LINKING SMALLHOLDER FARMERS TO MARKETS ENHANCES PRODUCTIVITY GROWTH: A CASE STUDY OF RICE FARMERS IN GHANA

Final Report By:

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July 2018

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List of Abbreviations

AGRA: Alliance for a Green Revolution in Africa.

ASFG: African Smallholder Farmers Group.

CDFO: Commercial Development for Farmer-based Organisation.

COSOP: Country Strategic Opportunities Programme.

FASDEP: Food and Agriculture Sector Development Policy.

GIDA: Ghana Irrigation Development Authority.

GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH.

GNRDS: Ghana National Rice Development Strategy.

ILRI: International Livestock Research Institute.

MCA: Millennium Challenge Account.

MiDA: Millennium Development Authority.

MoFA: Ministry of Food and Agriculture.

SRID: Statistics, Research and Information Directorate.

Acknowledgements

First, I would like to thank God for His grace, love and mercy. He was there to help every time I encountered a difficulty.

To my supervisors, Dr Olawale Olayide (academic supervisor), Mrs. Galina Okartei-Akko and Mr. Pius Sanyare (on-site supervisors), I express my gratitude for all the constructive and timeously feedback. Your guidance and advice made this research a success.

Special thanks to Mr. Ebenezer Appiah Adu, Mr Debrah Samuel and Mr Joseph Martey for their support, especially with the data collection.

I would also want to thank the staff of Ghana Agricultural Sector Investment Programme (GASIP) and Ghana Commercial Agriculture Project (GCAP) for their hospitality and willingness to share knowledge and information.

I wish to extend my most sincere gratitude to the International Fund for Agricultural Development (IFAD) for making this internship possible through the IFAD- MDP Universities Win-Win Field Practicum Award. The study broadened my horizon and I am truly grateful for this opportunity.

Executive Summary

Smallholder farmers are the major players in agricultural production and food supply systems in Africa. However, poor access to market limits their productivity growth. This brings into focus the need to support smallholders to become less subsistence-based and more entrepreneurial by tailoring production to market forces.

Agriculture is one of Ghana's most important economic sector, employing almost half the population on a formal and informal basis and accounting for about 20% of GDP. The multiple challenges faced by smallholder farmers in Ghana pose major obstacles that prevent them from integrating into rapidly evolving national and international markets, which contributes to sluggish growth and lingering poverty in the rural sector. This is especially seen in the rice sector as it is estimated that about 66 percent of Ghana's domestic demand for rice is satisfied through importation from China, USA, Thailand and other nations whereas local production only satisfies about 34 percent of total demand. In the 2016 market year, it was discovered that 689,000 metric tons of milled rice was imported into the country to satisfy the increasing local demand of the commodity. This action has posed serious challenges to local smallholder rice production, making it uncompetitive in local markets.

This study assessed barriers to formal market participation by smallholder rice farmers, identified the factors that influence the decision of these farmers to participate in agricultural output markets, and recommends effective strategies to improve market access among smallholder rice farmers in Ghana. Purposive sampling technique was employed to select rice farmers in the Volta and Greater Accra regions. The study was conducted in Aveyime of North Tongu district, Weta and Afife of Ketu North district and Asutsuare of Shai-Osudoku district. A semi-structured questionnaire was developed in order to obtain appropriate information that can be utilized to achieve the research objectives. The information included variables affecting the marketing decisions of smallholder rice farmers, which were deduced from farmer demographics, farm characteristics, marketing aspects and institutional factors. The questionnaires were administered to 400 rice farmers who were randomly selected and analysis done using descriptive and inferential statistics.

The results revealed that farm-level, social and economic factors enhance smallholder farmers' productivity and market access. These findings provide useful insight on what factors need to be target to stimulate market participation among rice farmers. These include: encouraging collective action, promotion of contract farming, gender equality, standardized measurement, development of climate-smart rice varieties, increase in rice quality, sensitizing the public to patronize local rice, youth participation and investment in rural infrastructure.

Chapter One: INTRODUCTION

1.1. Background to the study

Agriculture is the backbone of Ghana's economy and about 80 percent of total agricultural production is attributed to smallholder farmers, including women, with the potential to transform into a commercially-viable and sustainable enterprise, according to the Alliance for a Green Revolution in Africa (AGRA). Many commodities, including cocoa, maize, rice and cassava, are produced predominantly on small farms. More than 70 percent of Ghanaian farms are 3 hectares or smaller in size (AfroEuro, 2013).

Several Western African countries are dependent on imports of cereals and this dependence is increasing with the rapid urbanization of these countries. Because of volatile global markets, this dependence has become a real issue of national food security for these countries (Cadilhon *et al*., 2012).

Undoubtedly, rice has become a staple food that can be found in every household, giving the indication that it could be very lucrative when given the right attention. It is the second largest cereal consumed after maize in Ghana. Despite the huge potential, rice cultivation is said to be the least exploited in Ghana. It is disheartening to hear that Ghana spends over $500 million annually importing foreign rice while there is a huge potential for rice production in the country (Anane, 2017). About 70 percent of total rice consumed in Ghana is in the urban areas, mainly Accra and Kumasi (SRID-MoFA, 2010). The government of Ghana predicts the continuous increase in consumption levels due to rapid population growth and urbanization (GNRDS-MoFA, 2009).

However, agriculture, especially farming, in Ghana has always been perceived as a part-time job and is still practiced in most parts at merely subsistence level, dominated by ageing peasants and is unable to attract the youth - a situation which, if left to default, could in the next 10 years have adverse effects on national development (Korboe, 2016). Thus, there is the need to really create an enabling environment and grow agriculture as a business.

Reliable market access is critical to helping unlock the potential of smallholder farmers (AGRA, 2016). Strengthening access to markets by removing the inefficiencies and enhancing

connections to buyers generates employment and smallholder farmers are rewarded for their efforts. They are motivated to adopt new practices, increase their productivity and become more profitable than they ever would have imagined.

1.2. Problem statement

Performance in agriculture determines the overall improvement in rural people's living standard and development of the economy (URT, 2008). Cultivation of agricultural produces by rural farmers in Ghana is meant for both food and selling purpose. Selling of agricultural produce by rural farmers pose a challenge as their access to markets is limited.

Similar to other developing countries, the majority of the rural households in Ghana engage in smallholder agriculture characterized by low productivity, asymmetric information in prices and selling opportunities, and limited market access. Many of these households sell their commodities in markets that are less demanding but also less rewarding, such as village open-air markets. Others sell through intermediaries, due to the small scale of their production, the high transaction costs involved in reaching more distant markets, and their inability to comply with the stringent requirements relating to volume, quality, and timely delivery demanded by modern agricultural value chains. The multiple challenges faced by smallholder producers in Ghana pose major obstacles that prevents them from integrating into rapidly evolving national and international markets, which contributes to sluggish growth and lingering poverty in the rural sector.

Ghana's rice sector has attracted the attention of stakeholders and policy makers largely due to the increase in consumption and the effect of its rising import bill on the economy. Ghana has the right agronomic conditions to produce rice throughout the year (Assuming-Brempong, 1998). However, structural constraints namely, poor agronomic practices, low usage of agrochemicals, lack of homogeneous seeds of demanded varieties and low farm mechanization have resulted in a lot of inefficiencies in the rice sub-sector.

The most accessible markets for majority of smallholder rice farmers are informal markets. They are termed informal because they exist beyond the tax system and are off record. Informal markets trade upwards of 80-90% of the agricultural goods in most developing countries and

include all transactions at the farm gate, roadside sales, village markets, rural assembly markets, and sales in the main urban wholesale and retail markets. Typically, these markets have no formal grades, no traceability, they rarely use standard measures, and prices are set through arbitrary combinations of supply and demand, trader cartels, and local customer loyalties to specific sellers.

Formal markets on the other hand, are characterized by modern value chain systems. These markets can link the more commercial or competitive smallholder farmers with larger commercial buyers. Formal markets can offer smallholder farmers prospects for growth. These markets provide an opportunity for farmers to link to a consistent source of income, with clear market signals coming from the buyers. In addition to the more consistent income, farmers who succeed in linking to formal markets generally access more support services.

1.3. Research questions

Farmers need to be linked to markets, but how to do this, and make sure it is an effective, beneficial and sustainable linkage that is formed, is far more challenging. To investigate smallholder rice farmers' participation in high value markets, the key research questions are:

- What challenges are faced by the smallholder rice farmers in accessing markets?
- What factors contribute to a farmer's decision to participate in formal markets?
- What are the most effective strategies to improve market access among small holder rice farmers in Ghana?

1.4. Objectives

Most smallholder rice farmers are not linked to markets for a variety of reasons. Addressing and overcoming these market failures in order to link these smallholder farmers to markets to enhance productivity growth is the main objective of this report. The specific objectives are:

- To assess barriers to formal market participation by smallholder rice farmers.
- To identify factors that influence the decision of these farmers to participate in agricultural output markets.

- To recommend effective strategies to improve market access among smallholder rice farmers in Ghana.

Table 1: Analysis of objectives of the study

S/N	Objectives	Data collection	Analytical technique(s)
1	Assess barriers to formal market participation by smallholder rice farmers in Ghana	Sample survey (questionnaire)	Descriptive and inferential statistics
2	Identify factors that influence the decision of these farmers to participate in agricultural output markets.	Sample survey (questionnaire)	Descriptive and inferential statistics
3	To recommend effective strategies to improve market access among smallholder rice farmers in Ghana	Key Informants interview, focused group discussion. Sample survey (questionnaire)	Detailed description, direct quotations and observation from the interview. Content analysis, descriptive and inferential statistics

1.5. Research hypotheses

1. Market accessibility influences productivity growth.
2. The intensity of commercialization of rice produce is driven by economic, social and environmental factors.

1.6. Justification of the Study

In line with the agreed Strategic Framework for IFAD in Ghana (2012 COSOP), Ghana Agricultural Sector Investment Programme (GASIP) is built on four strategic axis: (i) linking smallholder farmers to agribusiness to enhance pro-poor growth; (ii) nationwide scaling up of a successful value chain investment approach; (iii) promoting and mainstreaming climate change resilience approaches in Ghana; and (iv) knowledge management, harmonization of intervention approaches and policy support.

This study would be useful to these various commitments by the various actors by providing empirical evidence on the factors that influence market participation and the barriers to participation by smallholder rice farmers which is vital in informing priority setting in policies, geared towards transforming smallholder rice farmers especially in the area of responding to market incentives for improved farm incomes and subsequent reduction in poverty and enhanced food security. In addition, the results of this study will be useful as a stepping stone for other researchers to carry out further study regarding smallholder rice farmers' participation in high value markets, especially in developing countries.

1.7. Plan of the study

This report is organised into five chapters. It begins with an introductory chapter, which includes the background to the study, a statement of the problem, the research questions, the objectives, research hypotheses and justification of the study. Chapter two reviews literature related to the subject at hand. Chapter three presents the methodology employed in the study while chapter four contains the results and discussions of the study. Chapter five consists of summary of findings, conclusion and recommendations.

Chapter Two: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Review of Theory

2.1.1. The concept of smallholder farmers

Although there are many ways to define smallholder farmers, the FAO's criterion of plot size is widely used, with 'smallholder farmers' being farmers who farm plots of 2 hectares or less (ASFG, 2018).

According to ASFG (2018), smallholder farmers fall into three broad groups:

- Farmers who own other assets in addition to their land, such as livestock or machinery; and who have sufficient access to inputs, services and knowledge to enable them to be active in markets to a greater or lesser extent. They are typically better connected, both physically and socially/commercially, and are often involved in producing for export, niche/high value added markets or integrated rural value chains.
- Farmers with only a little land to farm (one hectare or less) and few other assets; who lack access to high-quality inputs, credit, services and equipment; who may be cut off from markets due to geographic isolation, poor infrastructure, lack of information or a combination of these; whose rights to land and other resources may be weak; and who have not, as yet, managed to access markets in a way which can increase their productivity and lift them out of poverty.
- Finally, those subsistence farmers who are unable to survive on farm income alone, but who rely substantially, or even entirely, on off-farm work, remittances and/or social subsidies. This group includes the poorest and most vulnerable farmers, including a high number of women-headed households; and a growing number of farmers who no longer own any land at all.

These three categories of farmers require different forms of support to optimize their engagement with markets. Many of the opportunities and benefits relating to new markets and increased agricultural investment currently observed in Africa reach only the wealthier and better-

connected smallholder farmers, i.e. those in the first group, representing a small minority of the overall smallholder population (ASFG, 2018).

There are a number of characteristics common to smallholders, whether or not they control the land they farm or the commodity they produce, as detailed in the Ethical Trading Initiative (ETI) Smallholder Guidelines (2005):

- They produce relatively small volumes on relatively small plots of land.
- They may produce an export commodity as a main livelihood activity or as one of many activities.
- They are generally less well-resourced than commercial-scale farmers.
- They are usually considered to be part of the informal economy (because they may not be registered, they tend to be excluded from aspects of labor legislation, they lack social protection and they have limited records).
- They may depend on family labour, but may hire workers.
- They are often vulnerable in supply chains.

Approximately 1.5 billion people are engaged in smallholder agriculture across the world. They include 75% of the world's poorest people whose food, income, and livelihood prospects depend on agriculture. They mainly live in rural communities. Despite their important role as food producers and rural stewards, the commercial prospects for millions of poor smallholders remain challenging (Ferris *et al*., 2014). Agriculture remains the best opportunity for the estimated 1.5 billion people living in smallholder households to escape poverty. Studies show that income growth generated by agriculture is up to four times more effective in reducing poverty than growth in other sectors (Growth Commission, 2008).

Smallholder farmers in Ghana make up approximately 70% of the estimated 5 million farming household population. They have little access to secure growth capital from traditional banks or non-bank finance companies due to their very limited data footprints. Smallholder farmers in predominantly rural farming communities in Ghana face the challenge in finding the money they need to hire farm laborers, purchase fertilizers, seeds, and basic farm equipment to enable them increase crop yield. Financial institutions are often reluctant to serve smallholder farmers and associated farmer based organizations given their usually small loan sizes (SYECOMP, 2017).

2.1.2. Rice production in Ghana

According to Mobil and Okran (1985), rice has been cultivated in Ghana for a long time. During the 17th and 18th centuries, it was already one of the major commercial food crops. It was estimated that an annual average of 34,600 hectares of land area was under cultivation within the periods of 1960–1964, with an annual average paddy production of 35,800 tonnes (Ibrahim, 1984).

Just like in Nigeria or Senegal, rice consumption in Ghana has increased sharply (Cadihon *et al*., 2012). Domestic rice production in Ghana has been consistently less than its consumption needs. Demand for rice has outstripped supply due to the population increase and improved standards of living, as well as poor production and marketing arrangements on the supply side (Hardi, 2011).

