



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative

## Feed the Future Ghana Agriculture Policy Support Project (APSP)

Market Standardization, Grading and Pricing in Maize Markets in Ghana: Producing and Consuming Markets



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## ACRONYMS

AESD	Agricultural Engineering Services Directorate
BCFM	Broken Corn and Foreign Material
CREW	Competition Reforms in Key Markets for Enhancing Social & Economic Welfare
COMESA	Common Market for Eastern and Southern Africa
CSIR	Council for Scientific and Industrial Research
CSD	Crops Services Directorate
EAC	East Africa Community
FASDEP	Food and Agricultural Sector Development Policy
FDA	Food and Drugs Authority
FBOs	Farmer Based Organizations
GAVEX	Ghana Association of Vegetable Exporters
GSGDA	Ghana Shared Growth and Development Agenda
G & S	Grades and Standards
GGC	Ghana Grains Council
GPRTU	Ghana Private Road Transport Union
GSA	Ghana Standards Authority
ISO	International Standards Organization
METASIP	Medium Term Agricultural Sector Implementation Plan
MiDA	Millennium Development Authority
MoFA	Ministry of Food and Agriculture
NAFCO	National Buffer Stock Company
NDPC	National Development Planning Commission
PROTOA	Progressive Transport Owners Association
PPRSD Plant	Protection and Regulatory Services Division
SADC	Southern Africa Development Community
USDA	United State Department of Agriculture
US	United States
VEPEAG	Vegetable Producers Association of Ghana
WFP	World Food Programme

## **EXECUTIVE SUMMARY**

The main objective of the study was to investigate market standardization, grading and pricing of maize in Ghana using the Ejura Sekyedumase and Techiman municipalities of Ghana as case districts. The specific objectives were to understand how existing measuring units have evolved in maize marketing; evaluate marketing standards in relation to that developed by Ghana Standards Authority; identify the most commonly acceptable standards by all actors; identify options for introducing new standards; and to make policy recommendations. The methodology used was mainly social sciences qualitative methods such as participatory rural appraisal; key informant interviews, and focus group discussions with maize value chain actors and relevant institutions. Results were validated through a stakeholders' workshop. Results indicated that, measuring units evolved from an unstandardized measure size 4 bags (132Kg) to size 5 bags (155Kg) introduced by traders at the farm-gate in the two districts. Through an enactment and enforcement of a bye-law by the Ejura Sekyedumase Municipal Assembly, the size 4 bags (132Kg) was re-introduced in maize marketing and adopted by surrounding districts and municipalities such as Techiman, Nkoranza, Atebubu Amantin and Wenchi. The re-introduction of the size 4 bags did not change the price/ bag of maize; farmers therefore gained 23 Kg on each bag of maize sold representing 15% extra income. It was also observed that the size 5 bags were subtly re-surfacing in the market in another form. Few institutions operating in the municipalities such as the World Food Programme (WFP) purchased maize with a standardized weight of 50Kg and 100 Kg. WFP paid its farmers the prevailing maize market price for a 100 Kg bag; resulting in a 32 Kg grain gain and 32% income gain for the farmers on every bag sold (compared to the size 4 or 132Kg weight).

The issue of quality standards such as acceptable moisture content, disease and insect free grains have become matters of great concern due to heightened health consciousness of consumers. Most producers lacked on-farm storage and grading facilities to prevent deterioration of produce especially during the raining season. Actors mostly relied on personal experience and conventional methods to meet the quality attributes preferred by the market. Standards developed by Ghana Standards Authority with regards to labelling with variety name,

net weight in Kg, grade, and year of harvest are not implemented and therefore non-existent in the market. Awareness of these standards among producers and local traders was low and conformity to it was missing in domestic markets. The study report validation workshop provided an opportunity to discuss these issues with the maize actors and they agreed on continual improvement of maize quality and the implementation of standardized weighing scales or standardized 100Kg bags in maize trading as pertains in the neighbouring countries. The study identified two markets; a large informal local market with low standardization, and an emerging small commercial market which has adopted the formal standards. Respondents believed that the government must lead in enforcing standards through massive public education linking it to health. The study made the following short and long-term recommendations:

Maize value chain innovation platforms must be organised for maize actors to educate them on marketing standards. Some basic equipment such as mobile solar dryers, moisture meters and weighing scales may be subsidized and made available to both farmers and traders to encourage them comply with measures and standards. Government should consider using its huge procurement power to ensure that government agencies such as schools, hospitals, etc purchasing maize only purchase from accredited warehouses and farmer organizations that follow standards (quality and weighing scales). Furthermore, there should be a massive public education linking food quality standards to health and incomes of the citizenry to create the necessary environment needed for attitudinal change; using all forms of communication. Additionally, government and the private sector must implement the warehouse receipting system to formalise the commodity trading system and thereby stimulate investments warehousing facilities throughout the major maize growing zones of the country especially through Public Private partnerships arrangements. In terms of enforcing commodity standards and measures throughout the country, the study recommends the approach of the two municipal assemblies which adopted a grassroot approach involving key stakeholders such as the Assemblies, maize value chain such as farmers, traders, transporters etc instead of a national top down approach to effect changes at the district/ municipal/ metropolitan levels . At the national level, there is also the need for inter-ministerial efforts to regulate and enforce developed standards. Ghana Standards Authority should collaborate with District departments of Agriculture, Municipal Assemblies and Food and Drugs Authority to educate maize chain

actors extensively on grain standards using pictorial charts and distribute copies to them. To improve market efficiency, a Legislative Instrument (LI) on regulations on agricultural commodities standardization including maize grains is needed.

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# CHAPTER ONE

## 1.0 INTRODUCTION

The importance of maize cannot be overemphasized. Globally; it is used as animal feed, food for human consumption, and recently as industrial raw material (Gwirtz and Garcia-Casal, 2014; Orhun, 2013). Advances made in maize breeding and production technologies over the decades have resulted in its increased production (Orhun, 2013). However, quality of maize has become a major concern especially, when it is used for human consumption ( Achaglinkame et al., 2017). Commodity standards and grades provide a means for measuring levels of quality and value for agricultural commodities. These standards provide a basis for domestic and international trade and promote efficiency in marketing and procurement (USDA, 2016). The USDA shields and labels assure consumers that the products they buy have gone through a rigorous review process by highly-skilled graders and auditors that follow the official grading standards and process standards developed, maintained and interpreted by USDA's Agricultural Marketing Service.

Most nations have national grades and standards with main objectives as (i) facilitating trade and (ii) identifying economic values to the end users (Maghala, 2011). The most frequently measured quality factors in the US grades and standards are test weight, BCFM (Broken Corn and Foreign Material) and damaged grains including machine damaged and heat damaged grains (USDA, 2013). These standards are similar to that developed by the Ghana Standards Authority. However, standards differ from country to country (GSA, 2013). Although these maize grading factors are still important to end users; they do not describe the desired maize quality for each specific end user because the important characteristics differ with different end users and for different products. For example, broken grains may be unacceptable to the starch producer but may be of little concern to the producer of livestock feed. Therefore, each industry and each individual user within the industry has numerous quality attributes important to them (Maghala, 2011).

In the context of developing standardized grades and quality standards for the regional trade, the following points have been made. Most countries develop national maize standards, aiming to provide a framework for trade, both internal and external. In local or national situations,

where trading involves direct choice and price negotiation in front of the commodity, grading standards are rarely employed; quality is assessed visually and is influenced by end-use, and the price is determined by local rather than national factors. For regional level transactions that involve the movement of large volumes of maize over long distances, the buyer may never meet the seller or be able to examine the whole consignment. The use of an agreed standard will provide an unambiguous description of the quality of the consignment and assist in the formation of a legally-binding contract. Standards can also be seen to protect consumers' rights through setting limits to the amount of unsuitable or noxious material (<http://www.consumersinternational.org>).

In Ghana, the commodities market is less developed and hence there is very little enforcement of standards and grades. This situation has hampered formal trading of commodities in the domestic market and resulted in volatility of prices, market inefficiencies and marketing of commodities whose quality and health safety cannot be assured. Despite the research findings from the Competition Reforms in Key Markets for Enhancing Social & Economic Welfare in Developing Countries (CREW) Project that maize markets in Ghana are fairly competitive as there are large numbers of maize sellers and buyers, there are serious concerns about the quality of the maize that is generally marketed.

