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Willingness of Local Rice Producers to Supply and Participate in the Ghana School Feeding Programme Market: A Case Study of Selected Districts in Northern Ghana

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Abstract: The government of Ghana is not an exception with regards to putting in place measures that aim to improve the lives and livelihoods of its citizenry including the welfare of school children. In the context of the New Partnership for Africa Development (NEPAD's) Comprehensive African Development Programme (CADP), the Government of Ghana (GoG) set-up the Ghana School Feeding Programme (GSFP). Its concept of home grown school feeding addresses one of the United Nations (UN's) three pillars to fight hunger (United Nations, 2005). 'The government of Ghana was of the view that the if the School Feeding Programme was properly funded and implemented, the hunger, education and the food security and poverty landscape in Ghana will change for good (Government of Ghana, 2006). The study investigates the factors determining GSFP caterer's choice to buy local rice from farmers and farmers' factors influencing rice farmers to supply to the caterers. Purposive sampling was mainly used to select 120 respondents from GSFP beneficiary communities. The respondents were made of up 80 farmers and 40 GSFP caterers from the four selected districts. The study revealed that 46% % of rice farmers have access to the market created by the Ghana school Feeding Programme and about 48% of this group are able to sell their rice produce to the caterers of GSFP. However majority of the rice farmers are aware of the existence of the programme without any proper rules of engagement except that less than half of the farmers have been linked up with programme with the support of World Food Programme and the Netherlands Development Organisation (SNV), operating in the Northern Region. The major problem associated with rice farmers accessibility to the GSFP is caterers' unwillingness to buy from them even though majority of the farmers are aware of the programme and its basic objective of providing free meals to pupils in basic schools. Farmers indicated they would be willing to sell to the caterers if the prices offered by caterers are good or if they are able to produce enough to meet the demand of caterers on termly basis or the caterer is more willing to pay them in cash when they purchase their rice or other farm produce or better still be willing to pay on time for a period not more than one month when they buy on credit. The probit model was used to analyse the factors influencing rice farmers to supply to the programme on one hand and the factors affecting caterer's decision to purchase rice from the rice farmers on the other.

Keywords: School feeding; Accessibility; Willing; Programme; Factors; Probit Model.

1. Introduction

The government of Ghana is not an exception with regards to putting in place measures that aim to improve the lives and livelihoods of its citizenry including the welfare of school children. In the context of the New Partnership for Africa Development (NEPAD's) Comprehensive African Development Programme (CADP), the Government of Ghana (GoG) set-up the Ghana School Feeding Programme (GSFP). Its concept of home grown school feeding addresses one of the United Nations (UN's) three pillars to fight hunger (United Nations, 2005). 'The government of Ghana was of the view that the if the School Feeding Programme was properly funded and implemented, the hunger, education and the food security and poverty landscape in Ghana will change for good (Government of Ghana, 2006).

The GSFP operates under the umbrella of providing children in public primary schools and kindergartens in the poorest areas with one hot, nutritious meal per day using locally-grown foodstuffs. Local is conceptualised as involving the local community, the district and lastly, the national level. In the view of Tomlinson Mark (2007),

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Home Grown School Feeding (HGSF) aims to reach 50 million children of school age worldwide by 2015. The GSFP has as its immediate objectives to; reduce hunger and malnutrition, to increase school enrolment, attendance and retention and to boost domestic food production which ultimately will lead to a robust and resilient local economy.

In a systematic review of literature on accessing the effectiveness of school feeding programmes in achieving educational, nutritional and agricultural development goals, [Lawson \(2012\)](#) did indicate that such programmes are targeted towards populations that are food insecure and reside in areas with high concentrations of families from low socio-economic status or towards schools that face poor attendance and enrolment of students.

In a case study of Osun State Home Grown School Feeding and Health Programme (OSHGSF) initiated in 2004, [Partnership for Child Development \(2010\)](#) revealed that the benefits of the programme among other things include, improved participation and learning for school children.

Besides directly benefiting pre-school and primary school children in public schools, rural farmers and women within the programme's operational area do benefit as well. The GSFP is to provide ready market for locally grown foodstuffs by expending 80% feeding expenditure on local foodstuffs to feed the children. In addition, women from the communities are expected to be employed as cooks, caterers and suppliers. The sum total is expected to result in wealth creation at rural household and community level and the overall effect is to boost the local economy.

According to the reports there have been limited supports in terms of credits and inputs to farmers to produce and access the programme's market. Procurement of food from local communities could boost the patronage of locally products including rice. This is however under serious threat from importation. Rice for instance is the first cereal in Ghana accounting for 58% of cereal imports ([Coalition for African Rice Development, 2010](#)). Purchase of locally produced rice for instance could be an incentive to local rice producers. As a result of the above problems the research intends to examine the willingness of local rice producers to supply the Ghana School Feeding Programme (GSFP) with rice.

2. Literature Review

2.1. Importance of Rice in Ghana and in the GSFP

Urbanization and changing consumer preferences are the main drivers of significant growth in per capita rice consumption in Ghana as urban populations consume significantly more rice than rural populations ([Millenium Development Authority, 2011](#)). Rice constitutes a major staple on GSFP menu. It is normally cooked 3 times a week for the pupils ([GSFP/AOP, 2010](#)) Since the basic objective of the GSFP is to reduce malnutrition and boost domestic food production among others, it is significant to focus procurement of rice domestically because the rice grown in the country especially in the north (more of it being brown rice) provides more nutrition than foreign white rice. Local rice (especially brown rice) has been reported to be nutritionally better than foreign (white rice). According to [International Nutrition Foundation \(2011\)](#), brown rice provides more fibre and naturally occurring vitamins and minerals than white rice Brown rice contains antioxidants. It also contains important vitamins such as vitamin B, folic acid, niacin and riboflavin. These vitamins help the body use the energy provided by the foods we eat, as well as helping it use dietary protein to build and maintain cells and tissue, People who consume five or more servings of white rice every week had a greater risk of developing type 2 diabetes ([International Nutrition Foundation, 2011](#)).

[USAID \(2009\)](#) cites (JICA, 2007) and reported that Ghana's rice production estimates range from 200,000 to 300,000 MT of paddy or roughly 120,000 to 180,000 MT of milled rice, the bulk of which comes from the Upper East, Northern and Volta Regions. Rainfall remains the greatest driver of production variance. Rice is the second most important cereal next to maize in Ghana and is fast becoming a cash crop to many rice farmers ([Asare, 2010](#)).