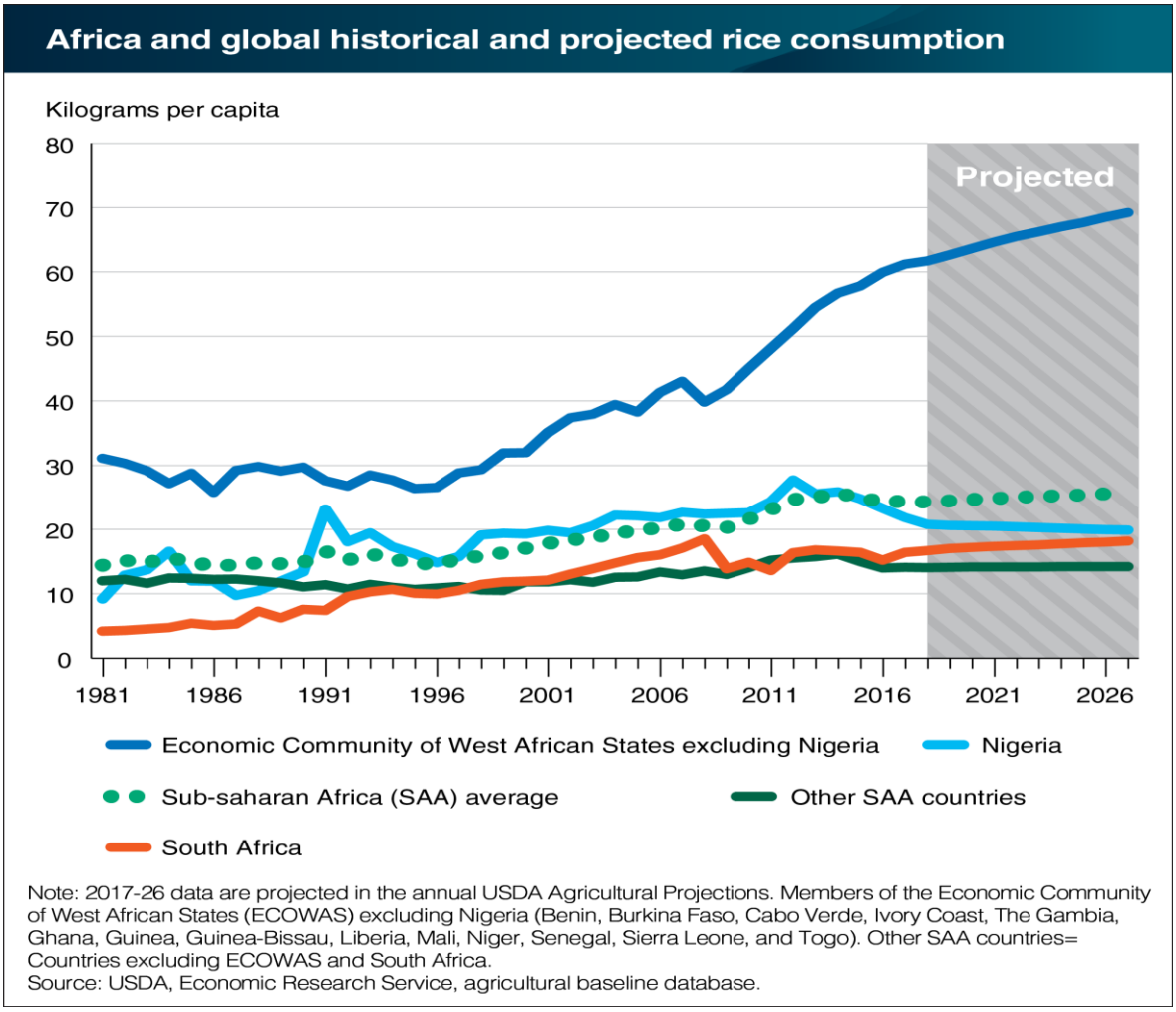

Figure 1: Africa and global historical and projected rice consumption

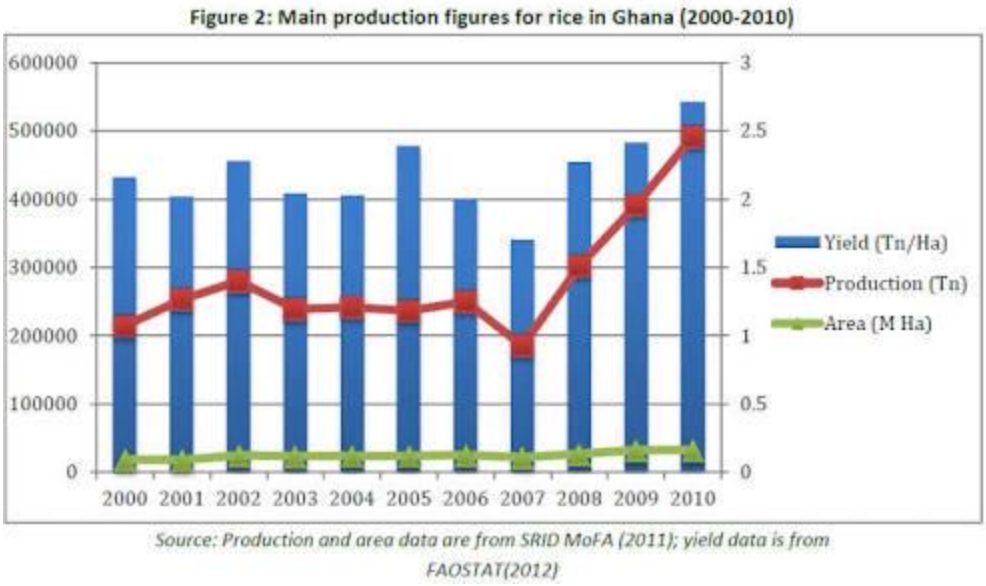

Figure 2: Main production figures for rice in Ghana

Ghana has relatively high levels of rainfall, and its tropical climate makes it a conducive environment for growing a number of stable crops including rice (Oxford Business Group, 2017). Ghana primarily grows the Oryza sativa and Oryza glabertima rice varieties.

The types of rice (Childs and Burdett, 2000) can be classified based on various characteristics:

Form

- Rough or paddy rice (both hull and bran layers attached to kernel)
- Brown rice (bran layers)
- Milled rice (no hull and bran layers)

Eco-geographical regions

- Indica rice (tropics and sub tropics)
- Japonica rice (temperate climate)

Aroma

- Aromatic (fragrant) rice (Thai jasmine and basmati from India and Pakistan)
- Non aromatic (non-fragrant) rice.

Rice is therefore considered a cash crop in Ghana. On average, 50% of the paddy is sold; 37% is used to pay various loans back in kind and only 13% is kept by rural households for own-consumption or gifts. As production increases, farmers are increasingly confronted with the difficulties of marketing their produce out of the rural areas. The market is very fragmented: different places of origin and qualities of rice lead to several different rice products (Cadihon *et al*., 2012).

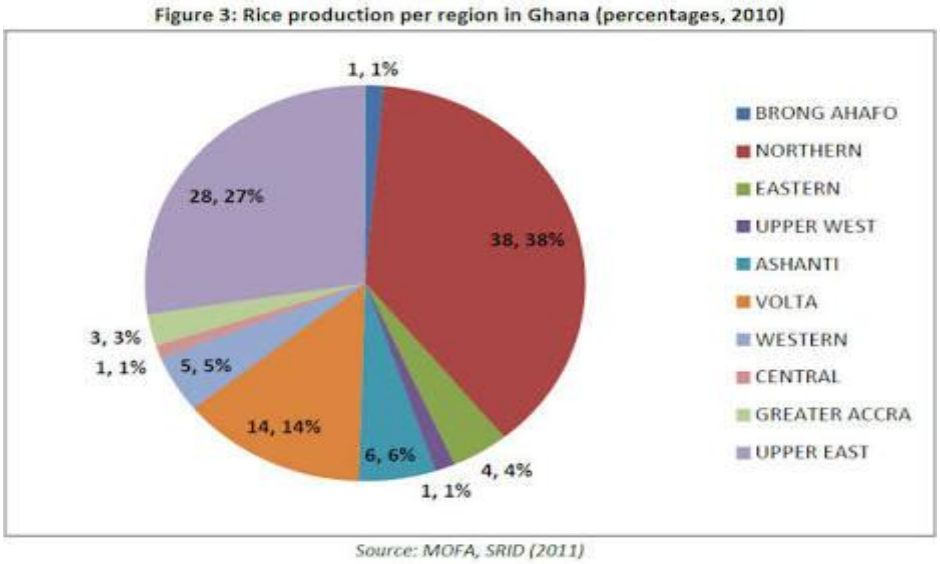

Figure 3: Rice production per region in Ghana

In a context of urbanization, increasing levels of income, and an aggressive marketing presence of importing agents, demand for rice is indeed increasing, but it is becoming more and more demanding on quality. Increasing local rice production can thus rapidly lead to a state of glut on the markets in the production areas. Conversely, marketing studies have shown that real opportunities existed for local rice. More than 90% of consumers surveyed were ready to support local production by buying local rice if quality and price were comparable to imported products. Some consumers surveyed thought that local rice could have superior nutritional and food safety qualities. Because the price of imported rice can be up to three times that of local rice, depending on the level of quality, one can estimate that the local rice industry could see its value addition double if it delivered the goods demanded by consumers (Cadihon *et al.*, 2012).

In recent years rice cultivation has benefitted from a number of programs aimed at increasing

domestic production. In 2008 Ghana released the National Rice Development Strategy (NRDS), with the goal of doubling rice production by 2018 and improving quality to increase demand for domestic rice. As part of the NRDS and the Food and Agricultural Sector Development Policy II, the government provided extension services, stabilized prices through the National Buffer Stock Company, which the government formed to intervene in staple markets such as maize and rice in order to set minimum prices at the beginning of the growing season (Oxford Business Group, 2017).

For the first time, six new rice varieties ─ four of which were wholly developed locally ─ have been released as commercial varieties in Ghana, by a team of AGRA-funded researchers led by Dr. Maxwell Asante. The effort aims to help boost rice production and quality, as well as reduce dependence on imports. Currently, Ghana's rice import bill is about $600, despite the fact that the country has the potential to produce to meet local and international demand (AGRA, 2017).

All six varieties, which are suitable for lowland and irrigated rice ecologies, are high-yielding, tolerant to Rice Yellow Mottle Virus Disease and iron toxicity, as well as have high cooking and aromatic qualities, making them farmer- and consumer-preferred varieties. The National Varietal Release Committee had no problem at all accepting all six varieties for release onto the local market (AGRA, 2017).

Dr. Asante believes that "the newly-released varieties would go a long way to help reduce Ghana's dependence on foreign rice imports". The effort, of developing four varieties from local crosses of the Crops Research Institute (CRI), is unprecedented and a major milestone for national research in Ghana. The locally-developed varies are AGRA-CRI-LOL-2-27, CRI-1-11-15-5, AGRA-CRI-LOL-1-7, and CRI-1-11-15-21. This brings the total number of rice varieties developed and released in Ghana with support from AGRA to thirteen (AGRA, 2017).

2.1.3. Political Economy of Rice in Ghana

• The business environment in Ghana is not very regulated.

• Avnash Industries Ghana Ltd, is now building one of the largest industrial rice mills on the Continent. The Buhler-equipped mill located in the center of the country will have a capacity of 500 tonnes paddy per day. The challenge is the ability to secure enough local rice to keep the mill turning.

• 40% devaluation of the Ghanaian currency that accompanied the crash in petroleum. Importers took big Forex-related losses and incoming volumes have dropped by 30% year on year.

• Ghana is another country where parboiled rice is important. It is the only place in West Africa where U.S. rice is eaten, but the major importers report that low global prices could mean no shipment from the Gulf of Mexico in the coming year.

• Singapore-based Olam group is one of the leading importers in the country.

• Private sector investment in a number of modern mills in the northern rice production zone has made well-cleaned, sorted and graded domestic rice now available, even though production costs remain much higher than in major export origins.

Source: World-Grain.com (2017)

2.1.4. Concept of Linking Smallholder Farmers to Markets

Posthumus (2010) stated that markets exist to facilitate the transfer of ownership of goods from one owner to another. Each time exchange of ownership is taking place, a price is determined. Neoclassical economics assumes that markets move towards equilibrium through competitive interactions between buyers and sellers, while each acts to maximize their utility or profit. However, this only happens when markets are perfectly competitive, having the following properties (Colman & Young, 1989):

- Producers are independent profit maximizers and consumers are utility maximizers with independent tastes;
- There are many sellers (producers) and buyers (consumers), both are price takers;
- All firms have identical technology, production functions and management ability;

 The product is homogeneous so that consumers are indifferent between the produce of alternative suppliers;
 Production factors are freely mobile in the economy, so that there are no barriers to firms wishing to enter or leave the market;
 Sellers and buyers have perfect knowledge and foresight about market conditions, and adjust their decisions accordingly.

These assumptions rarely hold in reality, even less so in Sub-Saharan Africa (Omamo & Farrington, 2004; Shiferaw et al., 2006). Information and knowledge is often limited and asymmetrically distributed, future market conditions may be uncertain, competition is limited, and markets are missing or failing. Because of these constraints, transactions in the market place can be costly. One of the main criticisms towards neoclassical economics is that it does not consider these transactions costs. Transaction costs are costs associated with trade, such as: searching and screening of business partners, negotiating a deal, monitoring performance and enforcing the deal, incurred losses when an agreement is broken, transport costs (Himmelweit et al., 2001; Jarillo, 1988).

Some empirical studies have attempted to prove that smallholder farmers can get obvious positive effects from being connected to high value agricultural marketing channels. Economic advantages that smallholder farmers can obtain from being linked in such high value agricultural channels include increase in production and productivity, asset stocks, profit share and welfare. By participating in modern food markets, small holder farmers can reach high efficiency levels regarding marketing barriers (Maspaitela, 2015).

The subject of smallholder farmer participation in high value agricultural markets has long been studied in many developing countries, and most results concluded that participation in such high value market channels also relates to farmer household welfare as well as rural development (Miyata *et al*., 2009; Qaim and Rao, 2012; Ismail, Kavoi, and Eric, 2013). Despite providing new obvious economic opportunities for farmers, the presence of high value marketing channels also brings about challenges that not all farmers are able to participate in (Neven *et al*., 2009; Qaim and Rao, 2012).

When done responsibly and sustainably, market-based agricultural development can empower smallholder farmers and provide them and their families with a more secure and nutritious supply of food as well as improved livelihoods. But there is still much work to be done (Hoevel, 2013).

Each farmer has different needs and a different type of market they are best suited to enter. There are three basic market types that value chain projects can target (Ferris *et al*., 2014):

(i) "Informal" markets, which have few regulations and often no taxation;

(ii) More regulated "formal" markets, which operate using standard weights and measures and where transactions are agreed upon based on clearly defined legal frameworks; and

(iii) Structured public markets that are organized by public sector buyers who offer standardized contractual buying arrangements with specific conditions (e.g., buying a percentage of the total procurement from smallholder farmers).