The above issues of low standardization and product differentiation (weights and measures, grades and standards) are hurdles for the country's trading competitiveness. Ghana's agricultural policy documents such as Food and Agriculture Sector Development Policy (FASDEP II), Medium Term Agriculture Sector Investment Plan (METASIP) and Ghana Shared Growth and Development Agenda (GSGDA) prioritized the issue of low standardization and product differentiation (MOFA, 2011; NDPC, 2010) as a major developmental issue that needs to be addressed in order to increase the nation's competitiveness and enhance its integration into domestic and international markets. This is because different measurements are used at different locations in the country depending on the bargaining power of actors. For instance, what is measured as one bag (50kg bag) at the farm-gate could comparably be two bags (100kg bag) or more at another market creating a wide income gap between the farmers and other value chain actors resulting in income disparities (Adu-Appiah *et al.*, 2014) which are usually to

the disadvantage of the resource poor farmers. To find lasting solutions to the disparities in marketing standards in Ghana this work was carried out.

## **1.1.0 Objectives**

### **1.1.1 Overall Objective**

The main objective of this study is to assess the standardization of maize in the Ghanaian markets in terms of the different measuring units, grading and pricing in two markets in the forest transitional zone of Ghana

### **1.2.1.1 Specific Objectives**

The specific objectives of the study are as follows:

- Understand and document how the existing measuring units evolved
- Evaluate the existing standards in both the producing and consuming maize markets in terms of measuring units, grading and pricing and compare with standards set by Ghana Standards Authority
- Identify the standards that would be acceptable to the maize consuming market and adhered to by all the other actors along the value chain
- Identify options for introducing new standards in the marketing of maize.
- Make policy recommendations

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Some Basic Concepts in Standardization

**Standardization** is the process of implementing and developing technical standards based on the consensus of different parties that include firms, users, interest groups, standards organizations and governments (<https://en.wikipedia.org/wiki/Standardization>). Thus, the measured standard needs to ensure the safety of both the stakeholders and the environment. Standardization allows consumers to differentiate agricultural commodities based on certain measurable qualities (Wang Ping, 2011). In other words, it is an activity that people develop on the basis of rules for measuring things and codes of conducts by establishing regularity from disorder. Others see standardization as the process of fixing certain norms established by a custom, tradition or an authority involving the determination of basic characteristics of a product. Standardized commodity grades can contribute to operational and pricing efficiency as well as increase consumer satisfaction and producer returns (USDA, 2013).

A **Standard** is a generally accepted measure that has a fixed value. The measure is therefore in units of basic qualities or attributes of a product or a service. Standards therefore relate to quality, appearance, and delivery of product (Zodow, 2014); conditions under which it is to be produced, packed, and transported; explicit description regarding its weight, color, and nutrients content; details of the inspection process and specific packing and labeling requirements. An authority recognized and accepted by all stakeholders of the standard usually approves the standards. **Grading** is the physical process of putting the products into groups of similar characteristics. Standard and grades ensures easy selling of products, increase demand, pricing and quality assurance.

#### 2.2. Types of standards and the commonly used grains standards in Ghana

Standards and grades can be in three main forms as; **object** standards such as weight, length, time and volume; **documentary** standards as specifications, methods, nomenclature etc; and **conceptual** standards, which is midway between object and documentary standards such as

behavior norms and values. For agricultural commodities, standards and grades are largely object standards such as weights and volumes. In maize marketing, as in other grain marketing, the most commonly used standard is the weight. According to Henson and Humphrey (2009), the evolution of regulatory requirements and private standards are driven by three things such as: heightened interest in changing conceptions of food safety and quality among consumers; restructuring and progressive globalization of agricultural food supply chains; and broader trends towards privatization of market governance

### **2.3. Importance of Standardization**

In the wake of the increasing trade globalization, standards and grades play an essential role by defining the procedures and their effects especially in developing economies. Standardization and Grading are useful marketing functions as they facilitate buying and selling of goods by sample or description. Consumers do less or no inspection when goods are of desired quality (Lakhotia, 2011). Standards and grades also serve as strategies for assuring quality and safety of marketers and consumers, niche definition, brand development and market penetration. Food safety standards can act as both a barrier to trade and the basis of competitive positioning for developing countries in international markets (Henson and Jaffee, 2008). According to East Africa Standards (EAS, 2011), standardization and quality assurance facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community. Other authors provide the following benefits of grain standards and grading as:

- Standardization and Grading enable the producer to direct the goods of different qualities towards the market best suited to them. The task of middlemen becomes easy because they can communicate well the characteristics of standardized products to customers. (Lakhotia, 2011). This helps to manage risks associated with human health from contaminants, pest residual and disease-causing organisms (Maghala, 2011). Lakhotia (2011) enumerated other advantages of standardization and grading as:
- Standardized goods enjoy a wider market.
- Standardization and Grading facilitate trading of goods on the commodity exchange. Hedging, future trading and price comparisons become easy.
- Standardization and Grading helps in raising finance because standardized products enjoy a ready market and they are readily accepted as a collateral security for granting loans.

- Standardized products can be easily valued and their prices fluctuate less widely. This helps in making insurance claims in the event of loss or damages to the goods.
- Standards ensure the efficient operation of individual markets as well as the smooth functioning of trade between different partners (Tok, 2011).
- Standards increase the competition among different producers in general and thus benefit consumers (Tok, 2011)

Despite the benefits with standards, there are however disadvantages associated enumerated as:

- Standards could have negative impact on developing countries but a positive impact on developed countries as realized by Anders and Caswell (2009)
- Standards may pose as a barrier for small holder producers' participation in domestic and international markets due to the complex technological procedures involved (Jaffee et al., 2011).
- Compliance to standards and quality assurance practices has costs aspect in two dimensions; production and transaction costs (Brouwer et al., 2012). Example; developed countries' food safety standards had a deterring impact on processed food exports of developing countries (Jongwanich, 2009).
- Confusion and difficulties may arise where standards vary significantly between countries. This may be a particular problem for procurers for regional maize food security reserves which require both uniformity and good quality (Brouwer et al., 2012).

## **2.4. Standardization Experience across Africa and Institutions**

### ***Africa in general***

Whether viewed as a development opportunity or trade barrier (Henson and Jeffee, 2008), it is clear that proliferation of standards is a significant challenge to African countries. The ability to comply with product standards has become an important factor in determining access to markets and, the countries capacity to export and involve smallholder farmers in commercial supply chains. An approach to improve the trade environment for food staples that has gained considerable force and extensive support in recent years has been to harmonize quality standards across countries and with international ones. Various policy papers on commodity

trade in Africa have pointed to the lack of consistency in quality requirements as a non-tariff barrier and called for the harmonization of standards to improve trade. The East African Community (EAC) has been active in pursuing harmonization with international standards in an effort to facilitate trade between Member States and ensure global markets remain open to EAC exporters. There have been discussions to extend harmonize standards to the Common Markets of Eastern and Southern Africa (COMESA) and SADC as part of an agreement to establish a tripartite free trade area between the three regional blocks (Keyser, 2012)

### **Eastern and Southern African Countries Situation**

According to Kagira (2009), the general quality standard requirement in East African countries (EAC), is that, maize should be fit for human consumption. In Malawi for instance maize is not to exceed the following parameter limits: 14% moisture content, 2.6% percent of foreign matter, 11% of broken grains, and 3 µg/Kg of aflatoxin. FAO (2011) restated the ISO 16050 standard for aflatoxins in maize grains for human consumption which shall not exceed 5 µg/kg (ppb). Compared with other Common Market for Eastern and Southern Africa, (COMESA) countries, the Malawi standard has fewer quality requirements and therefore are less restrictive to trade. The ideal situation as far as standards are concerned would be a regional (EAC/SADC/COMESA) maize standard, in support of intra-regional trade in maize.

In Uganda, Tanzania and Kenya, quality standards are enforced and in addition warehouse receipt finance which facilitates storage was introduced to farmers which gave them flexibility in deciding when to sell, and stabilizing intra-seasonal prices.

### **World Food Program (WFP)**

According to Zodrow (2014), the World Food Program (WFP) in an attempt to address marketing challenges of farmer based organizations (FBOs) engaged in a program to purchase food from 17 countries by signing forward purchase contracts. Since WFP had quality standards above that of other buyers, FBOs capacities were built in meeting these standards. WFP's food specifications for all commodities aimed to align with the Codex Alimentarius standards, national legislation, and any restrictions of the country. The Codex Alimentarius refers to



specific international food standards, guidelines and codes of practice that contributes to safety, quality and fairness of the international food trade.

Results from the project countries indicated variations in quality among the project countries; Latin America and Afghanistan had good quality than African countries. The three top quality attributes were moisture content, infestation and aflatoxin or mold. Moisture levels are often used as indicator for fungus, mold or rot. Although Ghana has made several attempts to address aflatoxin, the problem still exists, especially in rural areas. The lack of awareness among producers and consumers result in exposure to unsafe levels (Zodrow, 2014). The study also noted among project countries that enacting food safety and laws or regulations were not the main problem but enforcement. This is because the responsibilities for enforcing regulations are often shared among different ministries, departments, and agencies with a wide variety of expertise within the country. Many of the countries are currently working to improve their laws and regulations.