2.2. School Feeding Programmes and Agricultural Productivity

Food for Education (FFE) programmes traditionally have been thought of as school safety net interventions to achieve educational and nutritional goals. In recent times however, they have been thought of as possible tools for agricultural development ([Sumberg and Rachel, 2011](#)). Over the last five years, Home Grown School Feeding (HGSF) as an attempt to actively and explicitly link agricultural development with school feeding has received increasing attention from international agencies ([Sanchez et al., 2005](#)). Policy makers for instance the Comprehensive Africa Agricultural Development Programme (CAADP), national governments, academics and practitioners have co-funded some of these activities as well as other closely related initiatives such as the WFP's Purchase for Progress (P4). The 2011 funded USAID, Brazil and Mozambique "Trilateral cooperation-food security project" to design and promote the "Alive School" programme in Mozambique is an example of School feeding programme (SFP) designed on the concept of "Home Grown Feeding (HGSF) whereby food will directly be purchased from the local farming community to foster local economic development ([Lawson, 2012](#)). In the Ghanaian context for instance, the manner in which these goals link together can be seen in the proposed Ghana School Feeding Programme (GSFP) which has a number of strategies designed to supply food for Food for Education (FFE) programmes from purchases and procurement of locally produced food while enhancing the domestic production and demand for food ([Ahmed, 2004](#)).

Traditionally, the procurement of food for FFE programmes usually came from foreign food aid. A classic example is Sorghum and Cotton seeds oil from the United States Agency for International Development (USAID) in collaboration with the Catholic Relief Services (CRS) and the World Food Programme (WFP) for Ghanaian students in the 1990s. These amongst others targeted increasing school enrolments and retention rates as well as encouraging

girls to go to school. Notwithstanding these intentions, there are some scholars who vehemently believe FFE programmes relying on imported food supplies have their dark sides. One of such critics is

Barrett (2006) who is of the view that the distribution of food aid brings a lot of distortions to the local markets, which often results in lower prices and provide disincentives to local producers. In recent times however, a number of interventions have been put in place as substitutes to food aid. One of such developments is the World Food Programme's (WFP's) Purchase for Progress (P4P) initiative which looks to Home Grown School Feeding (HGSF) as a tool for agricultural development. The United Nations Hunger Task Force (UNHTF) did make seven recommendations on how to achieve the Millennium Development Goals (MDGs). One of the strategies identified by the UNHTF to achieve this goal is the implementation of the School Feeding Programme (SFP) with locally produced foods rather than imported food (aid). The Task Force expects that the implementation of the SFPs can stimulate the market demand for locally produced foods.

Ghana has as one of its School Feeding Programme (SFP) fundamental aims to contribute to food security in the country as a whole. According to the programme document, this long term objective is to be achieved through the purchase of locally grown food stuffs as a way of boosting food production at the community level (GSFP/AOP, 2011). Accordingly, 80% of the feeding cost shall be spent in the local economy (that is food stuffs for the Programme shall be purchased from local farmers). A report by SNV (2008) however has it that it was only in the Eastern region that more than 20% of food was bought from local farmers as compared to less than 20% of locally purchased food from the other regions.

The proposed Home Grown School Feeding is not without criticisms. There are some that have questioned the production and supply capabilities of communities where beneficiary schools are located. In Kenya for instance, the United States Department of Agriculture (USDA Foreign Agricultural Service, 2009) reports that rural communities in the ASALS do not have the production and supply capability to support a potentially overwhelming demand for food. In a research funded by the Gates foundation, the USDA stated that "without projects or collaboration with other partners to bolster the supply side of Home Grown School Feeding (HGSF) programme, the project as currently implemented is a local procurement project and not a local production project. The project schools in ASALS are characterised by limited production capacity with 60-70% of the food imported from outside the district" (USDA Foreign Agricultural Service, 2009). The Kenyan Ministry of Food and Agriculture reports that rural farmers are usually located far away from key agricultural inputs such as water, fertilizer, pesticides and seed, lack adequate large-scale storage facilities and have little access to affordable bank credit and are unable to efficiently transport bank harvest. (Langer Nica, 2011). It therefore means that the production and supply capabilities of such communities will be limited in a way thereby having an impact on food supplies for School Feeding Programmes (SFPs).

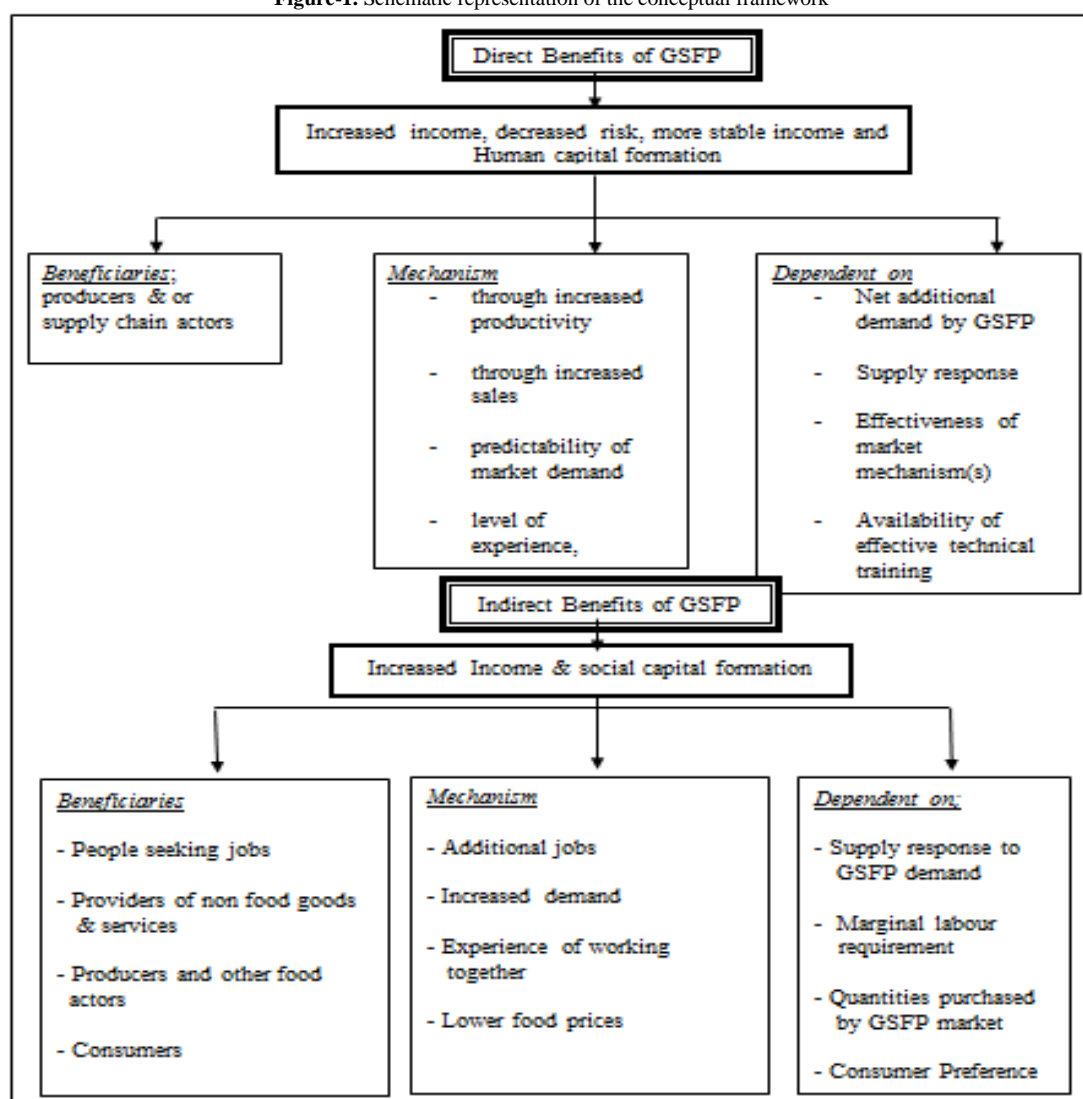
2.3. Conceptualizing the nexus between School Feeding Programmes (SFPs) and Agricultural Development