Positive characteristics of informal markets (Ferris *et al.,* 2014):

- Limited standards mean that there are relatively low levels of postharvest loss; this creates an environment where there may be extreme flexibility in value propositions, which makes these markets attractive to a wide variety of suppliers and buyers.
- Informal markets provide significant income opportunities for producers, wholesalers and retailers.
- The informal market process of multiple sellers and price fixing is used as risk management or as a safety net for sellers.

Negative characteristics of informal markets (*Ferris et al*., 2014):

- They are nominally managed by local authorities and are often controlled by strong cartels of traders who limit competition, enforce arbitrary stall fees, and use favoritism to benefit their political allies, immediate family, and other relations.
- Lack of investment and poor transparency often results in crowded and unsanitary conditions.
- Often, food safety issues are overlooked, resulting in a shift in the buying habits of some middleclass consumers (although most customers still value the accessibility and low

costs of informal markets).

- Markets have few modern trading facilities, and very few have computerized systems or operate in a coordinated manner. The lack of a business outlook on the part of market management limits investment and growth.

Formal market requirements for smallholders (Ferris *et al.*, 2014):

- It is common for firms to require traceability of lots along a supply chain. Each actor in the supply chain must adhere to a series of best practices for the production and handling of goods due to food safety standards. Failure to comply with such standards is penalized.
- Higher volumes in formal markets require a greater level of organization of smallholders through groups, associations and cooperatives, and access to specific services in order to maintain quality, volume, and flow.
- Farmers agree to lower prices in exchange for longer term buying arrangements, access to services, and social investments.

Formal market challenges (Ferris *et al*., 2014):

- Legal Frameworks – In modern markets, buyers and sellers rarely meet. Trust is reinforced through clearly defined standards that are supported by documentation and, often, certification. These contractual transactions depend on a reliable legal system. The establishment of legal frameworks is mainly the responsibility of government. However, there must be qualified, independently certified lawyers who operate according to international standards and are backed by law enforcement to prevent fraud. Otherwise, no party to a transaction can be certain that the terms of any contract will be upheld.
- Credit – Traders extend credit, usually as a cash pre-payment, to producers in almost all of the millions of transactions that occur in agricultural markets. Most traders are not able to generate enough cash to finance large deals, nor do they like the risks that come with carrying large amounts of cash. Nearly all advanced forms of market systems rely on banks to provide credit. Such systems are only able to work where banks can be relied on to work within a legally binding regulatory framework.

2.1.5. Means by which smallholder farmers have been linked to markets

2.1.5.1. Farmer associations and cooperatives

If transactions costs are high for individual smallholders when dealing with other actors in supply and value chains, then forming groups of farmers so they can aggregate sales, input purchase, loans and technical assistance might be one response. Not only do these promise to economize on transactions costs, but also they should give the group greater bargaining power, especially when facing those with monopoly power. They can also be a means by which farmers make their voice heard within policy-making (Wiggins and Keats, 2013).

Experiences of farmer associations and cooperatives have been mixed. Too often, they have failed owing to the lack of competence or honesty of their managers, often in collusion with leaders of the cooperatives. Some cooperatives have largely become vehicles for the political ambitions of their leaders, with services to members being neglected. Political considerations aside, theories about cooperatives can be useful to understand the conditions under which they may be successful. Johnston and Clark (1982) set out a simple benefit and cost framework. This states that cooperatives will only function if cooperation delivers benefits that could not be gained by individual effort alone (Curtis 1991); and if the (transactions) costs of cooperation are commensurately smaller than the expected gains. Costs of cooperation rise when membership is wide and diverse, when the aims of collective action multiply, and when it is difficult for members to appreciate how much others contribute to and receive from the cooperative. This helps explain the failures of many cooperatives set up in rural Africa in the 1960s and 1970s.They often had broad membership with everyone in the community registered, had multiple goals including not just production but also welfare provisions, resulting in complicated administration that made the cooperatives hard to manage, while members found it difficult to appreciate the contributions and rewards of other members (Wiggins and Keats, 2013).

2.1.5.2. Contract farming

Contract farming can be defined as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The arrangement also invariably involves the purchaser in providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. The basis of such arrangements is a commitment on the

part of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser and a commitment on the part of the company to support the farmer's production and to purchase the commodity. The intensity of the contractual arrangement varies according to the depth and complexity of the provisions in each of the following three areas (FAO, 2001):

* Market provision: The grower and buyer agree to terms and conditions for the future sale and purchase of a crop or livestock product;

* Resource provision: In conjunction with the marketing arrangements the buyer agrees to supply selected inputs, including on occasions land preparation and technical advice;

* Management specifications: The grower agrees to follow recommended production methods, inputs regimes, and cultivation and harvesting specifications.

With effective management, contract farming can be a means to develop markets and to bring about the transfer of technical skills in a way that is profitable for both the sponsors and farmers (FAO, 2001).

2.1.6. The journey so far in the study area

2.1.6.1. Rice farming in the Volta Region

The Volta Region could be made a hub of rice production to address the issue of rice importation and increase prospects of exportation. For a region with many swampy lands, the production of rice should be one of the viable investments for any investor (Graphic Online, 2017).

Rice production has always been part of farming activities in the region, but it started picking up tremendously from 2010.The region recorded a total of 1,529,022 metric tonnes of rice in 2010 with a total of 21,860 hectares for rice cultivation. The yield for that period was said to be 0.66 metric tonnes per hectare. Small-scale farmers contributed about 70 per cent of the total rice production in the region but due to interventions, including introduction of improved varieties of rice and good agricultural practices, the farmers were recording an average of 2.4 metric tonnes per hectare as the years went by. As of 2016, the average production per hectare had increased between 2.5 metric tonnes to 5.0 depending on the system used for cultivation and the season. According to the Volta Regional Crop Officer, Mr Alfred Bedzra, the high returns in the rice

business had resulted in more valleys being developed by private investors and individual farmers for rice farming. 'In Ketu North, for instance, individual farmers have developed the valleys around Klenomadi areas for that purpose'', he said. More of the farmers were moving away from broadcasting to transplanting and other improved technologies to maximize yields. ''In fact, most of the farmers grow Jasmine 85 and Agra varieties, which were all perfumed and high yielding,' he indicated. Buttressing the point that rice farming was becoming a toast for many farmers, Mr Bedzra said the total area of cultivation in the region had increased from 21,860 hectares in 2010 to 28,418 in 2016. "Though there is no scientific research yet done, the region can still boast of not less than 30,000 hectares of potential rice cultivation areas," Mr Bedzra added (Graphic Online, 2017).

Aside from the farming activities, many rice mills are springing up at vantage areas, making the rice industry prosperous. Some of them are located at Dabala, Adidome and Avalavi, with the recent being the Worawora Rice Mill constructed by Group Nduom. Indeed, some traditional areas have recognised the economic and traditional values of rice and have instituted festivals to honour the crop and showcase its importance. Some of the celebrations are Amu Festival of the people of Avatime, Lolobi IPor Rice Festival of the people of Lolobi traditional area and that of Wheta known as Amuza (Graphic Online, 2017).

Challenges

Despite the lucrative nature of rice farming, some farmers have complained of not having ready market for their produce, a situation discouraging others from venturing into the business. A farmer at the Ketu North District, Madam Celestine Agorha, said it was unthinkable that buyers or market women preferred the imported rice to the locally produced ones with higher nutritional value and good taste. Probably it is cheaper,'' she said, lamenting that she had had over 200 bags of rice in stock with no buyers for the past one month. ''The issue is that we are unable to get buyers for our produce and when we do, we sell at a cheaper price determined by market women or buyers. This affects us a lot because we are unable to recover production cost,'' she stated (Graphic Online, 2017).

Another issue bothering farmers was the invasion of birds on their farms. According to Mr Francis Nefui, a farmer, "the birds are no longer afraid of the scare crows'' (Graphic Online,

2017).

2.1.6.2. Rice farming in the Greater Accra Region

A recent TV3 report indicated how farmers at the Asutsuare area have to grapple with how to sell their produce. According to the farmers, they are fortunate to have had rain throughout almost the whole year but after they have spent money and effort to produce the rice, they are left at the mercy of the weather. According to rice farmers, one needs between GH¢3,000 and GH¢5,000 to cultivate one hectare of rice (Ghanaweb, 2017).

Now when these farmers have sunk all that money into a project for which there is need of and then turn around to complain, then there is a huge disconnect (Apau, 2017). First Disconnect, A random investigation conducted indicated that many women would prefer Ghanaian rice to imported 'perfumed' rice. Their reasons are that most of the imported 'perfumed' rice can become watery and go bad when it is left over night, do not cook well, and that most of the 'perfumed' rice are tasteless. On the aspects of the Ghanaian grown rice, the only challenge most women had was the length of time needed for cooking. According to them cooking Ghanaian grown rice needed some time and patience or one may end up destroying the whole meal. Aside that, Ghanaian grown rice is one of the best ever (Apau, 2017).

Second Disconnect, Amazingly you go around all the market places around the country and especially where rice is sold and it will amaze you to realize that of all the various varieties of rice, Ghanaian grown rice is non-existent. This disconnect is amazing. These are a group of farmers lamenting that they hardly get the needed market for their products and here are people who wants to buy the same product lamenting how difficult it is to get the product which is getting rotten under some unfavourable condition (Ghanaweb, 2017).

Third Disconnect, when leaders call for producing in Ghana and using made in Ghana goods, what exactly do they mean? There are a lot of institutions and programmes who purchase a lot of rice for food. Talk about School Feeding Programme, Senior High institutions and many others. Why can't we make it a policy that such bodies use Ghanaian grown rice so that instead of paying some huge dollars to outside farmers we can use part of that to grow the Ghanaian farmer and create more employment. Until leadership and the populace stop paying lip service to issues

to do with rice growing in particular and agriculture in general, we may have to contend with this problem for a long time (Ghanaweb, 2017).

2.2. Review of Methodology

Several studies, on linking smallholder farmers to markets, have been done. This section, presents a review of some related past studies in which the current study builds on. Therefore, a summary on the methodologies used, the key findings as well as their contribution to this study is presented.

Addison *et al.* (2015) sought to contribute to the on-going discussion on improving rice production in Ghana. The objective of their study was to analyze the effect of rice value chain development initiative on domestic rice production in the Ahafo Ano, North district of Ghana. Primary data for the study was gathered through focus group discussions and key informant interviews was complemented by desk studies.

Maspaitella (2015) identified and analysed key determinants affecting farmers' participation in the supermarket channels, using a comparison to the traditional market channels. He used a structured questionnaire and conducted face-to-face interviews with a random sample of 126 smallholder vegetable farmers in the Manokwari region, Papua Barat province of Indonesia. Factors influencing the market channel decision about whether to supply to supermarkets or traditional markets were analysed using binary logistic regression. Chi square analysis was used in comparing key factors between the supermarket and traditional market channels. Furthermore, a bivariate correlation was also run to find out the impact of market channel participation on farmer household income.

Musah (2013) assessed the levels of market participation by smallholder maize and groundnut farmers in the Upper West Region of Ghana by estimating the factors that influence the probability and intensity of participating in the maize and groundnut markets and then identifying and ranking the constraints to marketing maize and groundnut. He employed a multi stage random sampling procedure to select 400 farmers (200 maize and 200 groundnut farmers) from four agricultural districts in the region and used a semi-structured questionnaire to collect household survey data during the 2011 farming season. The Household Commercialisation Index was used to estimate the levels of market participation and the Double Hurdle Model was used to

estimate the factors influencing both market participation and intensity of participation. The Garrett ranking technique was used to rank the constraints to marketing.

Amedi (2014) investigated the agronomic constraints among rice farmers in Ghana under the MiDA in the Hohoe Municipality. Primary data was collected from 120 farmers from 4 beneficiary towns while secondary data was gathered from literatures and various organizations. Multistage random sampling technique was used to select the respondents. Obtained data were analyzed using Kendall's coefficient of concordance.

Apori-Buabeng (2009) conducted a study to find out how the marketing of local rice was organised and coordinated in the Ashanti Region of Ghana. The study investigated the socio-economic profile of the market participants, the structure, conduct and performance of the local rice market, the perception or attitudes of consumers towards local rice. Information and data were collected from rice farmers, millers, paddy traders, wholesalers, retailers and consumers. The data were analysed using both descriptive and inferential methods. The descriptive method included the use of frequencies and percentages in analysing some of the trends or characteristics of the data. Kendall's Coefficient of Concordance (W) was used in the inferential analysis. The W was used to analyse the attributes of rice on which preferences were based by consumers. These attributes included colour, presence of stones or foreign material, taste, aroma or fragrance and cooking quality.

Abdullah *et al.* (2017) assessed the factors that affect smallholder rice farmer's participation in market. In addition the study also examined the effect of commercialization on the welfare of smallholder farmers. The method of Heckman two-stage model was used to obtain the desired objectives. Random sampling technique was used to collect data from 249 smallholder farmers.

Amponsah *et al.* (2018) did an assessment of rice farmers' knowledge and perception of harvest and postharvest losses in Ghana. Farmers' knowledge and perception of harvest and postharvest losses in rice production across three agro-ecological zones (The selected communities were Nobewam from the forest, Sogakope from the coastal and Tamale from the guinea savannah agro-ecological zones) of Ghana were examined using farm-level data collected from 108 randomly selected rice farmers through focused group discussion and structured questionnaire. The data used for this study were analysed using the STATA 14 statistical software package (StataCorp, 2015). Descriptive statistics were used to summarise the data. To examine the

perception and knowledge of farmers on harvest and postharvest losses, means of a 5-point Likert scale were estimated, compared with the values of the individual perception statements.

2.3. Review of Empirical studies

Wilhemina *et al.* (2010) assessed the perceptions of stakeholders concerning implementation activities of the Food Security and Rice Producers Organisation Project (FSRPOP) in Northern Ghana. The project aimed at building the capacities of farmer based organisations (FBOs) to assist rice farmers access credit, organise production inputs and improve market access. The study results showed that although access to input supply and production credit improved, enhancing farmers' marketing capacity was not successful. The management capacity of the FBOs was weak in performing more complex administrative issues and market facilitating roles. Timely provision of production inputs, use of custom based processing and credit inventory system for maximum profit were some of the lessons learnt. Facilitation of farmer - medium scale buyer linkages and the development of lessons-based action plan for change with beneficiaries were recommended.

Addison *et al.* (2015) as mentioned earlier, analyzed the effect of rice value chain development initiative on domestic rice production in the Ahafo Ano, North district of Ghana. The main finding was that the rice value chain was not formalized in the district, although informal types existed. The study also showed that domestic rice producers had achieved regular annual increases due to informal rice value chains. Nevertheless, there was lack of competitiveness of domestic rice vis-à-vis imported rice due to the poor quality of milling. Therefore, the study recommended adopting sector-wide value chain strategies that would enhance development of formal rice value chain and competitiveness of local rice industry and investing in post-harvest product-quality infrastructure to ensure product quality.