In Ghana, the WFP achieved successes in standardization by introducing weighing scales to its farmer based association in collaboration with the Ejura Sekyedumase Municipal Assembly (WFP, 2015). Another success was achieved in the area of quality and food safety by utilizing mobile laboratories known as “blue box” to their farmers; this was used to detect aflatoxin and grain moisture content at the farm level.

## **2.5. Agricultural Commodities and Aflatoxin Contaminations in Africa**

According to Wacoo et al, (2014), Aflatoxins are toxic carcinogenic secondary metabolites produced predominantly by two fungal species; *Aspergillus flavus* and *Aspergillus parasiticus*. These fungal species are contaminants of foodstuff as well as feeds and are responsible for aflatoxin contamination of these agro products. The agricultural commodities prone to aflatoxins toxicity include maize and legumes. According to Achaglinkame et al (2017), factors such as temperature, relative humidity/moisture, soil properties, type and length of storage as well as nutrient composition of the food produce greatly influence fungal growth and aflatoxin production. At a concentration in excess of 2 ppm, intensive exposures of aflatoxin are reported to cause non-specific liver problems and

death within few days (Chauhan et al, 2016). In the international world market, aflatoxins toxicity remains a topical issue for the economic development of any country involved in the trade market. Earlier studies proposed that the occurrence of aflatoxins in food products is mainly influenced by favorable conditions such as high moisture content and temperature (Wu et al. 2011). The extent of contamination by aflatoxins also varies with different geographic locations, agricultural and agronomic practices, storage condition of crops and more importantly processing of food materials under favorable temperature and humidity conditions (Chauhan et al. 2008).

With increased production and utilization levels of maize across all regions of Ghana in recent times, aflatoxin (AF) contamination in grain maize remains a critical food safety concern (Sugri et al., 2015). A study by Akowuah et al. (2015) in Ghana revealed that, farmers and traders adopt practices that expose maize grains to aflatoxin contamination. These include: delayed harvesting, heaping harvested maize cobs on the field; use of hand dipping and teeth cracking method to determine dryness of maize, use of wooden stalls with no proper ventilation for maize storage at market centres and temporal storage in the open using tarpaulin resulting in heat build-up and moisture re-absorption. Interestingly, 63% of traders from both markets believed that, consuming contaminated maize have no health implications for consumers as food products from maize are normally cooked before consumption. The study therefore recommended the need to encourage farmers and traders to adopt best practices in maize production and marketing to ensure food safety of the final consumer. This is because it has been observed that storing maize in hermetic bags reduces aflatoxin incidence (Maina et al, 2016).

Aflatoxin contamination of the food chain has major economic and social impacts. The danger associated with the toxins sometimes makes it difficult to estimate incidence and cost. However, notable economic impacts are crop losses and reduced animal productivity. To protect the consumer and ensure food safety, countries like Ghana have set maximum acceptable levels of aflatoxins in food and food products and animal feed as a measure to overcome the challenge (GSA, 2013).

## **2.6. Challenges in Enforcing Quality Standards**

Challenges in enforcing quality standards as identified by the WFP include:

- Lack of funds and skills - Countries such as Ghana, Liberia, and Malawi reported lack of capacity to implement food safety and laws or regulations
- Fragmentation of responsibilities - Fragmentation of responsibility for the implementation of regulations and laws across different ministries, departments and agencies leads to uncoordinated and ineffective implementation. For instance, about 12 ministries in Ghana are implementing some form of food safety regulation.
- Lack of facilities /technology to regulate

### **2.6.1. Quality Standards of Buyers**

Most buyers rely on physical observation in purchases of the commodity without testing. Challenges from purchasing from smallholders include distant farm locations and lack of trust; traders have less interest in purchasing higher quality crops because they have already invested in equipments to clean the crops and therefore want to purchase any grade at lower prices and farmer organizations do not the capacity to reliably supply them with the desired quantities (Zodrow, 2014).

In some instances, buyers were reluctant to contract with farmers to produce quality commodities at agreed prices because companies which purchase from the traders may incur losses if contract prices fall below the agreed prices which may lead to a cancellation of the contract. On the other hand, if prices elsewhere are higher than the agreed price, farmers may sell it there.

## **2.7. Institutional Responsibilities in Grain Quality and Standards Development**

Standards vary from country to country because of differences in consumer choices, varied income levels, the sensitivity to natural concerns, technological advancement or historical reasons (Tok, 2011). The Ghana Standards Authority is responsible for the facilitation of

standards development; however, the development process involves several sectors; ministries and institutions. The roles and responsibilities of such institutions are as given below.

### **2.7.1. Ghana Standards Authority**

The Ghana Standards Authority (GSA); the national Standards body was established by the Standards Decree, 1967 (NLCD 199) which has been superseded by the Standards Decree, 1973 (NRCD 173). The Authority is also the custodian of the Weights and Measures Decree (NRCD 326, 1975). GSA is mandated to perform the following functions among other things: development and dissemination of national standards, testing services, calibration, verification and inspections of weights, measures, and weighing instruments, and advice the Ministry of Trade and Industry on standards related issues. There is a 11-member technical committee selected from various institutions in charge of setting standards. The institutions include the Council for Scientific and Industrial Research (CSIR), Crops Services Department of the Ministry of Food and Agriculture (CSD-MoFA), Plant Protection and Regulatory Services Department (PPRSD-MoFA), Ghana Association of Vegetable Exporters (GAVEX), University of Ghana, Vegetable Producers Association of Ghana (VEPEAG), Agricultural Engineering Services Department of MoFA (AESD), Quin Organics, Ghana Grains Council (GCC) and two other persons from the Ghana Standards Authority. The institutions are expected to ensure that the standards work. The standards are reviewed every five years. According to GSA, the export market standards for maize are well developed than the domestic market. Much has been done in promoting the standards but the challenge is with enforcement to ensure compliance which was believed to be outside their mandate. It is believed that for agricultural commodities, PPRSD and FDA have the mandate to regulate.

Details of the grain standards as developed by the technical committee are as given (Table 2.7.1). The current GSA standards are based on colour, endosperm types and quality. According to GSA, maize grain is classified as white, yellow and red in terms of colour. At most, a 5% mixture of another colour is accepted to qualify as standard colour. Endosperm classification based on flint and dent. Maize with kernels having hard outer layer enclosing the soft endosperm (Flint maize) and maize with small indentation at the crown of the kernel (Dent

Maize) were expected to be 95% by weight. Quality maize must have 13% moisture and 20mg of potassium hydroxide per 100g of fat acidity respectively (Ghana Standards Authority, 2013). Beside endosperm classification, there are grading standards based on degree of physical defectiveness and presence of foreign matter as in table 2.7.1b.

**Table 2.7.1a: Standards Requirement for Maize**

<b>Standard</b>	<b>Requirement</b>
Moisture content	≤ 13% on wet weight basis
Fat acidity level	20mg of potassium hydroxide
Aflatoxin level	≤ 15µg/Kg
<b>Contaminants Metal limits for maize parts per million (ppm)</b>	
Arsenic	≤ 1.1
Cadmium	≤ 1.5
Lead	≤ 2.5
Mercury	≤ 1.0
<b>General, Physical, and Health Characteristics</b>	
Free from objectionable matter, and have no foreign odor denoting any deterioration	
Maize grain shall be free of food additives and toxic substances and other requirements	
Free of insect infestation	
No adulterated maize	

Source: Ghana Standards Authority, 2013

GSA's grading standards based on degree of physical factors is shown below in Table 2.7.1b. It implies that maize can be classified into five grades based on factors such as diseases, discolouration, broken/ chipped, insect damage, stained and germination. The percentage of diseased, insect damaged, and germinated grains do not exceed 5% using Ghana standards, irrespective of the grade.

**Table 2.7.1 b: GSA Grading Standards Based on Degree of Physical Factors**

Characteristics %	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Disease	0.5	0.5	0.5	0.5	0.5
Discoloured	2.0	3.0	3.0	4.0	4.0
Broken/ chipped	5.0	6.0	10.0	14.0	50.0
Insect damaged	2.0	4.0	5.0	5.0	5.0
Stained	0.0	0.5	0.5	1.0	1.0
Germinated	0.0	0.5	0.5	0.5	0.5
Shriveled	1.0	2.0	3.0	4.0	5.0
Other grains	0.5	0.5	1.0	1.0	2.0
Total Defective	11.0	17.0	24	30.0	38.0

Source: GSA, 2013

Ghana has standards for maize throughout the supply chain as indicated in table 2.7.1c. This ranges from following good agricultural practices during production, through packaging and labeling to post-harvest and pre-marketing activities.