The study adopts the proposed framework by Sumberg and Rachel (2011) as a guide to explaining the link between Food for Education (FFE) and Agricultural Development. Until recently, Food for Education Programmes (FFE) were seen as interventions for achieving educational and nutritional goals. These programmes are now considered as potential tools for boosting agricultural development (Sumberg and Rachel, 2011). The two have a link in the regard of the proposal that food supplies should be procured from the local communities where the beneficiary schools are located (Ahmed, 2004).

The theory for linking FFE to agricultural development begins with a demand shift as the initial kick to the local economy in a HGSF system, as the food previously supplied to the schools came from donors now must be filled by local producers. The demand is more predictable for producers, which in turn decreases their risk, allowing for more development of local markets (Sumberg and Rachel, 2011). Increased demand for locally produced food was seen in the case of Indonesia SFP during the 1990s. In a survey conducted after the economic crises in 1997-98, 72% of surveyed farmers reported having more opportunities to sell their produce as a result of the purchases by the School Feeding Programme Studdart *et al.* (2004) as reported by Sabates-Wheeler *et al.* (2009)). Figure 1 presents the schematic conceptual framework which apparently shows potential benefits of the Ghana School Feeding Programme to agricultural and economic development. The model proposes that public sector can be used to stimulate a 'local' supply response which in turn for instance through new wages pumped into the economy create new demand for 'local' goods and services. In theory, as this cycle begins to turn, it becomes increasing self-sustaining.

The model makes us to understand that there are both direct and indirect benefits to targeted groups and others

Figure-1. Schematic representation of the conceptual framework



Source: Adopted from Sumberg and Rachel (2011)

Purchasing foodstuffs from the local economy will definitely have a direct impact on local farmers by boosting their capital base. To Ward and Lewis (2002), localisation can be seen as a process of “plugging the leaks” reducing the outflow of money from the local area. An increase in farmers’ income will indirectly contribute to improvement in farming techniques and methods through the purchase of fertilizer, insecticides and other farm implements. The long-term effect will be increased household food productivity thereby enhancing household food security. Purchasing from local communities will ensure that fresh vegetables are procured to meet the dietary needs of the school children.

Notwithstanding the theoretical justification for HGSF and the potential role it can play in agricultural development, there are some limitations in implementing the model. One, locally produced food needs to be received, stored and cooked which all require a school or district or a nation-wide infrastructure and logistical support system to be successful. Two, there could potentially be a mismatch between demand and supply of food needed for SFPs. To be able to rely on locally produced food as a source of food in SFP, the farmers will need to supply food consistently throughout the school year. The seasonality of local food production in the northern region of Ghana is a constraint in implementing the HGSF model.

A number of commentators have already noted that if not handled carefully, the process of establishing this virtuous cycle through HGSF could potentially result in negative impacts. For example, if a programme’s demand for food is large relative to the size of the “local” market and there is no immediate supply response, prices could be driven up with negative consequences for poor people who rely on the same market for food provisioning.

2.4. Factors Influencing Food Providers to Procure Foodstuffs from Farmers

A Home Grown School Feeding model is a theory that posits that by using a structured demand to make public procurement, the local economy will be stimulated (Baraji and Tadelis, 2001).

A farmers’ market is a physical retail market featuring foodstuff sold directly by farmers to consumers. Farmer organisation has been identified as a key factor in enhancing farmers’ access to markets. According to Hellin *et al.*

(2007) individual farmers capture a very small percentage of the final price paid by consumers. The act of farmers selling their farm produce directly to consumers is a value chain issue. Every enterprise is positioned in a value chain. In a narrow sense Porter (1985) defined value chain as all activities perform within a firm to transform raw materials into desired product which later will be delivered to consumers.

The variables which clearly define caterers' willingness to buy rice from local farmers are inherent in the rice value chain and the principles of demand and supply. Demand reflects both the willingness and ability to buy goods and services. Consumers' taste, their incomes, prices and availability of other goods and peoples expectation (about taste, incomes and prices) determine what individuals are willing and able to buy (Ziegler and Linda, 1997).

With the Ghana School Feeding programme the procurement process is highly decentralized and to a large extent engages with the private sector. Cash transfers are made from the District Assemblies under the supervision of the District Implementation Committees (DICs) to caterers (GSFP/AOP, 2010). According to the GSFP Annual Operating Plan for 2010 each caterer is responsible for procuring food, preparing school meals and distributing food to school pupils. The caterers are not restricted or guided in their procurement.

Following analysis of the rice value chain and the concepts of demand and supply, factors which are likely to influence caterers' decision to buy rice produce directly from any farmer for the School Feeding Programme include price, distance from GSFP caterer or school premises and the farmer, availability of storage and credit facilities, quantity of rice farmer can supply and the cost of processing paddy rice. The variables were carefully selected following the work. Shaibu and Al-Hassan (2014) and also from the conceptual framework of GSFP and other school feeding programmes. For example Shaibu and Al-Hassan (2014) argued that the farm gate price of paddy rice, and availability of storage facilities for the caterers were significant variables in influencing the caterers to purchase from farmers than other sources.

2.5. Effect of Access to Ghana School Feeding Programme on Output of Rice Farmers

Project evaluation or assessment is a systematic method for collecting, analyzing and using information to answer questions about projects, policies and programmes particularly about their effectiveness and efficiency (Queen's Land Treasury, 1997). There are several impact assessment models but since one of the research objectives was to analyse the GSFP on output, a production model which explains the relationship between output and inputs was justified. Other impact assessment models such as the difference-in-indifference, Propensity Score Matching (PSM), Instrumental Variables Methods, and the Heckman's Method were criticized respectively on the grounds of large data requirement for the PSM (Shadish *et al.*, 2002), difficulty in finding the instrument for the Instrumental Method (Basu *et al.*, 2007) and the imposition of a strong assumption of linearity for the Heckman Method (Briggs, 2004).

The transcendental logarithmic production function commonly known as the translog is an attractive and flexible model. It has both linear and quadratic terms with the ability of using more than two factor inputs as independent variables. With reference to agricultural production land, labour, fertilizer insecticides are the main input variables which determine output. This is evident in the works of Greene (1980), Christensen *et al.* (1973) and Onumah and Ackwah (2011). More over the translog allows the introduction of dummy variables to capture the difference in production between two groups of farmers (Tzouvelekas, 2010).