Maspaitella (2015) identified and analysed key determinants affecting farmers' participation in the supermarket channels, using a comparison to the traditional market channels. The empirical results suggested that education level of farmers, vegetables cultivated area, and farmers' membership of the farmer groups were some of the key determinants that had significant and positive effects on the farmers' decision about market channel participation. The results also revealed that the supermarket channel suppliers received higher average prices and paid more for

transportation costs, compared to the traditional market suppliers. In addition, the results suggested that market channel participation and the household income generated from vegetable farms were positively correlated. Maspaitella (2015) went ahead to emphasize that the results cannot be generalised to other contexts due to the nature of the study design. However, that they may contribute to some useful implications. Since farm production capacity was essential for being linked to supermarket channels, technical innovations need to be prioritised in agricultural development strategies. Also, collective actions through farmer groups should be encouraged to broaden the roles, especially in accessing new emerging markets.

Musah (2013) assessed the levels of market participation by smallholder maize and groundnut farmers in the Upper West Region of Ghana by estimating the factors that influence the probability and intensity of participating in the maize and groundnut markets and then identifying and ranking the constraints to marketing maize and groundnut. The results indicated that farmer characteristics (such as age, gender, education, household size); private assets variables (such as farm size, output, experience); public assets variables (such as credit, extension contact, price); and transaction cost variables (such as market information and point of sale) significantly influenced the probability and intensity of market participation behaviour in the region. With respect to the constraints to marketing, unfavourable market prices was the most pressing constraint faced by farmers while lack of government policy on marketing was the least constraint. Based on the findings, the study recommends that government through MoFA should institute productivity enhancing measures to increase the productivity of maize and groundnut as this would subsequently increase marketable surplus of farm households. It is also recommended that MoFA should establish rural finance schemes to address the credit needs of smallholders. The Statistics, Research and Information Directorate (SRID) of MoFA should create a department responsible for the delivery of agricultural market information to make market information delivery effective.

The investigation of agronomic constraints among rice farmers in Ghana under MiDA in the Hohoe Municipality done by Amedi (2014) showed that the five topmost constraints faced by farmers include: poor climatic conditions, high incidence of pests, poor yield, high cost of inputs and problem of poor milling equipment.

Apori-Buabeng (2009) conducted a study to find out how the marketing of local rice was organised and coordinated in the Ashanti Region of Ghana. The study investigated the socio-economic profile of the market participants, the structure, conduct and performance of the local rice market, the perception or attitudes of consumers towards local rice. Results indicated that at each level of the marketing chain, there were large numbers of sellers and buyers. None of the market agents controlled a sufficiently large share of the marketed volume, which they could use to influence prices to their advantage. Apart from their traditional roles, millers also provided other services such as loans and credit for farmers, and provision of storage facilities. Paddy traders also provided loans to farmers. Consumer ratings of local rice attributes that influence their choice depended on colour, aroma, stickiness, tastes, absence/presence of foreign materials, expansion and percentage of broken rice. Constraints identified were non-uniform weights and measures, inadequate information, difficulty in accessing transportation in the remote areas and difficulty in accessing loans. To help improve the system, it was recommended that the milling machines be provided with de-stoners to improve the quality of local rice. Provision of adequate market information and improved road network in the remote areas were also recommended.

Abdullah *et al.* (2017) assessed the factors that affect smallholder rice farmer's participation in market. In addition, the study also examined the effect of commercialization on the welfare of smallholder farmers. Result of the study indicated that gender of the household head, age, number of family members who assist in farming, household size, vocational training, and the farmer being landlord and farm size were the major determinants of market participation. The welfare of the farmer depends whether the farmer participate in the rice output market. The result also indicated that rice output, off-farm income, access to credit, and income from the sale of rice were important factors influencing the welfare of the household. The study showed that participation in market can be increased by providing subsidized prices for production, cold storage houses, vocational training, new technology, increasing contact with extension agent and providing genetically modified seeds.

An assessment of rice farmers' knowledge and perception of harvest and postharvest losses in Ghana, done by Amponsah *et al.* (2018) revealed that rice production was male-dominated (80%) with an ageing farmer population (42 years on average), smaller farm sizes (~5 acres) with over 70% of farmers formally educated. They suggested the potential and need for

mechanised interventions in rice production. Majority of the farmers sampled (over 95%) had experienced and were aware of harvest and postharvest losses in rice. Whereas over 50% of the farmers were cultivating the Jasmine rice variety, it was perceived by over 65% of the farmers to be associated with higher harvesting losses. Mechanical agents such as lack of appropriate harvesting machinery were perceived by over 40% of the farmers to cause harvesting losses. On the method of rice threshing, over 50% of the farmers used combines, 36% used the threshing by impact "bambam" method, 11% bag beating and 2% used mechanical threshers. Rice harvest and postharvest activities constituted 21% of total production cost, while accounting for nearly 20% of total grain loss. It is recommended that aside the mechanised interventions, efforts should be geared towards proper development of rice fields to ensure sustainable production and improved land productivity.

From the empirical literature review, the authors used different approaches such as Heckman two-step model, logistic regression model, inferential and descriptive analysis. The choice of the model used was based on the nature of the dependent variable and the objective of the study. The past studies discussed different factors that affected household or farmers' access to markets. Those factors can be characterized as socio- economic, institutional and environmental factors. This study is not much different from others studies discussed above especially in terms of the methodology. However, each study presented unique results with regard to constraints and factors which influenced access to markets. This may be due to the fact that the study areas are different especially in its population, institutions that regulate the market as well as the environmental factors. Therefore, these different empirical studies undertaken at different locations identified the most probable factors influencing access to markets and recommended the remedies that might mitigate these problems. Some results of these different empirical studies from different locations may be applicable in the current study area. For these reasons, some factors were picked and others were left out depending on the objectives of this study.

Chapter Three: METHODOLOGY

The purpose of this research is to analyze the market participation of smallholder rice farmers in the Greater Accra and Volta regions of Ghana. More specifically, to answer the questions: what are the challenges faced by smallholder rice farmers in accessing formal markets? What factors influence the participation of these smallholder farmers in agricultural output markets? And what can be done to improve market access among smallholder rice farmers in Ghana?

3.1. Study Area

Purposive sampling technique was employed to select rice farmers at the Volta and Greater Accra regions for this study out of the ten regions of Ghana. The motivation for such choice is that these regions hold much potential in rice production.

The Volta region which was declared as the leading producer of rice in Ghana, in 2015 by the Statistics Research and Information Department of Ministry of Food and Agriculture is well known for landscape suitable for arable farming. With Ho designated as its capital, it is located west of the Republic of Togo and to the east of Lake Volta. Divided into 25 administrative districts, the region is multi-ethnic and multilingual. The study was conducted in Aveyime of the North Tongu district and Weta/Afife of Ketu North district.

Figure 4: Map of Ghana showing Volta Region

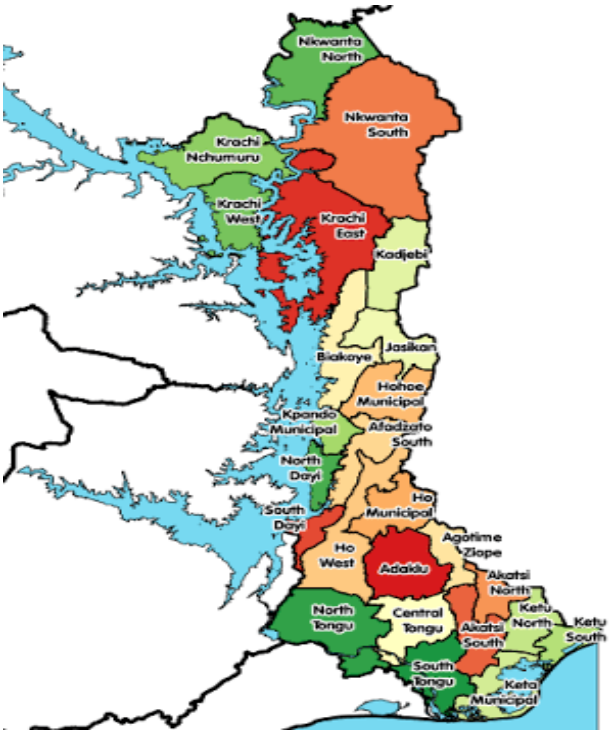

Figure 5: Map of the Volta Region

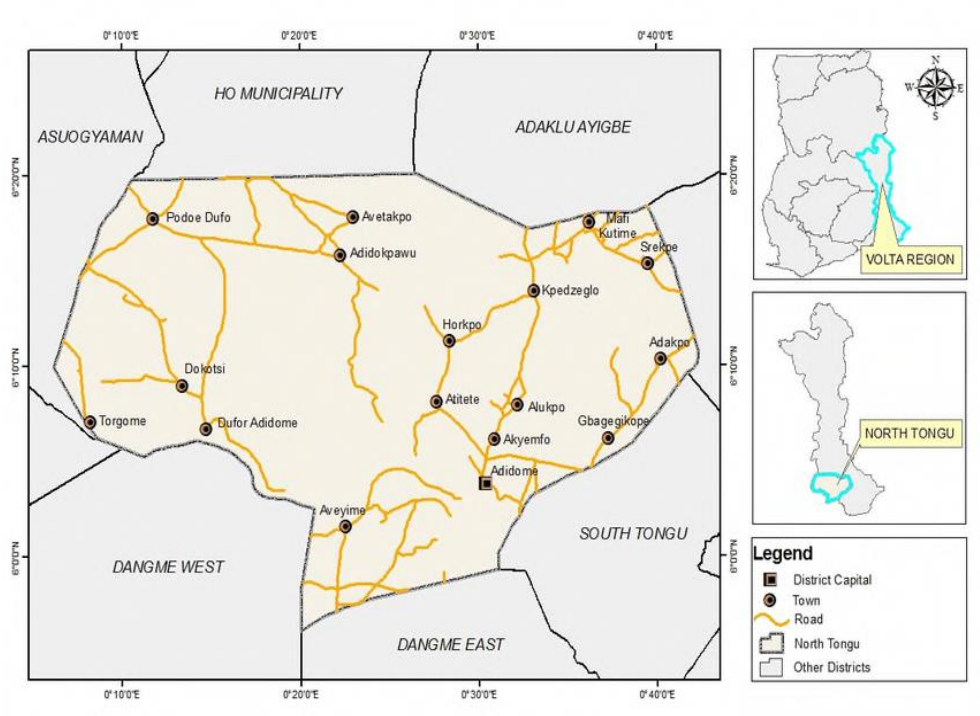

Figure 6: Map of North Tongu district in the Volta Region

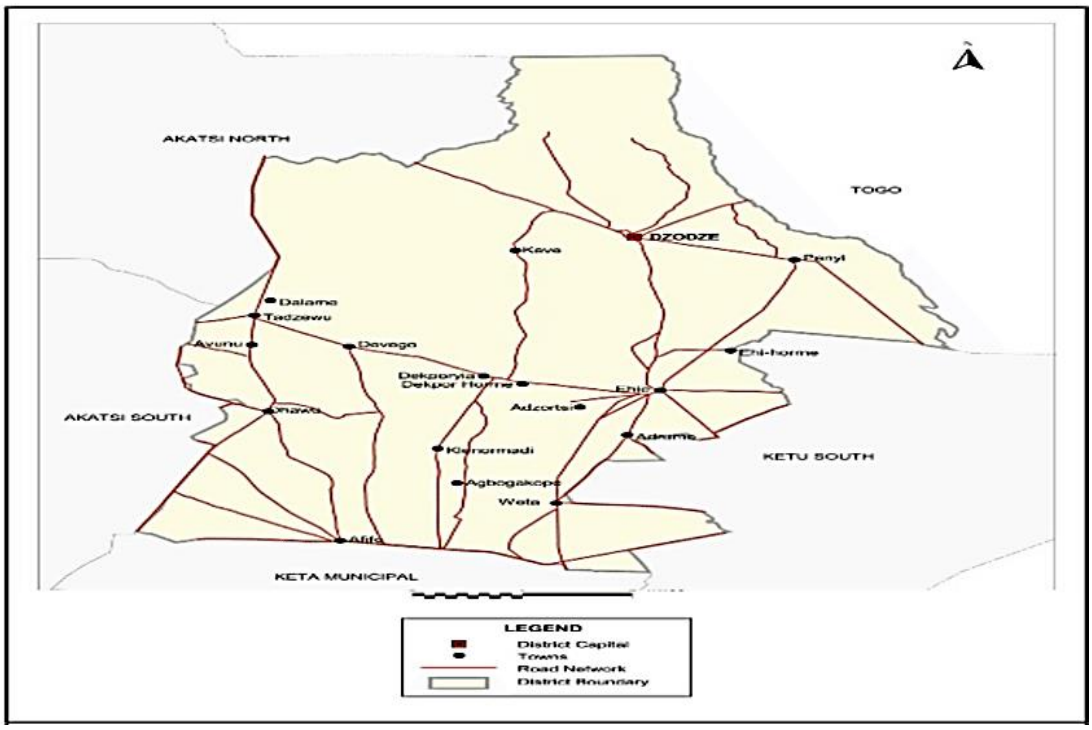

Figure 7: Map of Ketu North district in the Volta Region

The Greater Accra Region is bordered on the north by the Eastern Region, on the east by the

Volta Region, on the south by the Gulf of Guinea, and on the west by the Central Region. It is the smallest region of Ghana in total area, and is made up of 16 administrative districts. The region is also known for its vast natural resources and a very fertile agricultural land. The study was carried out in Asutsuare of Shai-Osudoku district. According to the District Analytical Report, soil around Asutsuare are placed under extensive rice and sugarcane cultivation, because they have poorly drained, pale-coloured, sandy silt and clayey soils and good for rice and sugarcane.