**Table 2.7.1c: Other Important Standards to Consider**

Hygiene	Production and handling should be done in accordance with good agricultural practices
Packaging	<ul style="list-style-type: none"> <li>Package grains should be clean, sound, free of insects</li> </ul>

	<ul style="list-style-type: none"> <li>• Packaging material should be devoid of harmful chemicals to human life or animals</li> <li>• Packaging in polythene or environmentally harmful materials is not allowed</li> </ul>
Labeling	Each package is expected to be marked clearly and indelibly as non toxic with the following information (The name of the product, Net weight in Kg, Grade, Batch code, Name or registered trade mark, Country of origin, Year of harvest)

Source: GSA, 2013

### 2.7.2 Ghana Grains Council (GGC)

Ghana Grains council is to facilitate grain and legume value chain efficiency through the provision of strategic value-added services including warehouse receipt, training and capacity building, provision of marketing information and other value-added services including market linkages and policy change interventions to the agricultural industry (<http://www.ghanagrainscouncil.org/en/>). This mandate put them in a strategic position as a key player in promoting and ensuring grain standards. GGC promotes trading by weight and by grade using standards developed by GSA at the producer level. GGC further promotes these standards at the next higher level of farmer and trader associations and further up at the industrial levels. GGC has contributed a lot in arriving at the associations standards.

Industrial processing organizations such as Nestle Ghana Limited also have their standards which are even higher than those at the first and second levels. Meeting the standards set by Ghana Nestle requires a lot of efforts and funding resources.

Efforts made by GGC in ensuring standards are easily implemented at the local level include:

- Collaborating with GSA and USAID to change the word texts into pictorial form such as posters for better appreciation by chain actors. Some of these posters are posted at the Techiman market and were seen by the team at the during the research visit
- Organizing trainings for traders in Ashanti, Brong Ahafo and Eastern regions on marketing
- Education of actors on the health risks of poor quality maize
- Producing a video documentary on the effects of the bush weights on the health of carriers.

- Conducted of Trainer of Trainers training of MoFA staff in turn trained farmers on the standards set and the benefits of complying.
- Development of a hand book on standards
- Implementation of the warehouse receipting system (WRS) which details all the specifications and rules that must be followed before grains are accepted for trading. This has really promoted the standards and must be encouraged. In the WRS, the GGC ensures that trading of grains is by weight and grade. Training of traders and national institutions such as the National Food Buffer stock company and the school feeding project ensures that they purchase maize by the recommended weight and grade (50Kg or 100Kg polypropylene bag).
- The GGC is advocating for collaborative efforts by different institutions within the economy to promote and enforce agricultural commodity standards. The different stakeholders to be involved are the Ghana Standards Authority, Ghana Grains Council, the traditional councils, task forces under the Ministry of Interior, Municipal Assemblies and Food and Drugs Boards and direct actors such as producers, traders, processors and poultry farmers.

### **2.7.3 Municipal Assemblies**

The Municipal Assembly under the 1992 Constitution of the Republic of Ghana, Article 240, is to plan, initiate, co-ordinate, manage and execute policies in respect of all matters affecting the people within their areas (<http://laboneexpress.com/blog/2015/08/functions-of-district-assemblies/>). Some of the specific functions of the Municipal assemblies as defined in Act 462 are as follows:

- To exercise political and administrative authority in the district, provide guidance, give direction to, and supervise the other administrative authorities in the district.
- To perform deliberative, legislative and executive functions.
- To be responsible for the overall development of the district and shall ensure the preparation of
  - (i) development plans of the district;



(ii) the annual and medium-term budgets of the district related to its development plans.

- To formulate and execute plans, programs and strategies for the effective mobilization of the resources necessary for the overall development of the district.

During the research team's interactions with the municipal planning officers, it was realized that much had been done in achieving the mandate. On agricultural commodity standardization, the municipalities' concentration has been on object standards, i.e. weight with little work on the enforcement of quality attributes. A concerted effort by six districts in Ashanti and Brong Ahafo Regions, spearheaded by the Ejura Municipality in addressing the issue of trading by weight was a milestone appreciated by traders and producers in study districts. In Techiman, through the municipality's initiative, a maize stakeholder platform has been formed in collaboration with GIZ. The maize stakeholder platform meets regularly to discuss issues of standardization. The municipalities were however optimistic of making progress in the area but indicated they needed assistance in terms of resources and cooperation from traders and producers.

At the Techiman Municipality, it was suggested that in order to implement and enforce the standards, relevant institutions such as GSA and FDA should have offices at the district level to work closely with the municipal and department of agriculture in the education drive.

#### **2.7.4 Ministry of Trade and industry**

The Ministry of Trade and Industry (MOTI) is the lead policy advisor to government on trade, industrial and private sector development with the responsibility of formulating and implementing policies for the promotion, growth and development of domestic and international trade and industry. Aside policy formulation, the ministry's core mandate includes: Facilitating enterprise development including Micro, small and Medium Scale Enterprises, (MSMEs), development and enforcement of standards in trade and industry, promoting and facilitating Ghana's internal and export trade with emphasis on diversification and value-addition and promoting and facilitating Ghana's active participation in global trade. The Ministry is also the advocate for the private sector within government and the principal agency responsible for monitoring and implementing the Government's private sector development programs and

activities. The ministry had a standards division which looks at policy related issues concerning standards conformity. There was a project on trade related Quality Enabling Project which supported the works of agencies such as the Ghana Standards Authority (GSA) (<http://moti.gov.gh/about-the-ministry-of-trade-and-industry-moti>; Field work, 2016).

MOTI argued that ensuring compliance of standards developed by GSA is the responsibility of Foods and Drugs Authority (FDA); but the research team's discussions with FDA indicates the lack of resources both material and human to discharge this mandate effectively though enforcement is one of their mandates. The research team noted that there is duplication of efforts by institutions connected with standardization in the country.

### **2.7.5 National Food Buffer Stock Company (NAFCO)**

The National Food Buffer Stock Company (NAFCO) was set up in the year 2010 with the objective to ensure food security through the provision of market access for farmers and insulate them against losses resulting from anticipated increases in the production of cereals, especially maize, rice and soya bean. The mandate of NAFCO is therefore to expand the demand for food grown in Ghana by performing the following functions:

- To manage governments emergency food preparedness
- To purchase, sell, preserve, and distribute food stuff;
- To mop up excess produce from all farmers in order to reduce post-harvest losses resulting from poor storage, thereby protecting farm incomes;
- To guarantee farmers an assured income by providing a minimum guaranteed price and ready market;
- To expand the demand for food grown in Ghana by selling to state institutions such as the military, schools, hospitals, prisons, etc and
- To employ a buffer stock mechanism to ensure stability in demand and supply.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1. Description of study areas**

The study was conducted in two municipalities namely Ejura Sekyedumase and Techiman within the Ashanti and Brong Ahafo Regions of Ghana respectively. The two municipalities are all in the forest transitional agro-ecological zone of the country. The two municipalities were selected based on the high volumes of maize produced in the country. The Ejura-Sekyedumase Municipality is located within longitudes 1°5" W and 1°39" W and latitudes 7°9" N and 7°36" N of northern Ashanti region. It has a large land area of about 1340.1 square kilometers which constitutes about 7.3 percent of the region's total land area. The climatic conditions together with the topography offer favorable conditions for the cultivation of food crops. Agriculture is the leading economic sector of the municipality in terms of employment and income generation. It employs about 69.7 percent of the municipality's population. In the rural localities, eight out of ten households (85.9%) are agricultural households while 55.5 percent of households in the urban localities are into agriculture. Crop farming forms a greater share of the sector with about 97.4% household being crop farmers. Prominent crops cultivated in the municipality include maize, yam, beans, rice, plantain, cassava and groundnuts, etc with maize dominating in terms of output therefore is a food security and an income generating crop (Ghana Statistical Service, 2014).

According to the Ghana Statistical Service 2010 census report, the second municipality; Techiman is situated in the central part of the Brong Ahafo Region and covers an area of

389.4km<sup>2</sup>. The municipality lies between longitudes 1°49” East and 2°30” West and latitudes 8°00’” North and 7°35” South. Agriculture is the economic mainstay of this municipality as about six out ten households (60.3 %) are engaged in it. In the rural localities, about six out of ten (59.7%) are agricultural households while in the urban localities, 60.9 percent of households are into agriculture. Most households in the district (96.8 %) are involved in crop farming as in the Ejura Sekyedumase municipality.