The selection of variables for the this investigation was carefully done from the above literature especially when access to the Ghana School Feeding Programme which was the main subject of interest for the study was used as dummy variable in the production model.

2.6. Willingness of Local Farmers to Supply or Participate in the GSFP Market

Generally speaking the supply of a commodity refers to the willingness and ability of producers to make available the commodity within a particular period. However the quantity of a good or service sellers are willing to sell in a market is affected by a number of factors (Hyman, 1997). Some of these include price of the commodity, prices of inputs, expectation about future prices, weather conditions and the number of sellers of the commodity. For agricultural commodities, supply is basically determined by weather conditions, inputs including land and labour and technology among others and the level of market participation by farmers (Newton Nyairo and Stefan Bäckman, 2009).

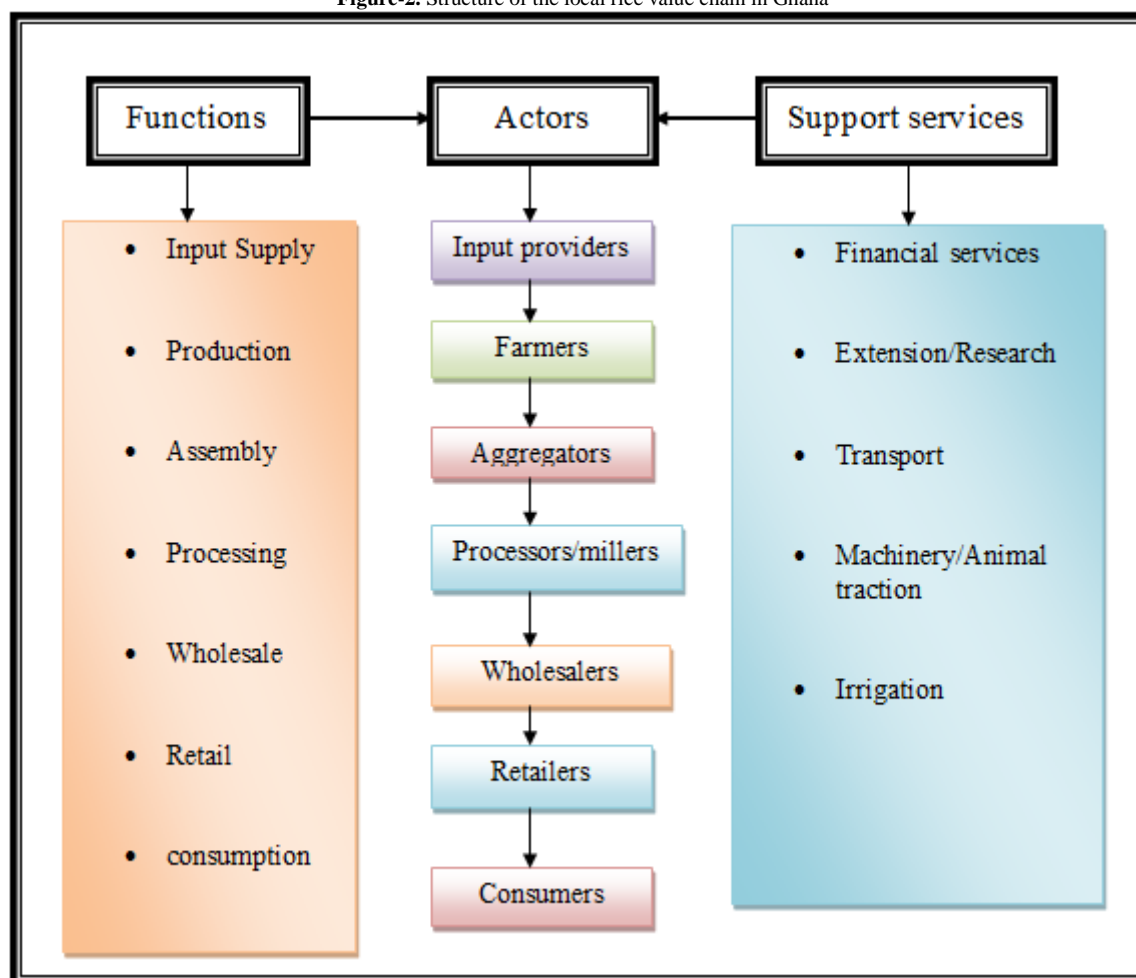
Additionally farmers' marketing decisions are affected by certain factors including farm size access to information and expected income from participating in a market. Participation in markets for certified products can represent a good income generation for smallholder farmers in developing countries (Le *et al.*, 2011) Empirical evidence for the selection of variables to measure the willingness of local farmers to supply rice to the Ghana School Feeding Programme is also found in the work Masuka *et al.* (2014) in their analysis of 'Factors affecting marketing decisions among maize small-holder farmers in Swaziland.

2.7. Rice Value Chain Analysis and GSFP Procurement

According to USAID (2009) analysis of the rice value chain, there two channels of the rice industry in Ghana; the local rice channel and the imported rice channels. In the local rice channel, the key actors include, producers, aggregators, processors, millers, transport service providers, input suppliers and support service providers whereas the exported channels have rice importers, wholesalers, retailers and regulatory bodies.

In the local industry aggregators are central to the value chain. In the view of Asare (2010) Farmers prefer to sell their paddy rice to aggregators because they provide them with seeds and credit. Processors also prefer to buy from aggregators because the quality and reasonable quantities of rice are guaranteed. Although there are number of Farmer Based organizations (FBOs) whose members produce rice, these FBOs are weak and mainly informal groups that come together to take advantage of donor resource. As a result of mistrust between FBO members and their leaders, most members prefer to sell their rice produce individually. Analysis of the local industry is summarized in Figure 2 below. Starting from input supply, most inputs for rice production are imported. These include fertilizers and pesticides that are marketed by wholesale input distributors like Wience Ghana Ltd, YARA and others. Rice cultivation is done by smallholder farmers and larger holding sizes of typical rain fed are dominated by farmers in the northern regions. Aggregators collect paddy rice after harvest from smallholder farmers and sell to rice processors. This aggregator have no formal contract with the farmers but often provide seeds and credit and order to secure the paddy rice at harvest. Processors either buy rice from either aggregators or farmers and parboil or mill it manually; local millers form a part of the processing group. They may also buy paddy from some farmers for milling. Wholesalers and retailers may buy the milled rice and sell to consumers.

Figure-2. Structure of the local rice value chain in Ghana



Source: adopted from USAID (2008) - Global Food Security Response- Case Study – Ghana

Following the above analysis of the Ghana rice value chain, the study conceptualized the GSFP model of the chain and identified the key actors in the rice value. These actors include the rice farmers, caterers, local millers wholesalers and retailers. From the survey data the caterer is at the center of chain buying both paddy and milled rice from farmer at farm gate prices and the rest of the actors taking certain factors into consideration; for example price, availability of the rice produce, proximity and early disbursement of feeding bursaries by GSFP secretariat are the main factors influencing the choice caterers' rice supplies. All the actors with the exception of retailers who sell only milled rice get supplies from the farmer.