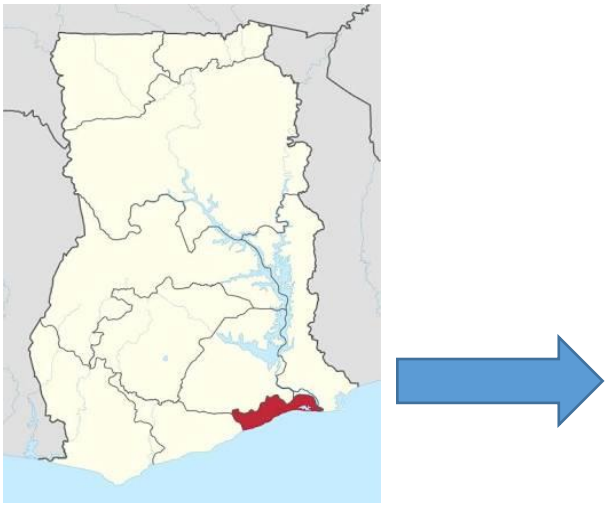

Figure 8: Map of Ghana showing Greater Accra Region

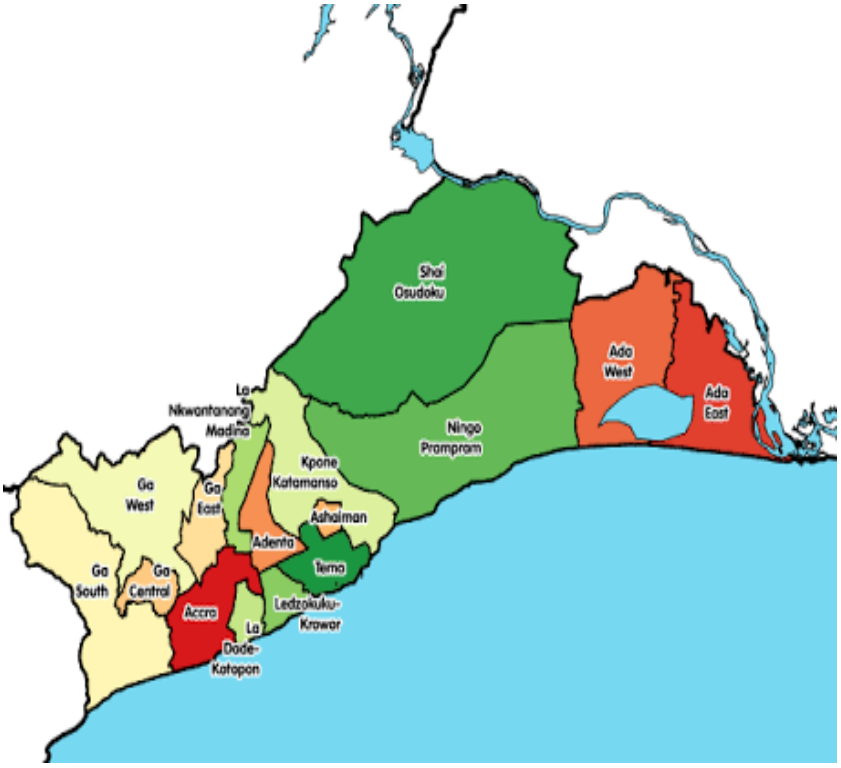

Figure 9: The Greater Accra Region

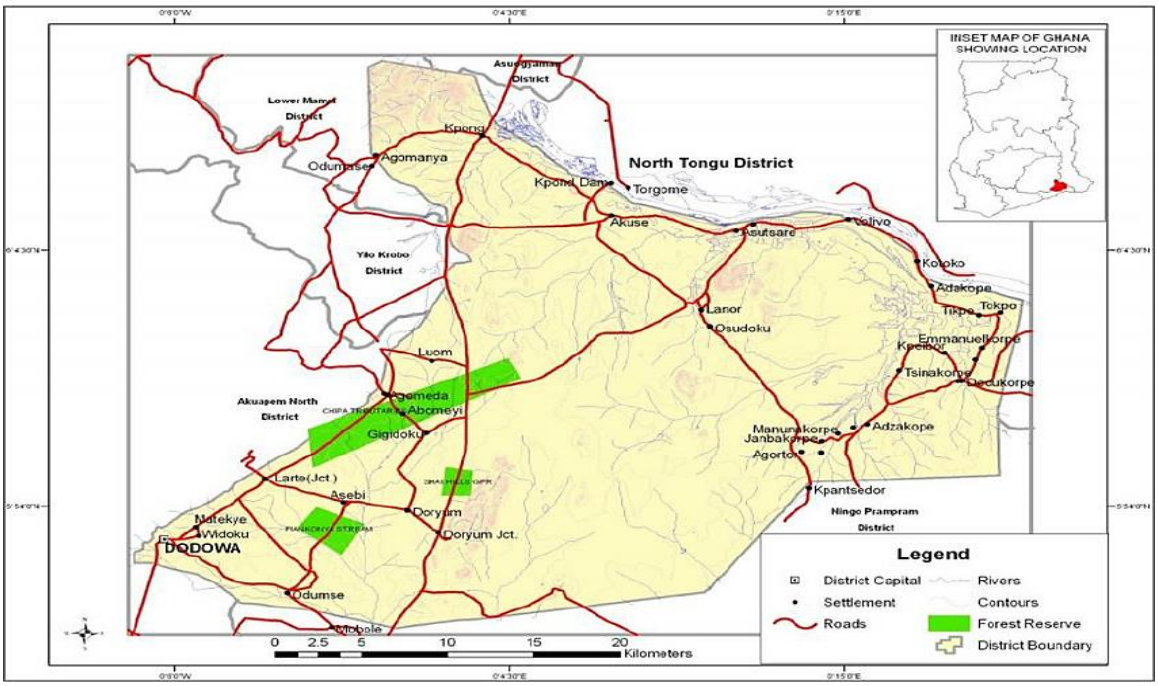

Figure 10: Map of Shai-Osudoku district in Greater Accra Region

3.2. Nature and Sources of Data

This study utilised a mixed methods strategy, a strategy of combining quantitative and qualitative approaches to achieve research aims. The importance of the mixed methods strategy is that by involving both approaches in tandem, the overall strength of a study is greater than either the quantitative or qualitative research method alone (Creswell, 2009). In this research, the quantitative approach was used as the main research strategy, while the qualitative approach was integrated to support the quantitative findings. Therefore, a survey was considerably used as the primary research method. A survey was designed and carried out to obtain a numerical description of trends, attitudes, or opinions of a population by investigating a selected sample of that population (Creswell, 2009).

Both formal and informal approaches were used in collecting the data. First participatory rapid appraisal techniques such as the focus group discussions were used to collect information about the communities as well as general information about the community with regard to rice production. This provided useful information for improving the formal data collection. Following this approach, the formal survey data was collected using semi-structured questionnaires through individual interviews.

3.3. Method of Data Collection

A semi-structured questionnaire was administered to 400 rice farmers who were randomly selected. The questionnaire was developed in order to obtain appropriate information that can be utilized to achieve the research objectives. The information included variables affecting the marketing decisions of smallholder rice farmers, which were deduced from farmer demographics, farm characteristics, marketing aspects and institutional factors.

The questionnaire development consisted of four sections. Section A was the socio-demographic data; section B comprised of the barriers to formal market and section C considered factors that influence the decision of smallholder farmers to participate in agricultural output markets.

After the first draft of questionnaire was prepared, the pre-testing procedure was carried out. The aim of pre-testing activities was to evaluate whether the questionnaire was relevant and easily understood by the targeted respondents in terms of the word selection (Dane, 1990; Ruane,

2005), question sequencing, and format and layout issues (Ruane, 2005). Furthermore, pre-testing activity will also allow the researcher to assess the validity and reliability of questions (Ruane, 2005).

Table 2: Study area and sample size

S/No	Region	District	Villages selected	Selected sample	Percent
1	Greater Accra	Shai-Osudoku	Asutsuare	225	56.3
2	Volta	North Tongu	Aveyime	103	25.8
		Ketu North	Weta/Afife	72	18
Total				400	100.0

3.4. Analytical Methods/Techniques

Data was analysed using the Statistical Package for Social Sciences (SPSS version 14.0).

Initially a cleaning process was performed to ensure its completeness and validity. This Process included checking for logical inconsistencies, outliers and missing values. In order to avoid these data problems, the values of means and standard deviations of variables were produced. Based on these values, there was no missing value found, but some outliers were identified. The outliers were treated by replacing them with the mean values of each variable. After the cleaning process, data was then given variable names and more detailed codes. For analysis purposes, some continuous data were considerably transformed into categorical bases. The final data set for analysis consisted of 400 rice farmers. Data was analysed using descriptive and inferential statistics.

Chapter Four: RESULTS AND DISCUSSION

4.1. Socio-economic characteristics of the rice farmers

4.1.1. Gender of the farmers

The study showed there are more male rice farmers. The result revealed that 74% of the rice farmers are male and only 26% are female. This is due to the fact that male farmers are well endowed with resources such as land than their female counterparts. According to Amponsah *et al.* (2018) rice production is male-dominated (80%).

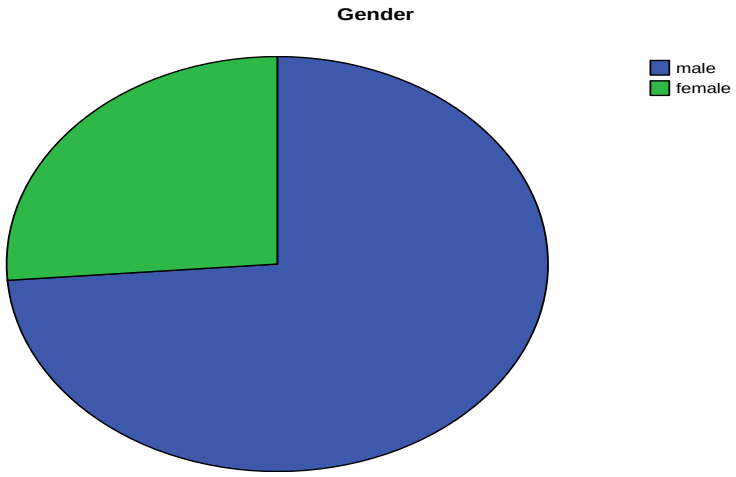

Figure 11: Gender of the sample size

The Female rice farmers were found to be less educated than the men which makes them more vulnerable and limits their access to markets. According to Appiah (2013), women's education has direct impact on sustainable agriculture uptake. A study conducted by a team from the School of Business, Economics and Law at the University of Gothenburg, Sweden, and the International Maize and Wheat Improvement Center proved that the successful implementation of sustainable agricultural practices(SAPs) in Sub-Saharan Africa is linked to improvements in women's education. The impact of women's education was relevant in both male-headed and female-headed households.

Table 3: Crosstabulation of Gender and Education

		Gender				Total	
		male		female			
		Count	% of Total	Count	% of Total	Count	% of Total
Education	primary	35	8.8%	22	5.5%	57	14.3%
	No formal education	48	12.0%	35	8.8%	83	20.8%
	middle school living certificate	4	1.0%	4	1.0%	8	2.0%
	no response	12	3.0%	2	.5%	14	3.5%
	junior high school	84	21.0%	27	6.8%	111	27.8%
	senior high school	90	22.5%	15	3.8%	105	26.3%
	professional health sciences	1	.3%	0	.0%	1	.3%
	diploma/certificates	13	3.3%	0	.0%	13	3.3%
	higher national diploma	2	.5%	0	.0%	2	.5%
	undergraduate education	3	.8%	0	.0%	3	.8%
	masters	3	.8%	0	.0%	3	.8%
Total		295	73.8%	105	26.3%	400	100.0%

Table 4: Chi-Square Tests for gender and education

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	34.525(a)	10	.000
Likelihood Ratio	39.618	10	.000
N of Valid Cases	400		

In these results, the p-value = 0.000. At significance level of 0.05, $p<0.05$. Therefore, there is a significant relationship between gender of the rice farmers and their education level.

4.1.2. Age of the farmers

Majority of the rice farmers fall into the age brackets 36-45(31%) and 46-55(28%). This indicates that youth participation in agriculture is minimal. Rice farmers within the ages of 18-25

were only 3% and those within the ages of 26-35 were 17% of the sample size.

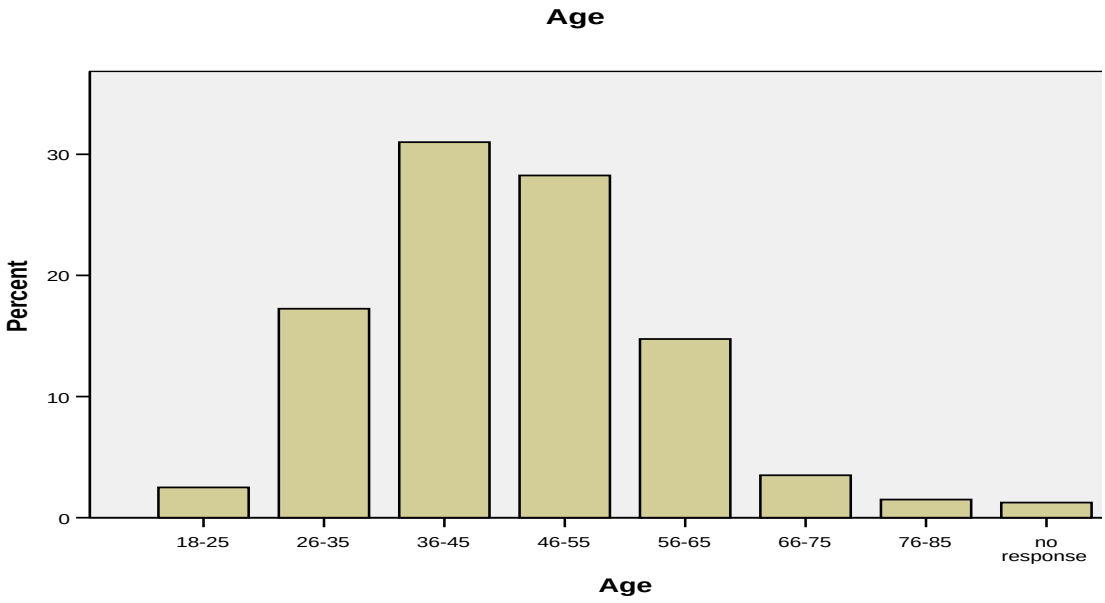

Figure 12: Age bracket of the sample size

Minchew (2016) emphasized that the future of farming may very well lie in scientific progress, economic interventions, and binding international agreements, but none of these approaches will succeed without buy – in from those who matter the most – the farmers themselves. To be specific, young farmers, who are the future of farming.

4.1.3. Marital status of the rice farmers

The result revealed that 78% percent of the rice farmers were married and only about 11% were never married. The rest were either separated, divorced or widowed.

Table 5: Marital status

Marital status	Frequency	Percent	Valid Percent	Cumulative Percent
never married	42	10.5	10.5	10.5
married	311	77.8	77.8	88.3
widowed	20	5.0	5.0	93.3
divorced/separated	19	4.8	4.8	98.0
no response	8	2.0	2.0	100.0
Total	400	100.0	100.0	

4.1.4. Education level of the farmers

About 28% of the rice farmers stopped at the junior high school level, 27% had attained senior high school level, 14% primary school level, 3% had diploma certificate while 21% had no formal education. Increase in education level showed extent of agricultural commercialization. This is because the farmers who attain higher levels of education are able to accumulate knowledge and have better access to information.