### **3.2. Sampling Technique**

The study employed multi-stage sampling technique to select the municipalities, communities, markets and the actors in the maize value chain in the study area. The municipalities were purposively chosen due to the high production and marketing of maize in the areas and its importance to the livelihood of the populace. The communities were randomly drawn from the agricultural operational zones as defined by the Ministry of Food and Agriculture (MoFA) in the municipalities. Five communities were randomly selected from a subset of communities in the two municipalities, making a total of ten communities across the two municipals. The communities were drawn based on the volumes of maize produced, importance of crop to the community and accessibility. Four producers were selected from each of the 8 communities in the two municipalities to give a total number of 32 respondents for the group discussions. 5 respondents were selected from each of the remaining 2 communities which produced the highest volumes of maize in the two municipalities, Thus, in total 42 farmers were selected for focus group discussions. Due to the operations of World Food Programme (WFP) in the Ejura Sekyedumase Municipality under the project Purchase for Progress (P4P), some of the producers were purposively drawn from the Farmer Based Organizations (FBOs) set up by the WFP. The communities selected are presented in Table 3.2 below. Different categories of traders such as wholesalers, middlemen and retailers were drawn from the major physical markets and communities for the focus group discussions. Key informants especially those in leadership positions were drawn from the transport unions; Ghana Private Road Transport

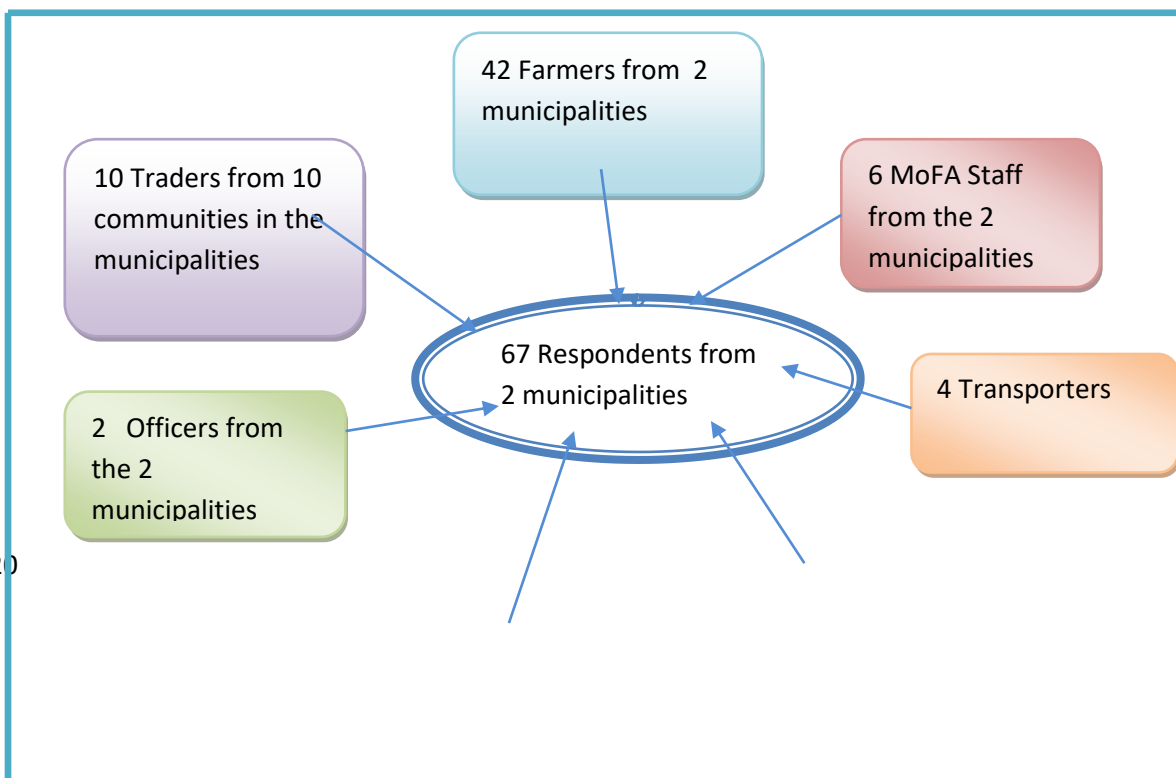
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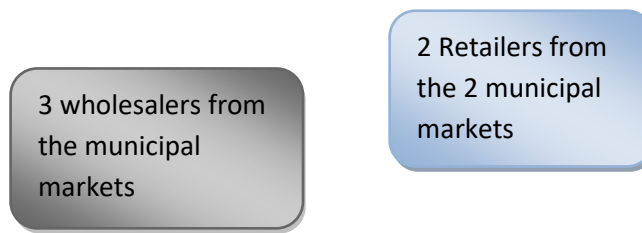
Union (GPRTU) and Progressive Transport Owners Association (PROTOA) within the Municipalities. Institutions connected with commodity standardization, pricing and regulations such as Ghana Standards Authority, Ghana Grains Council, Municipal Assemblies, National Food Buffer Stock Company, the MiDA Agribusiness Center, Food and Drugs Authority, Ghana Export Promotion Authority, Ministry of Trade and Industry, and the Plant Protection and Regulatory Services Department (PPRSD) of MoFA and Nestle Ghana Limited were also contacted. Figure 1 below depicts the representation of respondents from the various categories of actors interviewed.

**Table 3.2: Communities Sampled for the Study**

Municipality	Operational Area	Community selected
Techiman	Aworopataa Akisimaso	Aworopataa
		Akisimaso
	Oforikrom	Fiaso
	Tanoso	Kuntunso
	Nkwaeso	Nkwaeso
	Babaso	Babaso
	Kasei	Kasei
	Dromankuma	Dromankuma
	Miminaso	Nyamebikyere

The framework below illustrates the municipal level FGDs.





**Figure 1: Sampling frameworks of actors for Municipal Focus group discussions**

### **3.3. Data Collection Procedure**

The research team held planning meetings with MoFA to design survey instruments and interview schedules for each of the actors involved in the study. The methods of data collection and instruments were reviewed and changes made for smooth implementation on the field. The study employed informal data collection approaches. A reconnaissance survey preceded the key informant and group interviews to observe, ascertain, familiarize and have first hand information on the issues being investigated from target markets, transport unions and other relevant actors. It was also an opportunity to develop the sampling frame for the maize growing communities together with the district agric officers. The informal approach elicited responses from those interviewed as they provided a lot of insights. Furthermore, this approach was chosen in order to explore and gain general insights into the topic. The Participatory Rural Appraisal method was used during discussions with groups and key informant interviews. The results of the study were climaxed with a stakeholders' validation workshop.

### **3.4. Data Analysis**

The study made use of both primary and secondary information. The secondary information included desk reviews and searching through the internet for similar works in the area. The primary data was collected through the administration of a semi-structured questionnaire in the form of a checklist to key actors contacted during the survey. The data collected was analysed

through descriptive statistics and qualitative content analysis. Descriptive statistics involved frequency counts and percentages to summarise the socio-demographic information using Statistical Package for the Social Scientist (SPSS). With the content analysis, the data collected was coded into themes and information discussed under it.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSIONS**

#### **4.1. Demographic Characteristics of Producers and Traders**

There cannot be any meaningful developmental activity without taking into account the characteristics of the population for whom the activity is targeted. During the focus group discussions, basic demographic information of developmental interest was recorded to help describe the group. In total, the study engaged forty-two (42) producers in the focus group discussion ; they put in smaller groups of about 7-10 producers and about fifteen (15) traders in total with one focus group per municipality. Majority of the producers and traders were males. The higher proportion of males selected in the sample was due to the fact that males dominated in the maize business at both the producer and the trader levels. The females represented more than 30% of the producers and this indicates that females are also active in maize production and any developmental project and therefore it is important to consider the needs and interests of both gender groups. Tables 4.1a and 4.1b present the disaggregated information on sex and highest educational level of the producers and traders engaged in the study. The producers in Ejura Sekyedumase were more educated compared to Techiman; about 48% of producers in Techiman have had no formal education compared to about 5% in

Ejura. The situation was the reverse for the traders. Education is an important parameter as it shows how respondents react to innovations and understand consumer specifications.

