access to appropriate business location:	5	4	3	2	1

Access to required labour:	5	4	3	2	1
Access to apprentices:	5	4	3	2	1
Access to electricity:	5	4	3	2	1
Access to water:	5	4	3	2	1
Access to drainage/sewage:	5	4	3	2	1
Crime/corruption:	5	4	3	2	1
Access to markets:	5	4	3	2	1
Access to training courses:	5	4	3	2	1
Access to business support services:	5	4	3	2	1
Telephone and other communications:	5	4	3	2	1
Access to raw materials:	5	4	3	2	1
Access to packaging materials:	5	4	3	2	1
Ability to comply with regulations:	5	4	3	2	1
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Access to working capital:	5	4	3	2	1
Ability to register business:	5	4	3	2	1
Competition from other businesses:	5	4	3	2	1
Financial obligations in community:	5	4	3	2	1
Financial obligations to family:	5	4	3	2	1
Costs or consequences should anything fail:	5	4	3	2	1

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PART TWO: Stochastic Frontier Analysis

SUPPLEMENTARY QUESTIONNAIRE FOR ONLY MAIZE FARMERS

1. What is the size of the maize farm in acres? ……..
2. How many bags of maize did you get last year? …….
3. How many were sold? ……...……..
4. How much was each bag sold? ..…….
5. How many bags of fertilizer did you use?……
6. How much was a bag of fertilizer?……..
7. What quantity of seed was used?……..
8. What was the price per bowl of seed?……..
9. How many people worked on the farm per day?…….
10. How much did you pay per worker per day?……
11. What tools did you use on the farm?……
12. What was the total value of your farm tool?……
13. What was your total variable cost incurred?……

DEMOGRAPHICS

14. Name of respondents …….. 15. Sex ……..
16. Age …… 17. Size of household ……

18. Level of Education: 1. primary/JSS…… 2. Secondary …….
    3. Tertiary …… 4. None …… ……..
19. Years of farming experience……

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20. Which of the following objectives identified is the most important to you? Rank the objectives with one been the most important objective?

Objectives	Rank
Increasing security of household income	
Increasing level of household income	
Continue a family tradition/business	
Satisfaction from running own business	
Improving status in community	
To operate own business	
To fully employ one self	
Limited income from other sources	
Achieving a flow of money quickly	
Limited other ways to earn income	

21. Which of the following constrains identified is the most important to you? Rank these constrains with one been the most important constrain?

Challenge	Rank
Financial obligation to family	
Access to business sport services	
Consequences should the business fail	
Access to credit	
Keeping reliable records	
Cost of credit	
Access to working capital	
Financial resources within business	
Access to training courses	
Financial obligation to community	

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