3. Research Methodology

3.1. Profile of the Study Area

The study was carried out in four districts of the northern region of Ghana namely Tamale Metropolis, East Gonja District, Savelugu-Nanton Municipality and Karaga District. The Northern Region, which occupies an area of about 70,383 square kilometres, is the largest region in Ghana in terms of land area. It shares boundaries with the

Upper East and the Upper West Regions to the north, the Brong Ahafo and the Volta Regions to the south, and two neighbouring countries, the Republic of Togo to the east, and La Cote d' Ivoire to the west.

The land is mostly low lying except in the north-eastern corner with the Gambaga escarpment and along the western corridor. The region is drained by the Black and white Volta and their tributaries, Rivers Nasia, Daka. The climate of the region is relatively dry, with a single rainy season that begins in May and ends in October.

3.1.1. Profile of the Tamale Metropolis

The Tamale metropolitan Assembly is located at the centre of the northern region. It lies between latitude 9.16° and 9.34° N and Longitude 00.36° and 00.57° (Tamale Metropolitan Assembly, 2013). Its altitude is about 180 M above sea level. The Metropolis has Tamale as its administrative capital. It shares borders with the Savelugu/Nanton municipality to the North, Mion District to the East, Tolon District to the West and East Gonja District to the West. It has a population in the range of between 350,000 to 450,000 people even though the 2000 Population and Housing Census (PHC) put the population of the Metropolis at 293,881 (Tamale Metropolitan Assembly, 2013). Apart from Metropolitan Tamale where there is ethnic diversity, almost all people in the surrounding villages are Dagombas. Islam is the predominant religion in the Metropolis. An estimated 60% of the population is engaged in agricultural activities. Major cultivated crops include maize, rice, yam, sorghum, millet, cowpea and groundnuts. Tamale Metropolis has the greatest number of school pupils fed by GSFP and also the highest rice producing district in 2010 (Ministry of Food and Agriculture, 2011).

3.1.2. Profile of the Savelugu-Nanton Municipality

Savelugu/Nanton District is one of the eighteen administrative districts of the Northern Region. It was established by PNDC Law 207 under the Legislative Instrument of 1988. It was carved out of the then Western Dagomba District Council, which included Tolon/Kumbungu and Tamale Metropolitan Assembly. The District is located in the Northern Region of Ghana. It shares boundaries with West Mamprusi in the North, Karaga to the East, Tolon/Kumbungu in the West and Tamale Metropolitan Assembly to the South. The District's total land area is 1790.70 sq. km (Savelugu-Nanton Municipal Assembly, 2013). The 2000 Population and Housing Census (PHC) placed the Municipal's population at 91, 415 (Savelugu-Nanton Municipal Assembly, 2013). With a growth rate of 3%, the Municipal's population was projected in March 2006 to be about 109,442. Savelugu is the capital of the municipality. The Municipal Assembly remains an agro-based economy engaging about 97% of the labour force; majority of who produce crops on subsistence basis. Income levels are extremely low as majority of the produce depend on rain-fed agriculture. Agro-processing is largely done by traditional methods and on very small-scale basis. There are however efforts by external support to upgrade technologies especially for women in the processing of sheanut, groundnuts, rice, cotton ginnery and soap manufacturing.

3.1.3. Profile of the East Gonja District

East Gonja District is located at the South-eastern section of the Northern Region of Ghana. The district lies between Latitude 8.0° N & 9.29° N and, Longitude 0.29° E and 1.26° W (East Gonja District Assembly, 2013). It shares boundaries with Yendi municipal and Tamale metropolitan to the North, Central Gonja District to the West, Kpandai Districts to the East, and the Volta and Brong Ahafo Regions to the South. The administrative capital is Salaga. The district is endowed with rich natural resources and tourism. The 2000 Population and Housing Census put the population of the East Gonja District at 174,500 (Special Reports) and it is currently estimated at 197,932 using an annual rate of growth 2.1% per annum (East Gonja District Assembly, 2013). The income levels are generally low and irregular over the year. The greater proportion of the people is either engaged in subsistence agriculture, small-scale industries or petty trade. Incomes of this category of people are usually irregular or seasonal. Islam predominates in the East Gonja District. Traditionally, Salaga was a world renowned centre of excellence in Islamic education and an important slave market. The town has a long tradition of Islamic schools, with learned Islamic scholars mentoring a large number of students from across West Africa and the Sahel.

3.1.4. Profile of the Karaga District

Karaga District is one of the twenty six (26) districts in the Northern Region. The District is located in the North-Eastern corridor of the Northern Region, roughly between latitudes $9^{\circ}30'$ and $10^{\circ}30'$ North and longitudes 0° and $45'$ West (Karaga District Assembly, 2013). Karaga is the administrative capital. It shares boundaries with four districts in the Northern Region, West Mamprusi District and East Mamprusi District to the North, Savelugu/Nanton Municipal to the West and Gushiegu (the mother district) to the east. Karaga the district capital is 24km from Gushegu and 94km from Tamale, the northern regional capital. The 2000 Population and Housing Census (PHC) estimate the district's population to be 62,719 (Karaga District Assembly, 2013). Mixed farming is the prevailing farming system. Besides crop cultivation, the average family raises a variety of livestock and local poultry. With regards to crop production, semi-permanent to shifting cultivation is practiced. In Karaga, rice is the second largest crop after soya beans since 2000 to 2010 (Ministry of Food and Agriculture, 2011).

3.2. Data Sources

Data for the study was drawn from both primary and secondary sources. Secondary data comprising statistics on the Ghana School Feeding Programme (GSFP) and rice production was obtained from the School Feeding

Programme coordinators and the Food and Agriculture Organisation Department at each of the Metropolitan, Municipal and District Assemblies where the study was carried out. Other sources of secondary data include; books, articles, journals and reports amongst others. Primary data was obtained from the field through focus Group Discussion and interviews.

3.3. Sample Size Determination

Data available from the Northern Regional Secretariat of the Ghana School Feeding programme indicates that as at 2015, the numbers of caterers engaged in the study were as follows:

Tamale Metropolis 34

Karaga District 28

East Gonja 34

Savelugu District 38

The sample size for both caterers and rice farmers in the selected districts was calculated using the Snedecor and Cochran (1998) formula for a point estimate sample;

The sample size would therefore be;

$$n = \frac{z^2 pq}{d^2} \dots\dots\dots (1)$$

Where n= sample size, z= Z- score of a 95% confidence level of the study equivalent to 1.96, p= estimated number of rice farmers or GSFP caterers, q= estimated proportion of rice farmers whose products are not bought by the GSFP caterers (1p) d= margin of error of the study thus 100% - 95% = 5% in this study

Therefore the sample size =

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{0.05^2}$$

$$n = 120$$

This implies that 120 respondents will be involved in this study. A total of 80 rice farmers will be interviewed whilst 40 caterers of the GSFP will also be interviewed.