**Table 4.1a: Qualitative characteristics of producers**

Variables	Ejura Sekyedumase		Techiman		Pooled sample	
	Freq.	Percent	Freq	Percent	Freq	Percent
<b>Sex</b>						
Male	11	52.4	16	76.2	27	64.3
Female	10	47.6	5	23.8	15	35.7
<b>Educational level</b>						
None	1	4.8	10	47.6	11	26.2
Primary	6	28.6	3	14.3	9	21.4
JHS/ MSLC	11	52.4	7	33.3	18	42.9
SHS	2	9.5	1	4.8	3	7.1
Tertiary	1	4.8	-	-	1	2.4

**Table 4.1b: Qualitative characteristics of traders**

Variables	Ejura Sekyedumase		Techiman		Pooled sample	
	Freq.	Percent	Freq	Percent	Freq	Percent
<b>Sex</b>						
Male	5	52.5	6	85.7	11	73.3
Female	3	37.5	1	14.3	4	26.7
<b>Educational level</b>						
None	3	37.5	1	14.3	4	26.7
Primary	2	25.0	-	-	2	13.3
JHS/ MSLC	-	-	5	71.4	5	33.3
SHS	3	37.5	1	14.3	4	26.7

The summary statistics for the quantitative variables are presented in table 4.1c. The average age of the respondents engaged in the focus group discussion was 44 years depicting an economically active group as defined by Ghana Statistical Service in its 2010 Population and Housing census. With an average experience of 15 years, it shows that the people have a lot of experience in their farming, marketing and transport businesses and can be rational and adept in decision making concerning their businesses. The mean number of years in schooling of six (6) years of the respondents shows that quite a number of the respondents are educated up to the



primary level. With a minimum household size of 3 persons and maximum of 24 persons, there is a wide variation in the household composition in the two municipalities as some households have more members than others indicating high dependency ratios in some households.

**Table 4.1c: Summary statistics of quantitative variables**

<b>Variables</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Deviation</b>
Age	22	77	44.10	11.05
Experience	3	60	15.03	10.79
Years of formal education	0	15	6.21	4.63
Household size	3	24	8.24	3.84
N =42				

## **4.2. Existing Market Standards and its Evolution**

### **4.2.1. Standards in Relation to Weight (Object Standards)**

The standards in relation to weight have not changed much over the years in the study districts. During the discussion, it was realized that non-standardized measuring units were used both in the wholesale and retail markets. In the wholesale market, sacks labeled either as “Makola size 4” or “Makola size 5” are known to farmers and traders. The size 4 was previously used by farmers to package the grains and sell; both at the farm gate and district markets. Prices for the same weight of grains however, differed at the different points of sale and this caused farmers to negotiate with traders to receive the same price at the farm gate. The traders showed disaffection and so introduced the size 5 sack to use the extra weight to defray marketing costs (transportation, loading, off loading and municipal levies) borne by them. In the interim, this was accepted by the two parties. However, as the years went by, traders from big cities re-bagged the size 5 bagged maize into the “Makola size 4 sack” and sold at the price of “Makola size 5.” The local traders who serve as middlemen/women considered this practice unfair since it adversely affected the commission they gained on quantities supplied to the outside traders. Later, in Ejura Sekyedumase Municipality, the local traders petitioned the Municipal Chief

Executive and a market management committee comprising the Municipal Assembly, traditional chiefs, Ghana Private Road Transport Union (GPRTU), and local traders was constituted to deal with the issue of unfair trading practices. There was a concerted effort by the Ejura municipality with neighbouring districts which led to the enactment of by-laws that ensured the banning of the use of “Makola size5” sack in grain trade. In order to ensure compliance, a task force was put in place to check adherence on every market day in the Ejura Municipality. The “Makola size 4” sack then became operational weight in the districts. The challenge in some communities has been compliance at the farm gate where some traders still purchase with the “size 5 sack”. Notwithstanding the acceptance of this local standardized measure, some traders and farmers preferred the use of weighing scales.

In the retail market, several non-standardized measuring units existed with different local names. These include “Rubber kwaku” or “Bambara” or “Awareboni” (ten of which was equivalent to “Makola size 4 sack”). In order to know the actual weight of the size 4 and size 5 labeled sacks, the team conducted actual weighing and found the average weights to be 132kg and 155kg respectively.

Farmers belonging to farmer based organizations in the Ejura Municipality sold the grains to World Food Programme (WFP) under the project “Purchase for Progress” (P4P). WFP buys grains with a standard bag, 50kg which was always confirmed with the weighing scale. Other institutions such as the National Buffer Stock Company (NAFCO) and Nestle Ghana also used weighing scales in their purchases. Some processing centers and poultry farmers purchased grains in non-standardized bags but re-bagged in 50kg after improving quality before selling.

Despite the fact that the size 4 bag of maize in the open market weighs about 132 Kg, WFP combines two 50 Kg bags (which is a 100 Kg bag) of maize and pays the prevailing open market price to its farmers. Their farmers who sell to WFP therefore gained 32% extra maize which translates to 32% extra income. On the other hand, farmers who sell on the open market gain 23 Kg extra maize when there was a change from using 155 Kg to 132 Kg bags as depicted in figure 3. This represents a 15% increase of farmers’ income. Since the municipal assemblies charged GH 1 traders per each bag of maize sent to and from the market, as levies, they are more likely to increase revenues from maize trading in the study areas.



Figure 2: Effect of standard on income

#### 4.2.2. Standards in Relation to Grain Quality Attributes

The grain quality attributes used in local trading tend to mimic the classified grades and standards used by Ghana Standards Authority. There are a number of quality attributes used including prominent ones such as visual appearance, moisture content, grain color, dryness and cleanness. Both producers and traders graded the grains in a similar way using already mentioned attributes as the criteria. The traders however, paid particular attention to the amount of insect damaged grains and presence of foreign materials like stones or broken cobs. Processors on the other hand graded the maize grains based on classifications by the Ghana Standards Authority. Grains not meeting the preferred standard were further processed to maintain the moisture content at 12-13% to increase the shelf life. Details of the attributes used the different actors in the maize value chain are presented on Table 4.2.2a. below.

**Table 4.2.2a: Grain Quality Attributes and Grades by Different Actors**

Municipality	Supply chain actor	Grading standards	How standards are measured by actors
Techiman	Producers	Visual appearance	Inspecting for discolored (blackish or greenish), diseased or insect damaged grains
		Dryness	Biting the grain, rubbing in the hands for high pitched sound, Feeling in the hand for kernel hardness

	Traders	Low moisture content	Absence of moldy grains and greenish colored grains	
		Visual appearance	Absence of foreign materials (stones or broken cobs), insect damaged and discolored grains, grain mixtures	
		Dryness	Feeling in the hand for kernel hardness	
Eben Olam Company Limited		Grade on a 3- point scale (A-C)		
Ejura Sekyeredumase	Producers	Dryness and cleanness	Biting the grain, rubbing in the hands for high pitched sound, Feeling in the hand for kernel hardness, absence of broken cobs and chaff	
	Traders	Low moisture content	Absence of moldy grains and greenish colored grains	
		Visual appearance	Absence of foreign materials	
		Dryness	Feeling in the hand for kernel hardness	
	APC Victory Production and Marketing		Grade on a 3- point scale (A-C)	
	World Food Programme	In addition to the aforementioned parameters, accepted moisture content was 12%		Use of moisture meters to test samples
Green Leaders	Grade on a 3- point scale (A-C)			
Nkoranza				

Source: Field Study, 2016

The grading system used by the processing centers is as explained in table 4.2.2b below which is a simplified version of grades 1-3 developed by the Ghana Standards Authority (GSA). Nestle Ghana Limited required grains of higher standard than those set by GSA which it ensured through further testing abroad. Another prime attribute by Nestle Ghana Ltd was a non-genetically modified maize variety.

**Table 4.2.2b: Grades and Matching Attributes Used by Processing Centers**

Grade	Attributes
A	No color mixtures
	Non-broken of grains

	Absence of molds
B	Presence of few mixed colours
C	Presence of mix colours (over 5%) of other grains
	Presence of moldy grains

Source: Field Study, 2016

#### 4.2.2.1 Evolution of quality standards

Grain quality has not been a prominent matter for discussion in the maize markets until recently; about four (4) years ago. Maize used to be purchased irrespective of its quality. Consumers are now quality conscious because they are mindful of their health. On account of this health consciousness, organized traders' association have obtained the pictorial chart (figure 2) which they refer to as a guide when purchasing maize. This has led to a situation where the quality of maize traded in the market has improved. This chart was however never mentioned among the farmers.



Figure 3: Reference chart for assessing grain quality

#### 4.3. Pricing System

Pricing in the market was based on grain colour, quality attributes and seasonality. Yellow maize had a higher price in both Techiman and Ejura markets. The high price was influenced by the forces of demand and supply. On the supply, side few farmers cultivated the yellow maize which

was in high demand. High quality standards correlated highly with prices. Grains with low moisture content received higher price than grains with higher moisture content (above 13%). On the demand side, the consuming markets awareness of the nutritional value (presence of beta carotene) of the yellow maize is a big factor. Grains of low standards normally termed as “Nkoko aburo” in local language literally meaning “Maize for chicken” was priced lower and usually sold to poultry farmers as animal feed. Other traders who sell the commodity as food sometimes rejected this maize type totally.