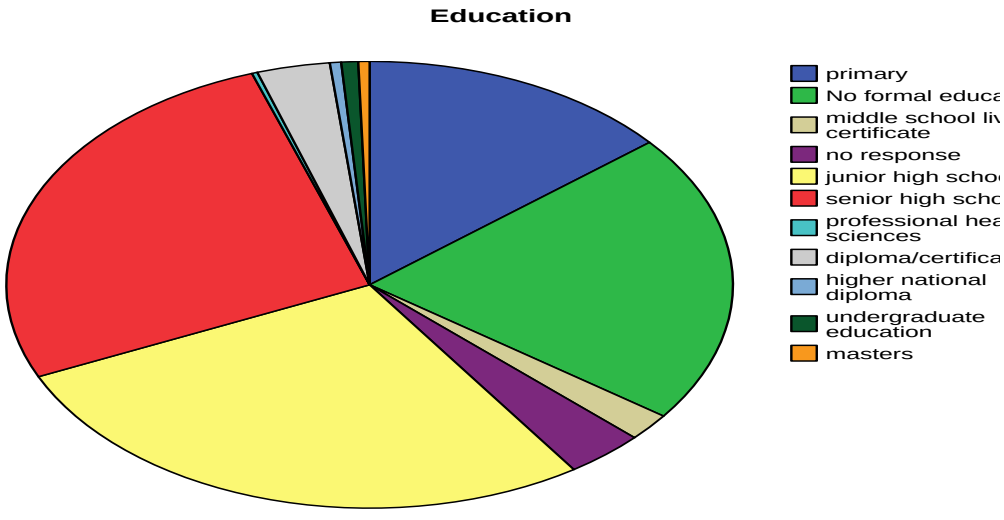

Figure 13: Education level of the farmers

Table 6: Crosstabulation of education level and access to credit

			Access to credit			Total
			yes	no		
Education	primary	Count	29	26	2	57
		% of Total	7.3%	6.5%	.5%	14.3%
	No formal education	Count	20	63	0	83
		% of Total	5%	15.8%	.0%	20.8%
	middle school living certificate	Count	7	1	0	8
		% of Total	1.8%	.3%	.0%	2.0%
	no response	Count	11	3	0	14
		% of Total	2.8%	.8%	.0%	3.5%
	junior high school	Count	37	74	0	111
		% of Total	9.3%	18.5%	.0%	27.8%
	senior high school	Count	55	49	1	105
		% of Total	13.8%	12.3%	.3%	26.3%
	professional health sciences	Count	0	1	0	1
		% of Total	.0%	.3%	.0%	.3%
	diploma/certificates	Count	10	3	0	13
		% of Total	2.5%	.8%	.0%	3.3%
	higher national diploma	Count	1	1	0	2
		% of Total	.3%	.3%	.0%	.5%
	undergraduate education	Count	2	1	0	3
		% of Total	.5%	.3%	.0%	.8%
	masters	Count	3	0	0	3
		% of Total	.8%	.0%	.0%	.8%
Total		Count	200	197	3	400
		% of Total	50.0%	49.3%	.8%	100.0%

Table 7: Chi-Square Tests for Education level and Access to Credit

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.495(a)	20	.008
Likelihood Ratio	40.142	20	.005
N of Valid Cases	400		

The corresponding p-value of the test statistic is p=0.008. At probability of 5% ($\alpha = 0.05$), $p<0.05$. Therefore, there is a statistically significant association between education level and ability to access credit. This results agrees with Denkyiral *et al* (2016) who have shown that educated farmers are more likely to have access to credit.

4.2. Barriers to formal market participation by smallholder rice farmers

4.2.1. Preference for informal markets

The study showed that only 10 percent of the rice farmers are dedicated to taking their produce solely to the market because long distances, transport costs, hire of stores are some of the expenses most farmers are not willing to pay. As a result, most of the farmers sell their produce on the farm, farm gate, drying floor or at the mill where traders (individuals and companies) come to meet them and buy. The problem with this informal setting is the lack of standardized measurements, therefore the farmers end up accepting lower prices for their produce. Apori-Buabeng (2009) has shown that non-uniform weights and measures is one of the constraints to market participation identified by rice farmers. Due to a lack of storage and market options, most smallholder farmers will sell their produce at harvest, when prices are at their lowest. Immediately after harvest, prices begin to rise, representing a lost income opportunity for smallholder farmers.

Table 8: Where produce is sold by the 400 rice farmers

S/No	Where produce is sold	Frequency	Percent	Valid Percent	Cumulative Percent
1	home(after harvest)	47	11.8	11.8	11.8
2	home, market	1	.3	.3	12.0
3	home, field	6	1.5	1.5	13.5
4	home, road side	1	.3	.3	13.8
5	home, drying floor	7	1.8	1.8	15.5
6	farm, market	1	.3	.3	15.8
7	store/warehouse, field	1	.3	.3	16.0
8	no response	36	9.0	9.0	25.0
9	farm(before harvest)	32	8.0	8.0	33.0
10	market	40	10.0	10.0	43.0
11	store/warehouse	33	8.3	8.3	51.3
12	field(on the farm or farm gate after harvest)	132	33.0	33.0	84.3

13	drying floor	52	13.0	13.0	97.3
14	home, farm(before harvest)	10	2.5	2.5	99.8
15	home, farm(before harvest), field	1	.3	.3	100.0
	Total	400	100.0	100.0	

4.2.2. Transaction costs

Table 8 reveals that challenges faced by the small holder rice farmers include; high transport costs, poor communication, high market dues, long distances to markets, low prices offered, lack of market information, poor storage facilities and labour costs. However, high transport costs, low prices offered and labour cost seem to take the lead. Farmers with larger household size hardly complained of labour cost. Martey *et a*l (2014) have shown that household size represents the supply of family labour for production activities.

According to the study done by Musah (2013), unfavourable market prices was the most pressing constraint faced by farmers, but in this study low prices offered ranks second.

Table 9: Farmers identify various challenges they face marketing their produce

S/no	Challenges	Frequency	Percent	Valid Percent	Cumulative Percent
1	high transport costs	33	8.3	8.3	8.3
2	no challenge	1	.3	.3	8.5
3	high transport cost, poor storage facilities	1	.3	.3	8.8
4	transport cost, low prices offered	8	2.0	2.0	10.8
5	low prices offered, poor storage facility	7	1.8	1.8	12.5
6	poor communication, low prices offered	4	1.0	1.0	13.5
7	high transport costs, high market dues	2	.5	.5	14.0
8	low prices offered, labour cost	5	1.3	1.3	15.3
9	low prices offered, lack of market information	7	1.8	1.8	17.0
10	poor storage facilities, labour cost	1	.3	.3	17.3

11	poor communication(i.e. telephone network)	5	1.3	1.3	18.5
12	transport cost, labour cost	4	1.0	1.0	19.5
13	poor communication, labour cost	1	.3	.3	19.8
14	three or more of these challenges	61	15.3	15.3	35.0
15	no response	70	17.5	17.5	52.5
16	high market dues	9	2.3	2.3	54.8
17	long distances to the markets	7	1.8	1.8	56.5
18	low prices offered	116	29.0	29.0	85.5
19	lack of market information	9	2.3	2.3	87.8
20	poor storage facilities	2	.5	.5	88.3
21	labour cost	44	11.0	11.0	99.3
22	lack of machines	3	.8	.8	100.0
	Total	400	100.0	100.0	

4.2.3. Farm size

Majority of the rice farmers own less than one hectare of land. In most cases, the larger the farm size, the higher the productivity. This is why the government stepped in and rented out additional lands to some rice farmers in other to enhance productivity growth.

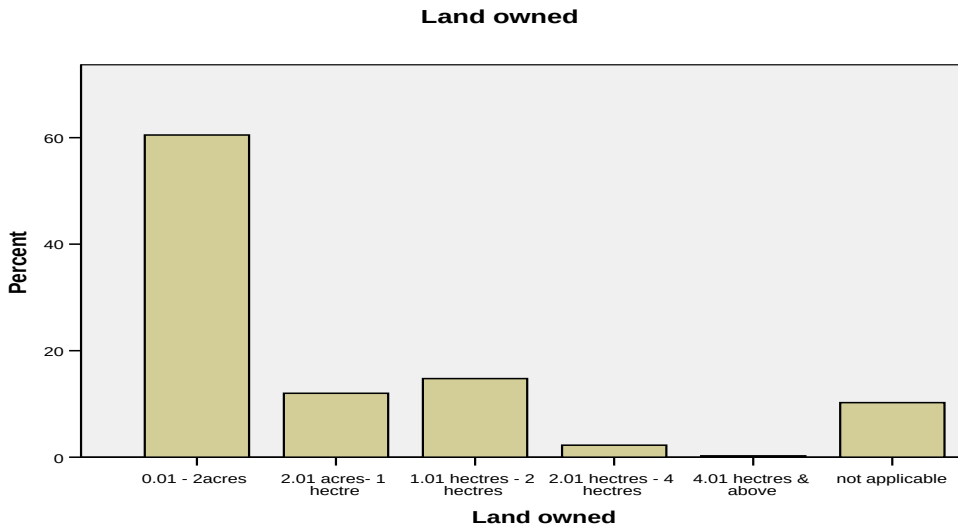

Figure 14: Bar chart showing size of farm land owned by the farmers

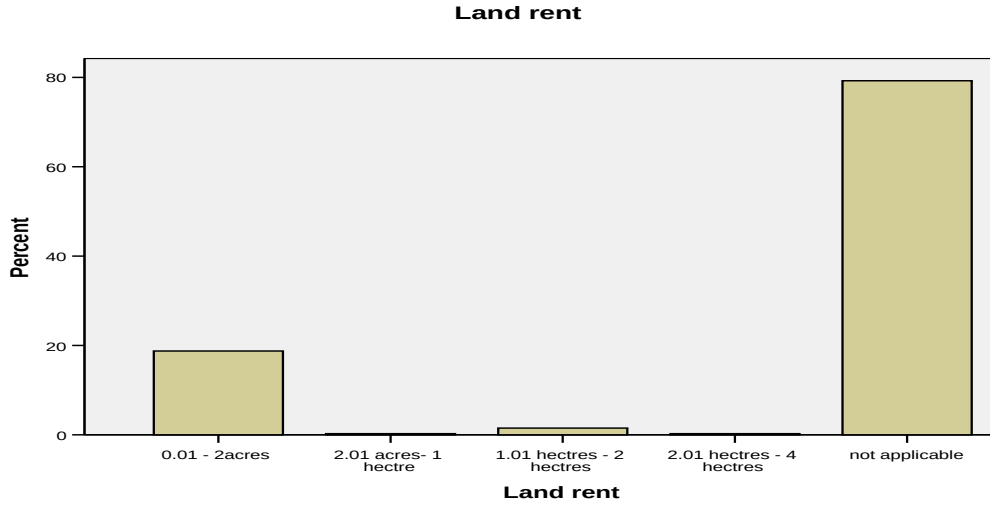

Figure 15: Land rented to the rice farmers by government

4.2.4. Unorganised seed industry

Many of the smallholder rice farmers who dominate the local rice industry lack access to good

quality seeds. Farmers related during a focused group discussion how this problem hinders participation in marketing linkages. Failure to plant high quality rice seeds does not only result in poor yields but also affects the quality of rice produced, thus resulting in red rice, rice with different shapes, which is difficult to mill and cook well, therefore, avoided by consumers.

4.2.5. High post-harvest losses

A constraint noted was lack of access to mechanization by the farmers resulting in post-harvest losses. Other reported causes of post-harvest loss include: rice paddy getting moldy during drying, rice shattering at harvesting and spilling of rice grain on the farm floor. The implication is that rice farmers lose huge amount of produce resulting in low productivity, thus uncompetitive for the contract markets.

4.3. Factors influencing the decision of smallholder rice farmers to participate in agricultural output markets.

4.3.1. Distance to market and Produce price

The study revealed that informal markets are more accessible than formal markets and that distance and produce price were the major determinants of market channel choice.

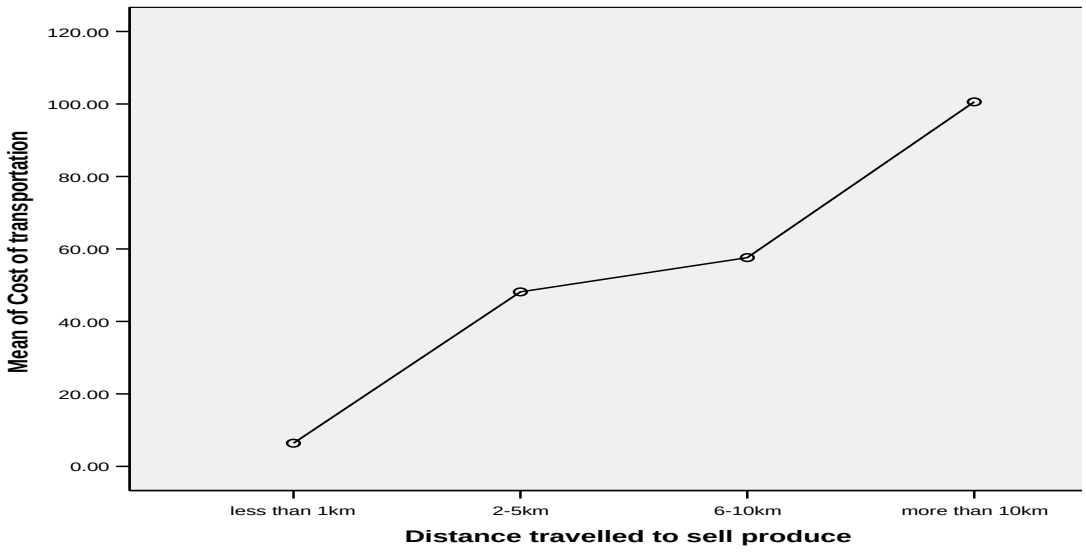

Figure 16: Graph showing average cost of transportation in Cedi versus distance travelled to sell produce

Because of the cost of transportation to high value markets, the farmers would rather sell their produce on the farm or the local markets. Majority of the farmers do this.

Figure 17: Distance travelled to sell rice produce

4.3.2. Exploitation

Farmers who think they are exploited by traders in the informal markets are more compelled to access the formal market. Exploitation indicated by farmers include low prices offered, obscurity in measurement, refusal of traders to use standard measurement and limited buyers. As a result of few buyers, there is no room for competition, therefore farmers accept price offered by the traders.

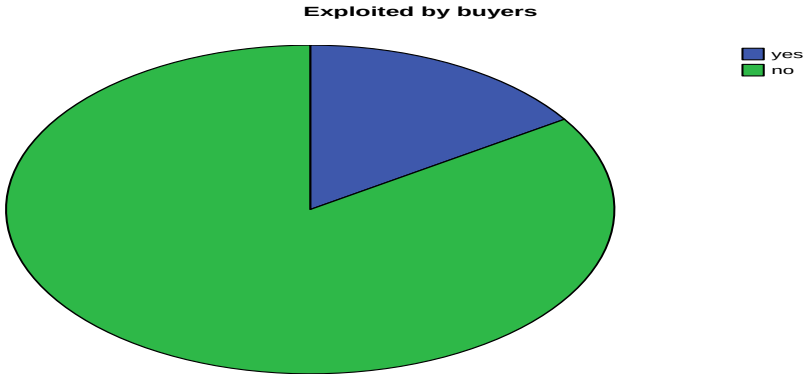

Figure 18: Proportion of farmers who complained they are being exploited by buyers

4.3.3. Share of rice produce sold and household size

Another factor influencing market access is the share of rice produce sold which also reflects the size of farm, household size and farm level. Those who sell nearly all the rice harvested are more likely to participate in agricultural output markets. Those who sold about half of the produce did so because the other half was consumed by family. The farmers who sold less than half of their produce, did so as a result of consumption by a larger family size and they are more likely to sell the remaining produce at home, to friends and neighbors. John Omiti *et al* (2009) have shown that extent of agricultural commercialization is related to proportion of produce sold.