3.4. Sampling Techniques/Procedures

Simple random sampling technique was used initially in the selection of the GSFP beneficiary communities. This was to ensure that each beneficiary community has an equal chance of being selected. Within each beneficiary community, snow-ball sampling was used in reaching out to local rice producers. In each community, the rice producers were selected using snowball sampling. This was to enable the study reach out to other rice farmers through the identified or targeted ones.

Purposive sampling was used in selecting 10 caterers from each of the four research communities giving us a total sample size of 40.

3.5. Data Collection Techniques

Focus group discussions and survey questionnaire were the main techniques of eliciting data from the respondents. Data elicitation started with a focus group discussion convened in one of the research areas. A focus group is 'carefully planned discussion designed to obtain perception on a defined area of interest in a permissive non-threatening environment (Krueger, 1988).

The reason for adopting this technique according Dakurah (2012), is to give room for further revision of the questions through insights that might come from the discussion. The focus group with a membership of 10 involved separate sessions for men and women. The FGDs tried to explore factors that influence the purchase of rice from local rice producers by caterers of the GSFP and the willingness of rice producers to sell their produce to the caterers. The FGD sessions were recorded with a tape recorder and transcribed into themes.

3.6. Model Specifications

3.6.1. Analysis of Accessibility of Rice Farmers to the Ghana School Feeding Programme

In analyzing farmers' accessibility to the GSFP market, descriptive statistics were used and farmers were categorized into those who have had access to GSFP market either directly or indirectly through local millers and those who have not. The numbers of farmers in respect of each group were identified. Frequency tables cross tabulation and histograms were used to analyse the data. Farmers accessibility were measured using variables such as, farmers' awareness of GSFP programme, residential status of farmers in GSFP Community, farmers' direct sales of paddy rice to caterers, the number offers made, the number of farmers selling rice to caterers whether a farmer was a member of a Farmer Based Organisation (FBO) and farmers were engaged with the GSFP. A comparison discussion was made on how farmers were related to the Ghana School Feeding Programme.

3.6.2. Analysis of Factors Determining the Willingness of GSFP Caterers to Buy Rice from Local Farmers

The probit regression model was employed to quantify the factors that determine the willingness of GSFP caterers to buy local rice from farmers due to the dichotomous nature of the dependent variable. The justification for the use of the probit model over the logit model is as a result of its ability to constrain the utility value of the decision to buy variable to lie within 0 and 1, and its ability to resolve the problem of heteroscedasticity (Asante *et al.*, 2011).

Willingness to buy from local farmers (WB) was captured as a dummy variable with the value of 1 assigned to a caterer who is willing to buy and 0 for otherwise. Following from Greene (2003), the binary probit for the two choice models can be written as;

$$Y_i = \begin{cases} 1 & \text{if } Y_i > Y_0 \\ 0 & \text{if } Y_i \leq 0 \end{cases} \quad (1)$$

The probit model is given by:

$$P(Y=1|X) = \frac{1}{2\pi} \int_{-\infty}^{\infty} e^{-\frac{1}{2}(XB)^2} dx \quad (2)$$

Where:

$$X = (1, x_{1i}, x_{2i}, \dots, x_{ki}) \quad (3)$$

$$\beta' = (\beta_0, \beta_1, \dots, \beta_k) \quad (4)$$

The empirical model for determining the willingness of GSFP Caterers to buy rice from local farmers in this study is specified in equation (5) as follows;

$$WB_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \epsilon_i \quad (5)$$

Where WB_i represent willingness of a caterer to buy and ϵ_i is the error term. The set of potential explanatory variables, definitions and their a priori expectations are presented in Table 1.

Table-1. Variable Definitions and A priori Expectation

Variable	Description	A prior Expectation
(X ₁)	Willingness to assist in processing paddy rice (1=Yes, 0= No)	-
(X ₂)	Distance between the caterer and market	-
(X ₃)	Status of Caterer (1=resident caterer, 0=Non-resident caterer)	+
(X ₄)	Unit Cost of processing an 80kg of paddy rice in Gh¢	-
(X ₅)	Quantity of rice farmer can supply per term kg	+
(X ₆)	Distance in km between rice farmer and Caterer or GSFP school	-
(X ₇)	Availability of storage facilities for rice (1=Yes, 0=No)	+
(X ₈)	Caterer can purchase rice on credit (1=Yes, 0=No)	+
(X ₉)	Timely release of feeding grants (1= Yes, 0=No)	+

Source: authors own description

3.6.3. Analysis of Farmer's Willingness to Supply Rice to the Ghana School Feeding Programme

Included in the survey were questions regarding willingness of farmers to supply a given quantity of rice per week to the Ghana School Feeding Programme that caterers stated they would require for their schools. To obtain information about willingness to supply rice to the GSFP, farmers were first asked whether they would be willing to sell a portion of their rice produce to the caterers. If they indicated they would sell some, they were asked how many kg per week they could commit. They were then also asked what price they would need for their produce (prices are hypothesized to have greater influence over decisions regarding disposition of rice and therefore farmers are more willing and able to sell if the price offered is good). In this section price together with other explanatory variables were hypothesized to influence rice farmers' willingness to supply to the Ghana School Feeding Programme in the study area.

The willingness of rice farmers to supply to GSFP in this study is expressed as follows;

$$WTS = f(PR, QTY, STOR, CREDIT, ASSTCTR, PROX, FBO, PAYBACK, \dots) \quad (1)$$

Where;

PR represents the price offered by the GSFP

QTY is the quantity of rice in kg farmer is able to supply to caterer per week

STOR is the availability of storage facility for large quantities which is a binary choice between 0 and 1 (1 = storage facility available and 0 = otherwise),

CREDIT represents farmers' willingness to supply rice to the caterer on credit which is also a binary choice variable with 1 for "yes" and 0 for "No".

ASSTCTR represents farmers' capacity to assist caterer in processing paddy rice purchased from them.

The Probit model was used to estimate equation (1), since willingness to supply to the GSFP caterer is a categorical variable. Following Greene (2008) the empirical model for the study can be represented as:

$$Pr(WTS_i=1) = \Phi(\beta'X_i) \quad (2)$$

Where: WTS_i is the variable representing whether the i th farmer would be willing to supply rice produce (1 if 'Yes', 0 if 'No'), Φ is the standard normal cumulative distribution function, and X_i is vector of explanatory variables for the i th farmer. Once again the probit was preferred to the logit model due to the dichotomous nature of the dependent variable

the empirical model for the study may stated as

$$WTS = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon_i$$

Where WTS represent willingness of a caterer to buy and ϵ_i is the error term. The set of potential explanatory variables, definitions and their a priori expectations are presented in Table 2.