The prices of maize in the two district markets at the time of the study were quite similar. At Ejura Sekyedumase, a kilogram of white maize was sold at GH¢ 0.53 and GH¢ 0.76; while that of yellow maize was sold between GH¢ 0.83 and GH¢ 0.91. Similarly, a kilogram of white maize was sold between GH¢ 0.61 and GH¢ 0.75 at Techiman, while yellow maize ranged between GH¢ 0.61 and GH¢ 0.91 as indicated in table 4.4a. The price differences basically were due to the seasonal fluctuations, market forces and grain quality issues. The service charges by the grain processing and storage centers are presented on table 4.4b.

With Nestle Ghana, price is determined after conducting marketing intelligence, and receiving quotations from aggregators who have met the requisite standards. At the time of the study, Nestle purchased maize at the price of GH¢1.15/ Kg from its suppliers. NAFCO on the other hand had a post-harvest committee comprising maize farmers, poultry feed millers and poultry farmers who determined maize price based on total production cost plus 10 % margin.

**Table 4.3a: Grain Prices in Study Areas**

<b>Municipality</b>	<b>Price of white maize/kg</b>	<b>Price of yellow maize/kg</b>
Techiman	0.61 - 0.75	0.61 -0.91
Ejura Sekyeredumase	0.53 -0.75	0.83-0.91

**Table 4.3b: Service Charges for Grain Processing and Storage Centers**

Company	Service Provided	Price (GHC)/ Kg	Unit of measure	Duration
---------	------------------	-----------------	-----------------	----------

ABC Victory Production and marketing company	Drying and cleaning	0.1	50kg	1-month
	Storage	0.007 – 0.0071	135-140kg	1-month
Eben Olam Company Limited	Drying and cleaning	0.18	50kg	1-month
Green Leaders	Drying and cleaning	0.14	50 Kg	
	Storage	0.006	50kg	1-month and beyond

Source: Field Study, 2016

#### 4.4. Effect of Farmer Based Associations on Standards and Grading

The study revealed that, farmers belonging to FBOs have marketing linkages with buying institutions such as the World Food Program (WFP) and large poultry farmers who are conscious of quality standards. Association members then tried to meet specified standards. As an organized group, members periodically benefit from training programs aimed at meeting the grade 1 grain quality required by these institutions. These institutions purchased grains from producers at a standard weight of 50kg using weighing scales. Nestle aggregators purchase from the farm-gate and sort the grains to meet standards required by Nestle. This activity always attracted premium prices from Nestle Ghana. Specific training programs received by FBOs included:

- Ensuring aflatoxin free maize through proper drying to the required moisture content level (12%-13%) to prevent moldiness.
- Removing foreign materials, stones, discolored and broken grains.

#### 4.5. Market Segmentation

The consuming grain market is made of different segments that producers could target. In the study area, four main segments were identified: processing companies, individual traders in and outside municipalities, organized market associations and the poultry farmers' association. The major trading product was the raw maize grain.

All the segments are particular about grain quality and examined it before making purchases. Processors and some poultry farmers further improved the grain quality through sorting, drying

(rapid heating), cleaning and grading before finally packaging. Value added maize grains were sold to organisations like World Food Program (WFP), National Food Buffer Stock Company (NAFCO) and the School Feeding Program.

ABC Victory Production and Marketing Company, Babaso Catholic Centre, Green Leaders Company and Eben Olam Company Limited are some of the local processing companies in the two regions. The Green Leaders and Eben Olam Company procured maize and processed for NAFCO.

Trade associations are very significant in maize trade in the municipalities. They are well structured with defined leadership hierarchy and bye-laws which govern their activities. The leadership facilitates the activities of traders and market agents extensively from the farm-gate to community, district and regional markets. Trade associations include wholesalers, retailers and aggregators. Through these associations, traders are able to supply some West African markets such as Burkina Faso and Niger.

## **4.6 Evaluation of Existing Standards and Preferred standards**

### **4.6.1 Standards by Weight**

In terms of measuring units, two main standards were identified; the size 4 bags (132 Kg), and the use of weighing scales (though this is on a minimal scale). While traders preferred the 132 Kg bag which was not normally weighed, farmers preferred the introduction of weighing scales. It was alleged that the 132 kg bags, could be expanded by removing the inner strands of the sacks to allow for more room for more grains. Traders therefore stand to gain more profit if the size 4 (132 Kg) is continuously allowed in the maize trade. On the other hand, farmers' preference of weighing scale was also motivated by profits drawing lessons from the WFP experience. This difference in measuring units' preference was ironed out during a stakeholder's workshop where both farmers and traders agreed that weighing scales should be introduced in maize trading.



#### **4.6.2 Grain Quality Standards**

Both traders and farmers perceived moisture content to be the most important quality indicator. They use a lot of methods to arrive at the acceptable moisture content level; most of them unscientific. Some of the methods used were:

- Biting with the teeth
- Feeling in the hand: a dry maize makes sound
- Pushing the hand inside the grains to see how far the hand can reach. The farther the hand can go the drier the grain.
- Visual inspection: A dried maize brightens
- Using moisture meters: This is the most accurate method but seldom used by both traders and farmers.

#### **4.6. Options for Introducing Preferred Standards**

The study came out with three options for introducing preferred maize marketing standards. The first option was that, government should take lead in enforcing and influencing standards; and this can be achieved by using its huge procurement power to direct its own buying agencies to purchase high quality maize. The second option is to create a platform of key maize actors so that they can combine their efforts by exerting pressure on their peers and thereby influence standards. The final option is for government to mount massive public education using the mass media on the importance of ensuring quality standards on the health of the citizenry. This will help achieve attitudinal change in the area of maize marketing standards.

#### **4.7. Market Standards, Grading and Pricing Challenges**

The fundamental challenge to standardization of maize markets in Ghana is lack of enforcement and adherence to the standards set by the recognized institutional body (GSA). Appreciable number of producers and end users are not aware of the standards developed by the GSA. The markets are not regulated as weights and measures used in trading are not standardized. This

has resulted in the use of varied weights from 50 kg to 132 kg depending on the buyer at the market centers and 155 kg at the farm gate. Grading of grain was discretionary based on visual appearance, cleanness and moisture levels.

Poor coordination between regulatory agencies was also seen as a major challenge to maize market standardization. Regulatory agencies such FDA, PPRSD, MMDAs, and EPA belong to different ministries and departments which affects their ability to effectively harmonize implementation, approaches and enforcement of regulations developed by GSA. Activities of FDA, PPRSD, and EPA were centralized in the nation's capital with less representation or agencies at the district assemblies.

## **CHAPTER FIVE**

### **CONCLUSIONS AND POLICY RECOMMENDATIONS**

#### **5.1. Conclusions**

The study revealed the dual nature of Ghana's maize market; a local, informal market with generally low standards and a more advanced, commercial market where standards are observed to the letter. The existing standards in maize local markets based on measuring units and grain quality are observed only to a limited extent. Measuring units have evolved from the use of 132 kg to 155 kg and then back to 132 kg. Reverting to the 132kg weight involved a concerted effort between the municipal authorities and actors in the maize value chain through the enactment and enforcement of bye-laws. The introduction of market task forces especially in the Ejura Sekyeredumase Municipality has had a significant impact. Further progress has been made when at a stakeholders' validation workshop both farmers and traders agreed on the use of weighing scales as the method for measuring weights in the domestic maize market. Grain

quality which was not of prime concern years ago has gained significant attention recently due to shifts in consumer purchasing behaviors making it the number one criterion during purchases of the commodity. To enhance compliance with quality standards, and thereby respond to consumers' needs and preferences, trade associations have started using pictorial quality assessment charts to guide their purchases. This chart must be widely distributed among maize actors with intensive education and campaigns for compliance.

The study found that grading of maize grains was done based on individual preferences and criteria. Visual inspection for disease, discoloration, insect damage, broken grains and use of the hand or teeth to check for moisture content were some of the common unscientific methods employed in ascertaining grain quality and grading by most traders and producers. This situation is in contrast with recognized institutions such as World Food Programme, Nestle Ghana Limited, NAFCO and processing centers which were particular about grain quality and used standardized scales and moisture meters to check weight and moisture levels. Nestle Ghana, have the highest standards level of quality and this posed a big challenge for the average farmer to meet. The company never compromised on these standards so before issuing payment cheques for the grains purchased, samples will have to be tested in international laboratories for specific quality variables.