4.3.4. Climate change and infestation of pests

Some of the poor harvests were due to the attack of pests such as birds and rats and in some cases low production was caused by flood incidence as a result of climate change. Amedi (2014) investigated the agronomic constraints among rice farmers in Ghana under the MiDA in the Hohoe Municipality and he identified five topmost constraints faced by farmers, which are: poor climatic conditions, high incidence of pests, poor yield, high cost of inputs and problem of poor milling equipment. This applies to this study as during a focused group discussion in Aveyime, some farmers revealed that they didn't harvest or had very poor harvest in the previous farming season as a result of flood incidence and pests attack, especially rats.

4.3.5. Farmer Based Organisation membership

Rice farmers found to be members of farmer based organizations had more access to market information and better pricing. Most contract farmers also belong to these farmer based organisations. Denkyiral *et al* (2016) have shown that 85.9% rice farmers who had access to credit were members of farmer based organization. Also Maspaitella (2015) revealed that education level of farmers, cultivated area, and farmers' membership of the farmer groups were some of the key determinants that had significant and positive effects on the farmers' decision about market channel participation.

Figure 19 has shown that most formers identified the source of their market information as coming from other farmers. This highlights the importance of collective action in linking smallholder farmer to markets.

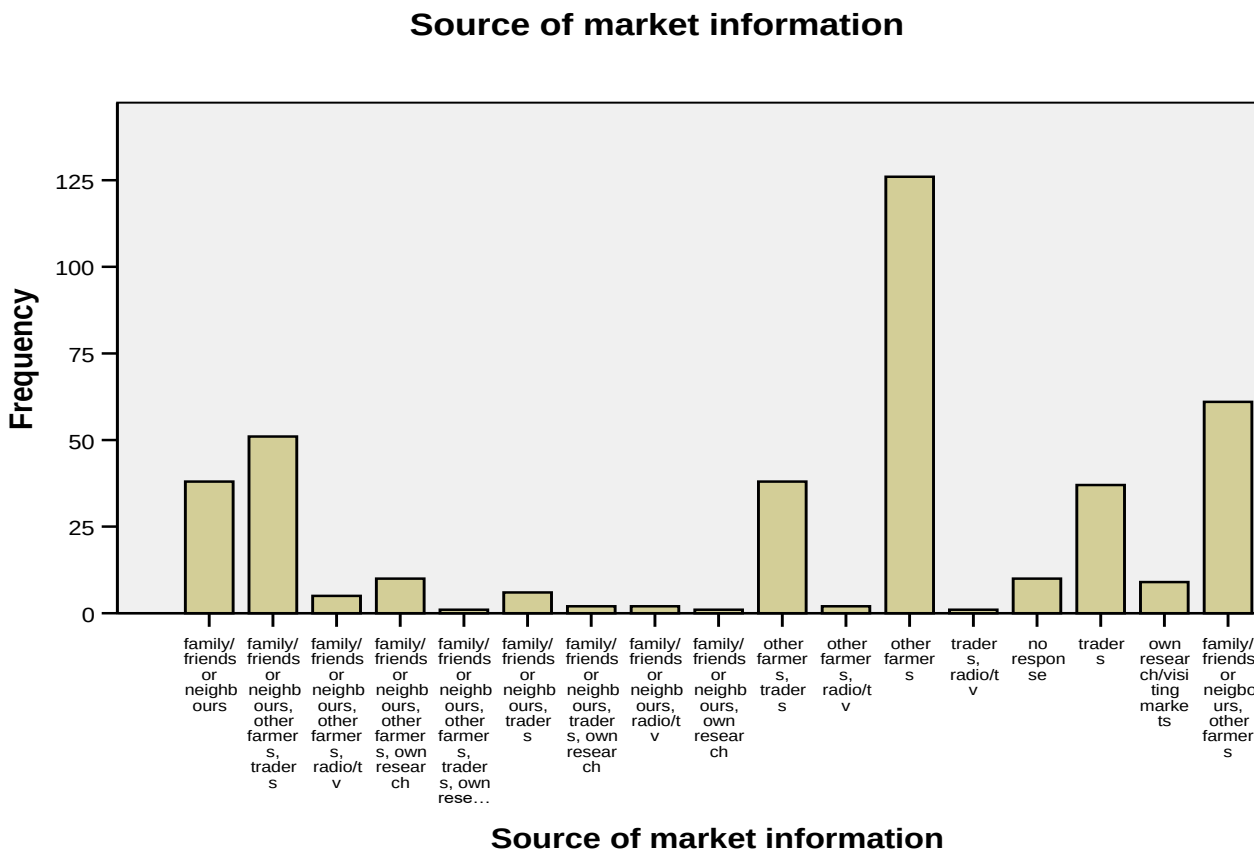

Figure 19: Various sources of market information identified by the rice farmers

4.3.6. Financial literacy

Generally, the rice farmers in this study have no culture of saving money. This is an important factor that could influence participation in high value markets. Agriprofocus (2011) stated that when farmers make good decisions on money matters they are more likely to succeed in their agricultural businesses. Besides, many organisations that provide loans to farmers will want to see that the farmer has the capacity to save before trusting him/her with their money.

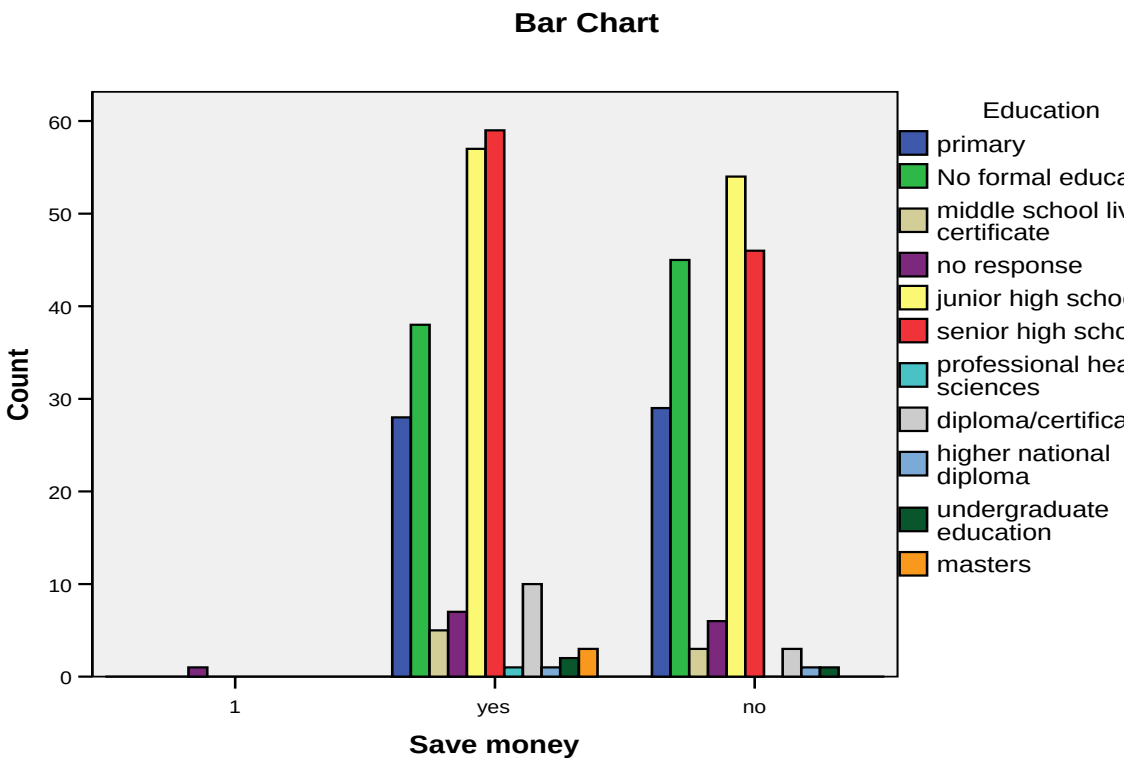

Figure 20: Habit of saving versus educational level

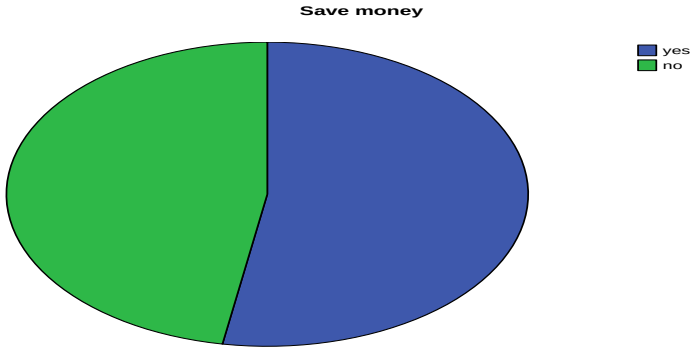

Figure 21: Proportion of the rice farmers who save money

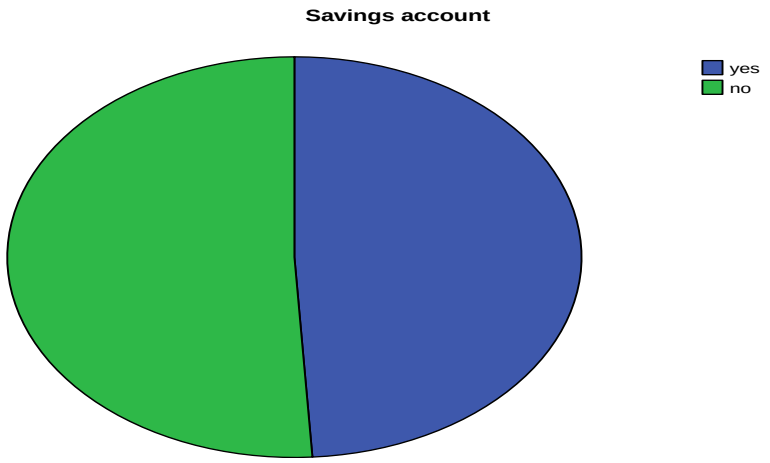

Figure 22: Proportion of rice farmers having a savings account with a financial institution

4.3.7. Inputs support to farmers by off-takers/marketers

Farmer based organisations or individual farmers who receive credit support from off-takers or contract buyers respond to output markets as indicated by some of the famers in the study. There is some bonding between them tying their total output to the contract buyer.

Chapter Five: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of findings

Smallholder rice farmers are faced with a lot of constraints that are seriously affecting productivity growth. These farmers are left to an unfair competition with imported rice in the market, limiting the socio-economic growth the Ghanaian rice sector has to offer. Mr. Debrah Samuel, the leader of Aveyime Rice Farmers Association said that investment in rice will help Ghana more than any other crop. It is not difficult to see the reason why, given the profound amount of money spent on importation of rice yearly. This report has been able to identify and assess these constraints as well as identify factors that influence participation in agricultural output markets. With the use of semi-structured questionnaire, focused group discussions and key informant interviews, the rice farmers revealed issues surrounding poor market performance. The major findings are therefore presented.

There are companies in Ghana trying to mitigate these issues, for example, in Aveyime, RMG Ghana Limited is helping link smallholder rice farmers to markets by purchasing produce at their farms, immediately after harvest. The Wienco Ghana Limited used to be active in the area until it partnered with RMG Concept Limited. The FAO is also trying to come in to assist. In the past a German company, GIZ collaborated with the Ghanaian government to link rice farmers at Aveyime to markets which didn't work out eventually due to the fact that after a series of bank transactions and 'procedures', the money that finally got to the rice farmers was small and couldn't make any meaningful change. Power supply has been a major challenge since the Electrical Company of Ghana cut off electricity from the area due to accumulated electricity bill. The China government came and supplied the farmers with electricity via solar power which still gives issues from time to time. Rice yield is difficult to calculate as the number of bags produced is not the actual yield. Most of the farmers keep part of the produce for domestic consumption. Those who help in harvesting and drying of rice are paid in kind. For example, a bucket of rice from each bag harvested is given to those who helped in harvesting. At Aveyime, farmers have to hire machines to harvest their crop.

Method of selling of rice produce at Weta/Afife is more flexible. Farmers could choose to sell to local traders within. About 15% of produce is sold this way. Then there are the itinerary traders

(brokers) from other regions of the country, especially from Kumasi. This represents 55% of produce sold. The third method is the contract aggregates (30%) who are contract farmers. The itinerary traders make use of the volumetric system (buckets) in measuring rice paddy while the contract companies make use of a weighing scale. Only the local traders process rice within the local community. The local traders sell the processed rice at the farm gates and on market days. The itinerary brokers and contract aggregates buy the rice paddy and transport to mills not in the locality for processing. Weta is known and most patronized for its rice quality, long and perfumed. Buyers tend to approach farmers with higher rice quality, so this keeps the farmers on their toes to produce quality rice. Each farm section has a farm pack (store) built by the Ghana Irrigation Development Authority, GIDA for farmers to store their rice produce.

The rice sector holds much more prospects to solve the unemployment issue in Ghana, but the youth seem to shy away from the agricultural sector with most of them seeing it as a retirement job. The previous bar chat on age statistics of rice farmers indicates only about 20 percent of the farmers fall within the ages of 18 and 35. This clearly shows that older men and women mostly practice agriculture, thus explaining the issue of food insecurity. Unfortunately, due to the poor nature of rural agriculture, the youth finds it unattractive and unrewarding. As a result, many opportunities that can be utilized for the growth of the economy are left unexplored.

The number of female rice farmers is so little compared to their male counterparts. This is as a result of limited access or control over land, education and other productive resources. In addition, there are challenges to women in particular in their position as wives and mothers. Women have been found to be extremely productive and multitasking. By giving women the same access as men to agricultural resources, there would be a boost in productivity growth. Education provides farmers with the capacity to compete effectively in a liberalised economy and shouldn't be taken for granted.

High transport costs, low prices and labour cost are constraints the famers complained about which had the highest frequency. As a result of limited buyers and lack of competition, farmers settle for low prices. And because of transaction costs involved in reaching formal markets, rice farmers prefer to sell at their comfort zone. Only a few who feel that they are being exploited by the traders who come to meet them at the farms try to access formal markets. Those who were

finally able to access the formal market confirmed that indeed they were being exploited especially through obscured means of measurement.

Extent of commercialization is tied to portion of produce sold and farm size. Flood incidence due to climate change caused a lot of loss to some famers. Some of them made no harvest at all in the past season as result of flood. Pests attack is another factor that affects the yield. One of the farmers narrated his unfortunate experience during one of the previous seasons, how he harvested only a bag of rice paddy from one acre of land as a result of rats' infestation. Usually an acre of land would produce 20 to 25 bags of paddy rice (90kg/bag). Only about three farmers complained of not being able to produce in the last season as a result of ill health and who had no other person to pass on the farming responsibility.

Farmer based organisations proved to be of tremendous help to its members especially when it came to training on healthy farm practices and new technology, easy and cheaper access to market information and better pricing. Other benefits include, access to credit and market research. Farmers who belonged to farmers' groups had testified that market access had improved over the year.