Table-2. Variables Definitions and apriori expectation

Variable	Definition	Expected sign
X1	Price offered by caterer	+
X2	Quantity of rice (kg per week/per school term)	+
X3	Availability of Storage (1=Yes, 0=No)	+
X4	Credit Purchases (1=Yes, 0=No)	-
X5	Membership of FBO (1=Yes, 0=No)	+
X6	Payback period for credit (Days)	-
X7	Proximity= of caterer (1=Yes, 0=No)	+
X8	Proximity of caterer (km)	-

4. Results and Discussions

4.1. Accessibility of Rice Farmers to the GSFP Market

In the case of the Ghana School Feeding Programme there has not been any specific procurement procedures detailing how caterers should buy foodstuffs from local farmers. In the Caterer's Model of school feeding, monies are given to these caterers to purchase local foodstuffs from farmers emphasizing that it should be purchased from farmers in beneficiary GSFP Communities. In analyzing farmer's accessibility to the GSFP market, descriptive statistics were used and farmers were categorized into those who have had access to GSFP market either directly or through local millers and those who have not by estimating the relative frequencies in respect of each group from the sampled farmers. Frequency tables and cross tabulation were used to analyse the data. Variables measured include, farmers awareness of GSFP programme, farmers proximity to GSFP School, customers of farmers, type or level of engagement and how farmers are related to the School Feeding programme.

The results of farmers accessibility to the GSFP is presented in [Table 3](#). As can be seen 58 of the 80 respondents representing 73% live close to schools where the school feeding is operated. This suggest that majority of the rice farmers meet the criteria that caterers should buy foodstuffs from farmers living in communities where School feeding is operated. The customers of the rice farmers are mostly GSFP caterers and retailers. Thirty (38) respondents representing 48% sell their rice to both caterers and retailers. While 8 which represents about 10% of the sample population sell their rice produce to only caterers 28 (representing 35%) of the respondents sell their rice to only retailers across the four study districts. Caterers were also asked to indicate whether they had easy access to GSFP caterers or the market opportunity created by the Ghana School Feeding Programme or not. The responses of farmers were taken through a binary choice model; (1 = Yes and 0= otherwise). Out of the 80 respondents interviewed, 37 representing 46% reported that they easily are able to sell to the caterers without any difficulty. The remaining 56% did not have easy access to the caterers or are not able to sell their rice produce to them. This confirms the analysis made by [Shaibu and Al-Hassan \(2014\)](#) that access of rice farmers to the Ghana School Feeding programme is statistically insignificant in influencing rice farmers output. On the rules of engagement, it was reported that most of farmers who had access to the GSFP, were linked up through the assistance of NGOs notably World Food Programme (WFP) and SNV as 39.5% of the 38 respondents were linked up with the help of these two bodies. Apart from this, 12 out of the 38 rice farmers representing 31.5% had direct offers from the caterers themselves. This goes to attest to the fact on the grounds that the selection of farmers to supply foodstuff to the School Feeding programme is arbitrary as reported by [SNV \(2008\)](#). The results further suggest that overall 37.5% of the farmers (30 out of 80) are not in any way related to the programme while 30% supply other foodstuff to the caterers.

The conclusion from the analysis above is that accessibility to the School Feeding Programme is based on farmers' proximity to the caterer or the school which operates the GFSP and the role of stakeholders in identifying farmers in beneficiary communities. The accessibility problem could be attributed to the nature of the supply chain in the various districts. It is easier for caterers to locate farmers in the communities where GSFP is being run than elsewhere but it is much difficult for caterers to buy from farmers because most farmers do not have the capacity to process their rice produce before selling to the caterer.

Table-3. Farmers accessibility to the GSFP

		District				Total
		Tamale	Savelugu	East Gonja	Karaga	
GSFP School	No	1	1	14	6	22
	Yes	19	19	6	14	58
Total		20	20	20	20	80
Customers	GSFP Caterer	1	2	5	0	8
	Local miller	0	0	3	0	3
	Wholesaler	0	0	3	0	3
	Retailer	3	4	3	18	28
	1 & other	16	14	6	2	38
Total		20	20	20	20	80
Access to GSFP	No	2	7	17	16	42
	Yes	17	13	3	4	37
Total		20	20	20	20	80
GSFP ¹ Engagement	GSFP Secretariat	1	1	1	0	3
	GSFP SIC	2	3	0	0	6
	GSFP caterers	0	8	2	2	12
	Open Invitation	1	1	0	0	2
	NGO	13	2	0	0	15
	NGO & GSFP	0	0	1	0	1
Total		17	15	4	2	38
How related to GSFP	Supply them rice	10	10	2	2	24
	Provide information	0	0	2	0	2
	other foodstuff	8	5	3	8	24
	Not Related	2	5	13	10	30
Total		20	20	20	20	80

Source: Field Survey, 2015

4.2. Factors That Influence GSFP Caterers to Buy Local Rice from Farmers

Table 4 presents the estimated results from the probit model showing GSFP caterer's willingness to buy rice from farmers. The LR statistic of 29.22 and a p-value of 0.0005 were reported suggesting that the whole model is statistically significant at 1 percent. The Pseudo R-square value of 0.7503 implies about 75% of the variation in the dependent variable is explained by variations in the explanatory variables

All the estimated coefficients had the expected sign. However the estimated coefficients that were not statistically significant include processing cost of paddy rice and the distance between the caterer and market where the caterer could buy from other than from the farmer. The negative signs for processing cost, distance to the market and delays in feeding bursaries variables support the hypothesis that the probability that a caterer will choose to buy paddy rice from the farmer would decrease if the cost of processing the paddy rice bought from the farmer increases, or if the distance between the market which is an alternative source of rice supplies increases or if there are more delays in the release of feeding bursaries. The coefficients with the positive signs support the hypothesis that the probability of a GSFP caterer choice to buy local rice from the farmer increases as quantity of rice available from the farmer increase or as more storage facilities are available to the caterer, or if there is a high probability of a caterer living closer to the rice farmer in community. Another important variable was the willingness of farmers to sell on credit and which was statistically significant at 1% with a marginal effect of 98% suggesting a caterer has 98% probability of purchasing rice from the farmer if he/she is willing to sell on credit. The marginal effect for the farmer "willingness to assist caterer in processing the rice" suggest caterers are about 98 percent likely to buy paddy rice from farmers if they are willing to assist in processing the rice. This is possible because the caterer may not have enough time to process and mill the paddy before using it to prepare meals for school pupils. Similarly, a caterer who has a storage facility is also about 93 percent more likely to buy paddy from farmers while a kg increase in the quantity of rice supplied or produced by the farmer increases the probability of caterer's choice to paddy rice from the farmer or farm gate by 0.044 percent because is able to meet the caterer demand.

From the analysis on Table 4, the conclusion is that caterers are more influenced to buy from local rice farmers if they have enough storage facilities to stock pile paddy rice which is a raw material for the school feeding programme or if the rice farmers have the capacity to produce more and process their rice or if farmer is more willing to sell on credit. These results are consistent with the findings of ESCARSAD (2010), Le *et al.* (2011) and Shaibu and Al-Hassan (2014).