The importance of farmers' income security cannot be over emphasized. The result revealed the poor attitude of the farmers towards saving money. Saving is an essential financial discipline. Running a farm successfully relies on sound planning and financial management. Financial literacy will improve farmers' capability in terms of knowledge and skill and then help transition a farmer from subsistence to commercial farming.

The government has instituted projects such as the Ghana Agricultural Sector Investment Programme (GASIP), Ghana Commercial Agriculture Project (GCAP) and the West African Agricultural Productivity Programme (WAAPP). These projects have been able to make some progress in linking rice farmers to markets, though there is still much to be done.

5.2. Conclusion

Growing demand for agricultural products from Africa for food, feed, industry and fuel has become the foremost issue confronting the continent's agricultural sector today. This is premised on continued population and income growth, combined with urbanization, which is putting

pressure on current food supplies. Therefore, Ghana must invest in its rice sector which holds so much potential.

Local rice must reach quality standards that are close to those of imported rice. So as to reach those standards, improvements in rice processing are needed, but also improvements in production and harvesting operations.

Markets provide the opportunity to generate income, contributing to a reduction in poverty. Sustainable access to markets is required to guarantee smallholder rice farmers an increase in productivity, income and to lift them out of poverty.

5.3. Recommendations

The results of this study have identified several challenges faced by smallholder rice farmers and factors that influence the decision of these farmers to participate in agricultural output markets. This section recommends effective strategies to improve market access among small holder rice farmers in Ghana.

- The Ghanaian government can adopt a scheme whereby it would buy the farm produce directly from the farmers and sell it to the open market to create ready market for rice farmers and ensure better pricing (Anane, 2017).
- Post-harvest losses can be avoided when government provides adequate machinery and ready market where produce is sold immediately after harvest.
- The district assemblies need to come up with their own policies to link the school feeding programme to the rice business to ensure that caterers within rice farming localities purchase locally produced rice (Anane, 2017).
- Advertisement and public sensitization of the nutritional and economic benefits of patronizing local rice should be done zealously. Promotion activities are also needed to push products onto new markets.
- Farmers must make sure paddy produced must be devoid of stones and other foreign materials to enhance quality and attract buyers.

- More agribusiness firms should go into contracts with these rice farmers to ensure continuous and stable source of income for the smallholders.
- Construction of good roads by the government to enhance market access and productivity.
- Projects targeting women should focus on increasing women's participation in trainings and skill development. Opportunities should be created that would help women as well as men in market-led agricultural activities by, for example, bringing them into relevant discussions; attending to their concerns, needs and ambitions; and ensuring that those ready to enter markets have the links and tools they need to do so (ILRI, 2011).
- The youth should be encouraged to come together to form cooperative farming groups. The government can provide loans to young farmers coupled with training and monitoring to guide the farmers in utilizing the funds efficiently (Amengor, 2016).
- Farmers organizations should be created and strengthened where it is nonexistent to gain the critical bulk, better prices and achieve uniformity of price for rice produce.
- Climate-smart rice varieties should be developed with resilience to drought, flooding and extreme temperatures. Other traits such as weed tolerance, good milling, parboiling qualities and high yields are also preferred traits. The government should employ extension workers who would ensure even distribution of developed rice seeds to farmers, especially to the most vulnerable of them all.
- The agricultural census to take place in Ghana is one of the best things to happen to the agricultural sector according to Mr. Ebenezer Appiah, the manager of the Weta Irrigation Scheme. He said there would be accurate data which will put an end to the issue of 'ghost farmers'. "This is a problem, especially in fertilizer distribution", he added. He went ahead to say that indigenous development will aid the agricultural sector more than foreign aids.

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Appendices

Appendix 1: Research questionnaire

QUESTIONNAIRE

GPS Coordinates Latitude _____ Longitude_____ Address_____

Section A : Socio-demographic data		
1. Gender ☐Male ☐Female	2. Age _____	3. Tribe_____
4. Religion ☐Christianity ☐Islam ☐Traditional ☐Other(please specify)_____	5. District/Village_____ 7. Marital status ☐Never Married ☐ Married ☐ Widowed ☐ Divorced / Separated	6. Education ☐Primary ☐Junior High School ☐Senior High School ☐Professional Health Sciences ☐Diploma/Certificates ☐Higher National

8. What is your primary occupation? ☐Subsistence farming ☐Commercial farming ☐Wage employment ☐Trade and Commerce ☐Casual labour ☐Unemployed ☐Other (specify)_____ 10. Household size_____	9. What is your secondary occupation? ☐Subsistence farming ☐Commercial farming ☐Wage employment ☐Trade and Commerce ☐Casual labour ☐Unemployed ☐Other (specify)_____ 11. How much land do you own? _____(acres)	Diploma ☐Middle School Living Certificate ☐Undergraduate Education ☐Master's Diploma ☐Ph.D. ☐No formal education 12. How much land do you rent? _____(acres)

13. Kindly state your household total expenditure per month on the following items

s/n	Expenditure items	Amount of money spent per month(Cedi)
1.	Food	
2.	Clothing	
3.	Housing/accommodation	
4.	Water and sanitation	
5.	Health and medication	
6.	Education and school fees	
7.	Socials	
8.	Transportation	
9.	Gifts/tithes	
10.	Electricity and fueling	
11.	Waste disposal	
12.	Security	
13.	Communication (telephone/airtime)	
14.	Repairs and maintenance	
15.	Others (specify)	

14. Do you save money? ☐Yes ☐No	15. If yes, do you have a savings account with a financial institution? ☐Yes ☐No

Section B: Barriers to formal market participation	
1. Have you sold any agricultural produce during the last one year? ☐Yes ☐No	2. If No, what is the reason? ☐Don't produce enough ☐Lack of market ☐Not interested ☐Ill health

	☐flood incident
3. What share of your production do you and your family sell (and not consume yourselves)? ☐ Nearly everything ☐About half ☐Less than half	4. From where do you sell your produce? [Multiple response] ☐Home (after harvest) ☐Garden (before harvest) ☐Market ☐Store/ warehouse ☐field/farm ☐road side drying floor
5. If market, what type of market do you mostly sell your produce? ☐Village market ☐Assembly market ☐Wholesale market ☐Roadside retail market ☐ Other (specify)_____	6. To whom do you mostly sell your produce? ☐Friend / Neighbour ☐Traders (Individual) ☐Traders (Company) ☐Gov't institutions (i.e. sch., hosp. etc.) ☐Private institutions / NGOs ☐Other (specify)_____

7. Do you sell produce in ☐paddy ☐milled	8. What means of transport do you use to transport your produce to the market? ☐Foot ☐Bicycle ☐Motorcycle ☐Vehicle ☐tricycle ☐Other (specify)_____
9. What is your main source of market information? [Multiple response] ☐Family/friends or neighbours ☐Other Farmers ☐Traders ☐Radio / Television ☐Newspapers ☐LG Official ☐Billboards / posters ☐own research / visiting markets ☐=Other (specify) _____	1. Kindly state the costs you incur in the process of marketing your produce

S/n	Expenditure items	Cost of item(Cedi)
1	Hire of stores	
2	Communication(airtime)	
3	Market dues	
4	Transport	
5	Storage	
6	Accommodation	
7	Other(specify)	

11. For how long have you been a farmer (in years)? _____

12. If you own a land, how did you acquire it? ☐Bought from government ☐Hired/Rent ☐Inherited ☐Given by the government ☐Accessed a free land ☐ Bought from another owner ☐other (specify)_____	13. If hired how much do you pay per season? _____ Cedi 14. Do you pay land tax/water user fee? ☐Yes ☐ No

16. Indicate the problems you experience from acquiring labour. ☐No problem ☐High cost ☐Bureaucracy ☐other (specify)_____		15. If yes, how much? _____ Cedi	
17. Do you have a personal means of transportation? ☐Yes ☐No	18. What Distance did you travel to sell your produce? (approximate) ☐Less than 1km ☐2-5km ¨ ☐6-10km ☐more than 10km	19. Do you pay for market information ☐Yes ☐No	20. If yes, how much do you pay?_____ Cedi

Section C : Factors influencing participation in agricultural output markets

1. What type of agricultural produce did you sell? [multiple response]
☐Beans ☐Cassava ☐Chicken ☐Cocoa ☐Groundnuts ☐Maize ☐Milk ☐Millet ☐Fruits ☐Kola nuts ☐Rice ☐Yam ☐Sorghum ☐Soya Beans ☐Vegetables ☐Palm oil ☐Tomatoes ☐Tobacco ☐Cotton ☐Coconuts ☐Other (specify) _____

2. Quantity sold (unit / measurement)
☐Beans [...../.....] ☐Cassava [...../.....] ☐ Chicken [...../.....] ☐Cocoa[...../.....] ☐Groundnuts [...../.....]☐Maize [...../.....] ☐Milk [...../.....] ☐Millet [...../.....] ☐Fruits [...../.....] ☐Kola nuts[...../.....] ☐Rice [...../.....] ☐Yam [...../.....] ☐Sorghum [...../.....] ☐Soya Beans [...../.....] ☐Vegetables [...../.....] ☐Palm oil [...../.....] ☐Tomatoes [...../.....] ☐Tobacco [...../.....] ☐Cotton [...../.....] ☐Coconuts [...../.....] ☐Other (specify) [...../.....]

3. What price? (price/ unit)
☐Beans [...../.....] ☐Cassava [...../.....] ☐ Chicken [...../.....] ☐Cocoa[...../.....] ☐Groundnuts [...../.....]☐Maize [...../.....] ☐Milk [...../.....] ☐Millet [...../.....] ☐Fruits [...../.....] ☐Kola nuts[...../.....] ☐Rice [...../.....] ☐Yam [...../.....] ☐Sorghum [...../.....] ☐Soya Beans [...../.....] ☐Vegetables [...../.....] ☐Palm oil [...../.....] ☐Tomatoes [...../.....] ☐Tobacco [...../.....] ☐Cotton [...../.....] ☐Coconuts [...../.....] ☐Other (specify) [...../.....]

4. What crop is your most marketed produce? _____

5. Please specify the yield of your most marketed produce in the table below.

Year	2015	2016	2017
Harvest			
Acreages			
Yield			

6. Are you a contract farmer? ☐Yes ☐No

7. If yes, name of the company you have a contract with _____

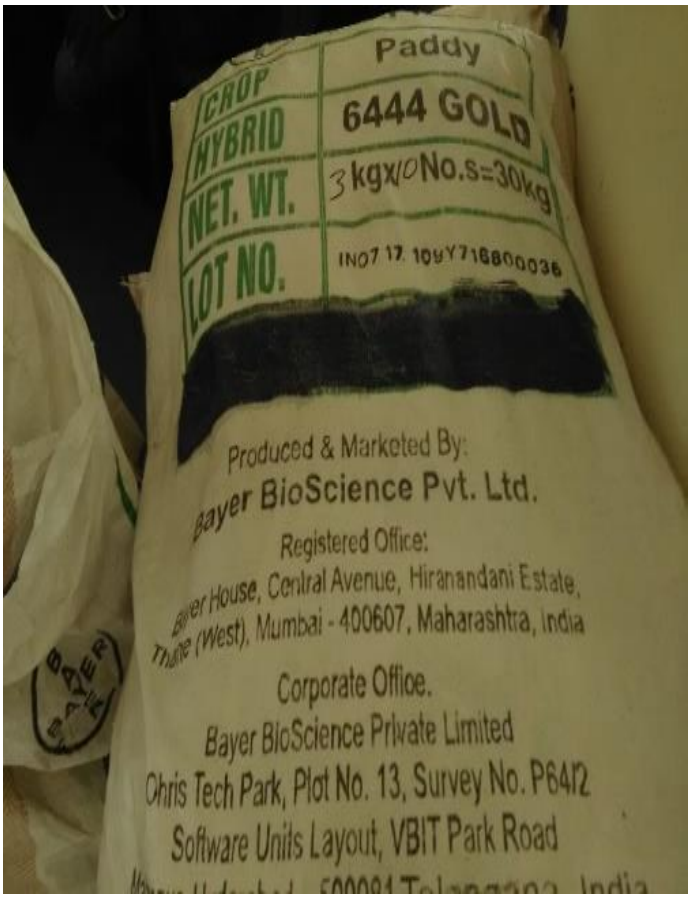
8. How do you rate the performance of the company in terms of honouring the contract?

9. Are you aware of any organisation / company helping farmers to access markets? ☐Yes ☐No

<table>
<tr><td colspan="2">☐Very Good ☐Good ☐Poor ☐Very Poor ☐Refused to answer</td><td></td></tr>
<tr><td colspan="2">10. If yes , name the organisation / companies _____</td><td>11. Are you currently a member of any farmers' group? ☐Yes ☐No</td></tr>
<tr><td colspan="2">12. If yes, name the group(s)_____</td><td>13. How long have you been a member of this group?
☐less than 1 year ☐1-3years ☐4-6 years ☐More than 6 years</td></tr>
<tr><td colspan="2">14. How has the group helped you to access markets for your agricultural produce? [multiple response]
☐Market information ☐Access to finance (credit) ☐Training ☐Market research ☐ Others (specify) _____</td><td>15. Do you think you are exploited by the buyers of your agricultural produce?
☐Yes ☐No</td></tr>
<tr><td colspan="2">17. Why do you think you are exploited? _____</td><td rowspan="2">16. If yes, who do you think exploits you most? [multiple response]
☐Friend / Neighbour ☐Traders (Individual) ☐Traders (Company) ☐Gov't institutions (i.e. sch., hosp. etc.) ☐Private institutions / NGOs ☐ Other (specify) _____.</td></tr>
<tr><td colspan="2">18. Do you own any asset? ☐Yes ☐No</td><td>19. If yes, what type of asset do you own? Please specify_____</td></tr>
<tr><td colspan="2">20. Do you have access to credit? ☐Yes ☐No</td><td rowspan="2">21. What constraints/challenges do you meet in the process of marketing your produce? [multiple response]
☐High transport costs ☐Poor communication (i.e. telephone network) ☐ High market dues ☐Long distances to the markets ☐Low prices offered ☐Lack of market information ☐ Poor storage facilities ☐Labour costs ☐Others (specify)_____</td></tr>
<tr><td>22. How do you rate market access of your produce during the last one year?
☐Improved ☐Same ☐Worsened ☐Not Applicable</td><td>23. What suggestions do you have to improve access to markets of you agricultural produce (give most important three)?_____</td></tr>
</table>

Appendix 2: Pictures from the field


Arize


Paddy
CROP
HYBRID
6444 GOLD
NET. WT.
3 kgx10 No.s=30kg
LOT NO.
IN07 17 10BY716800036
Produced & Marketed By:
Bayer BioScience Pvt. Ltd.
Registered Office:
Bayer House, Central Avenue, Hiranandani Estate,
Thane (West), Mumbai - 400607, Maharashtra, India
Corporate Office.
Bayer BioScience Private Limited
Chris Tech Park, Plot No. 13, Survey No. P6472
Software Units Layout, VBIT Park Road