¹ Analysis is made based on the number of farmers who sell to caterers

Table-4. Results of the probit model explaining the caterers of choice of rice supplies

Independent variable	Coefficient	Std Error	Probability	Marginal Effects
Processing Cost	-0.002	0.004	0.629	
Distance	-0.048	0.152	0.752	
Storage Facility	2.416**	1.053	0.022	0.927
Quantity supplied	0.008**	0.004	0.020	0.044
Assist in processing	2.376***	0.690	0.001	0.986
Proximity	3.040*	1.587	0.055	0.918
Delays In Bursaries	-0.105*	0.063	0.097	-0.424
Credit sales	2.407***	1.743	0.003	0.980
Constant	-12.896	6.531	0.048	-
Dependent variable : Binary choice (1=if caterer buys from farmer, 0= otherwise)				
Log likelihood	-9.132116		***p< 0.001,	
Prob	0.0003		**p< 0.05	
R	0.7353		*p< 0.10	

Source: Field Survey, 2015

4.3. Willingness of Local Rice Producers to Supply the Ghana School Feeding Programme

The probit model was used to estimate the coefficients of the factors influencing rice farmers to sell to caterers in Tamale Metropolis Savelugu-Nanton, East Gonja and Karaga districts of the Northern Region of Ghana. These parameters and their marginal effects were estimated using E-views software. The results are presented in table 5. The McFadden R-squared value indicates that 36 percent of the variation in the willingness to sell to caterers of the Ghana School Feeding Programme was explained by the independent variables. The significant likelihood ratio (LR) of 73.43 indicates that at least one of the variables in the model had a significant effect on farmers' willingness to sell their rice produce to the Ghana School Feeding Programme and that the explanatory variables jointly influence the farmers' willingness of selling to the caterers.

Farmers' willingness to supply or sell to GSFP was significantly influenced by the prices that caterers offer to farmers, the desire of caterers to buy farmers rice on credit, the duration of the credit period and the quantity of rice produced by the farmer at the end of each crop season. Statistically, price was the most influential determinant of willingness to sell. The probability of a farmer to supply rice to the caterer will increased by 6.6% if the price offered by the caterer is good It can be inferred from the result that farmers who had good price from caterers were more willing to supply rice to the caterers than those who had not. Good prices could enhance their farming business as this is consistent with the principle of supply which states that "all things being equal a supplier of product is willing to supply more of product at a higher price at any given period". The results also showed that the probability of farmers to supply rice to the caterer is 5% if the quantity of rice produced by the farmer is increased by 1kg. The analysis in Table 5 under sub section 4.2 suggest that caterers prefer to buy the paddy rice from the farmer in bulk in order to minimize procurement cost than in smaller quantities from difference sources. The results in Table 5 also show that 'credit purchases' was significantly associated with a higher probability of farmer's willingness to sell to the caterers.

The probability of farmer's willingness to sell decreases by 8% for every additional credit purchases made by the caterer. This variable was significant at 5%. Related to this was the duration of the credit. The results show that farmers are 3.3% less willing to sell for any additional week it takes for the caterer or the GSFP to pay for rice purchased on credit.

Table-5. Results of the Probit model explaining willingness of rice farmers

Variable	Coefficient	STD Error	Marginal Effects
Price offered by caterer	0.0004	0.0002	0.0656***
Quantity of rice	0.0445	0.0654	0.0501**
Availability of Storage	0.0628	0.357	0.0691
Credit purchases	-0.001	0.0772	-0.0082**
Membership of FBO	0.3354	0.2431	0.3689
Payback period for credit	-0.0302	0.0175	-0.0332*
Proximity of caterer	-0.0688	0.0106	-0.0757
Constant	3.4950		
Number of Observation	80	Log likelihood	64.526
Mean Dependent var.	0.86	MaFadded R-squared	0.3626

***p< 0.001, **p< 0.05 and *p< 0.10

Source: Field Survey, 2015

5. Conclusions and Recommendations

5.1. Conclusions

Rice farmers across the study districts do not have direct access to the Ghana School Feeding Programme as more GSFP caterers buy milled rice from local millers than paddy rice. This is largely due to the fact that farmers are not supported to process the paddy rice they produce. Another factor that hinders farmers accessibility to the GSFP market is delays in the release of feeding bursaries to caterers and farmers unwillingness to sell on credit. Selling to the Ghana School Feeding Programme is not encouraging farmers because prices offered by caterers are below their expectation, quantity of rice they produce is not enough to meet caterers demand

The rice value chain does not facilitate GSFP procurement from local farmers because farmers do not process paddy into milled rice, a product used by caterers. From the survey data the key actors in the rice value chain are farmers, processors/local millers, retailers, wholesalers and the caterers. Less than 50% of the caterers procure paddy rice from farmers because it has to be process before being used for meals. The processing aspect which is quite tedious and costly have not been factored into the cost of feeding the children by the Ghana School Feeding Programme. In contrast caterers easily purchase other foodstuff such as beans, fresh pepper and tomatoes from the famer since these items requires limited processing.

5.3. Policy Recommendations

The recommendations are measures that can be put in place to strengthen the relation between farmers and caterers, increase local purchase and make the situation for the market relation between caterers and farmers more favorable

Firstly, in order to facilitate easy farmers' access to GSFP market, the GSFP secretariat and government for that matter should contract caterers on permanent basis focusing on those who can spend their time and energy to buy local foodstuffs including paddy rice directly from farmers. This is because one of the reasons why most caterers do not want to buy paddy rice from farmers is there are engaged in other business activities and do not want to add the processing aspect as part of their income generating activities. It is therefore for ideal to recruit individuals who are not in any employment.

Secondly the disbursement of feeding bursaries should also be timely such that it coincides with the harvesting or peak period when prices of foodstuffs including rice are generally low. In this regard, it may also be possible for the government to assist financially through subsidies or grants or by providing some inputs to farmers to increase their output order to meet their demand schedules of caterers

Government should support rice farmers by creating the necessary environment to make accessibility to the GSFP market more easily. This can be done by enlisting all farmers in the GSFP communities across the countries and the detail submitted to caterers. A procurement manual detailing the procurement process which focuses on buying foodstuffs from farmers should also be initiated and a monitoring system developed to check compliance. The target farmers can be supported with credit facilities, fertilizer subsidy and other inputs to help increase their output and yield.

The GSFP Supply chain can be shortened if caterers buy rice directly from the farmers. This is likely to increase the cost of procuring rice for the GSFP as aggregators might be taken out of the chain. Additionally parboiling and milling cost component originally borne by aggregators could be taken up by the caterer. Notwithstanding these potential challenges, government should consider increasing the feeding fee per child so that these extra costs can be catered for by the caterer in providing rice meal to pupils in the GSFP Schools.

Also government in collaboration with the Ghana Education Service should provide adequate storage facilities in all GSFP schools. With this, caterers will not have much problem stocking paddy rice which they can buy from farmers. The list of all rice farmers in GSFP communities will assist caterers to locate farmers easily. From the literature caterers are assisted by cooks to provide food for the pupils. It is therefore possible for a caterer to allow the cooks to assist them in processing the paddy rice bought from the farmers since the farmers do not have inadequate capacity to process the rice themselves.

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