It was found out during the study that another important aspect of the developed standards that was clearly missing in the maize trade the non-use of labels on packaged grains. The requirement is that packaged grains must be well labeled with information such as the net weight (Kg), grade, batch code, registered trade mark, and year of harvest. In the maize markets, pricing of maize was dependent on the grain color, quality attributes as well as the forces of demand and supply and the farming season (major or minor). In the maize market, yellow maize received the highest price. Low priced maize is regarded as of lower quality and this is normally sold to poultry farmers to be used for animal feed.

A major finding of this study is that there is a lot of fragmentation in the efforts of state institutions responsible for implementing and enforcing standards in the maize value chain. This

is against the backdrop that these institutions lack the human and financial resources to discharge their mandates effectively and efficiently.

The study revealed that the adoption of standard weights and measures by the municipal authorities and key actors in the maize value chain through the enactment of bye laws has resulted in income and revenue gains by the farmers and the municipal authorities. The farmers and the district assemblies' gained by 15% to 32 % in addition to other benefits such as healthy and safe commodities.

## **5.2. Recommendations**

The following recommendations are made for policy considerations.

- Maize value chain actors must be supported to form Innovation Platforms to facilitate education and promoting of marketing standards.
- Farmers should be organized into groups to facilitate market access and various training programmes organised for producers and traders to encourage them to make efforts to sort the grains to improve quality. Farmer and trader groups can be supplied with some basic equipment such as moisture meters, mobile solar dryers and weighing scales at subsidized rates.
- Government can use its huge procurement power to ensure that Ministries, Departments and Agencies purchasing maize do so only from accredited warehouses and farmer organizations that follow standards as in the use of weighing scales, moisture content and other quality attributes of maize.
- There should be a massive public education linking quality standards to health and incomes of the citizenry to create the necessary environment needed for attitudinal change. The World Food Programme already has such video documentation which the government can join forces with to speed up. There should be a short jingle or documentary on grain standardization aired on various community information centers.
- Government and other key stakeholders should implement the Warehouse Receipt System (WRS) to stimulate investment in warehouses in the maize growing districts

through the Public Private Partnership. The WRS ensures enforcement of and adherence to the standards, improve the maize value chain and enhance maize grain export as in the case of the East African countries. The WRS also ensures that prices are set for the different grades of maize for the benefit of all actors in the maize chain.

- For effect sustainable changes in standards and grades in the maize markets in the local markets, lessons must be drawn from the grassroot experiences of the two municipal assemblies that enacted the required by laws to compel compliance with the standards.
- There is the need for inter-ministerial efforts in regulating and enforcing developed standards. Ghana Standards Authority may collaborate with District departments of Agriculture, Municipal Assemblies and Food and Drugs Authority to educate maize chain actors extensively on grain standards using the pictorial charts and distribute copies to them. The Ministry of Interior and Transport Union can contribute to enforcing standards on market days drawing lessons from the Ejura Sekyedumase experience.
- To improve market efficiency, a Legislative Instrument (LI) on regulations on agricultural commodities standardization including maize grains is needed.
- Ministry of Food and Agriculture may be resourced financially and through training of its staff to organize pre-planting, pre-harvesting and post harvest meetings for maize value chain actors especially producers as poor grains development start from the field. The Ministry can seek support from other donor institutions. Information on production, harvesting, grain handling, management and standardization in their E-Extension program

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## **APPENDICES**

### **APPENDIX I: Checklists for Farmers**

Demographics

Farmer & Market Based Association and its effects on maize standardization, grading and pricing

Experience in maize production and marketing

Farm level characteristics

Prevailing standards (units of measure, cleanness, aflatoxin, etc), grades (grain sizes, appearance, varietal difference, etc) in maize marketing

History of evolving standards in maize marketing

Maize pricing (Current prices and how information on pricing is sourced)

Transportation (fares and what determines it)

Maize target markets

Maize marketing structure in the districts and Ghana

Awareness of Ghana Standards Authority, their roles and standards set for grains in Ghana

Preferable standards and Grades with reasons

Contractual arrangements and its influence on maize standardization

How are agreements made

Challenges in the marketing (sales) of maize

Copping strategies  
Gender Issues  
Dominating gender along the chain  
Production  
Selling at the farm-gate, buying at the farm-gate  
Selling/ buying at the municipal market  
Transporting  
Can the farmers give us an idea about the cost of producing an acre of maize?  
Land preparation  
Planting  
Weeding  
Harvesting  
Average yield

## APPENDIX II: **Checklists for Marketers**

Demographics  
Market Based Association and its effects on maize standardization, grading and pricing  
Experience in maize marketing  
Maize marketing structure, who are the actors, what do they do?  
Market level characteristics (Volumes purchased/ period (weekly, season))  
Prevailing standards (units of measure, cleanness, aflatoxin, etc), grades (grain sizes, appearance, varietal difference, etc) in maize marketing  
History of evolving standards in maize marketing  
Maize pricing ( Current prices and how information on pricing is sourced)  
Transportation (fares and what determines it)  
Maize target markets  
Sources of their ware and units of measure used during purchases  
After receiving supply, when do you sell?  
Maize marketing structure in the districts and Ghana as a whole  
Awareness of Ghana Standards Authority, their roles and standards set for grains in Ghana  
What of the Ghana grains council?  
Preferable standards and Grades with reasons  
Contractual arrangements and its influence on maize standardization

How are agreements made

Is there cross border trade in maize? What do they look for?

Challenges in the marketing (purchasing and sale) of maize

Coping strategies

Gender issues

Which gender dominates at the farm-gate? Municipal market? At the big cities (Accra, Kumasi etc) outside the municipal market?

### **APPENDIX III: Checklists for Transporters**

Demographics

Membership of associations and its effects on maize marketing

Roles in maize marketing chain

If involved in maize purchases, what are the Prevailing standards (units of measure, cleanness, aflatoxin, etc), grades (grain sizes, appearance, varietal difference, etc) in maize marketing

History of evolving standards in maize marketing

Transportation fares and what influences it

Dynamics between Ghana and Burkina/ Niger maize marketing

Other cross boarder trading

Routes and operational markets

Encounter losses and how is it managed

Maize marketing structure in the districts and Ghana as a whole

Awareness of Ghana Standards Authority, their roles and standards set for grains in Ghana

Preferable standards and Grades with reasons

How these standards are met

Contractual arrangements (any time bounds, if not delivered on time what happens, etc)

How are agreements made

Volumes of maize for the past 5-years

Seasonal variations in the maize trade in terms of volumes and prices  
Taxes paid to the Municipal Assembly  
Commissions earned along the maize marketing chain  
Challenges in Transporting (marketing of) maize  
Coping strategies  
What gender operates in maize transport?  
Who are the owners? Men, women, youth?

#### **APPENDIX IV: Checklist for Nestle Ghana Limited**

The mandate of Nestle Ghana

The mandate of the Regional Agricultural Services sector of Nestle Ghana Limited

Source of maize supply

Do you have some special farmers who produce for you? How different are they from other farmers?

Any contractual arrangement? Verbal, Written?

Are they able to meet your standards? How are they able to meet your standards?

Do you offer any special training for them?

What are your standards in purchasing maize? Measuring units, grading, and pricing?

Price determination of maize: How do you arrive at a particular price?

What varieties of maize do you prefer and why?

Are you able to get them from the local market?

Any achievement in ensuring standardization in the purchasing of maize?

What do you think can be done to improve on maize standards at the market?

Can you assist us with any literature?

## **APPENDIX V: Checklist for PPRSD**

- The mandate of PPRSD
- The Role of PPRSD in developing standards for agricultural products
- What standards do you have for maize? Grain maize and seed maize?
- Standards for measuring units, grading and pricing maize
- The role of PPRSD in enforcing these standards
- How are standards enforced?
- If standards are not enforced why?
- Are there challenges?
- What do you think should be done to improve compliance of standards?
- Any achievements, lessons?
- Can you help us with some literature?

## **APPENDIX VI: Checklist for FDA**

- The mandate of Food and Drugs Authority
- Do you have standards for agricultural products (and maize in particular)? In term of measuring units, grading, and pricing?
- What are the standards?
- Are they enforced?
- If yes, how?
- If standards are not enforced why?
- Are there challenges?
- What do you think should be done to improve compliance of standards?
- The role of FDA in Developing and sustaining standards
- Any achievements, lessons?
- Can you help us with some literature?

## **APPENDIX VII: Checklist for NAFCO**

- The mandate of NAFCO
- Do you have standards for agricultural products (and maize in particular)? In terms of measuring units, grading, and pricing?
- What are the standards for purchasing maize? Quality, measuring unit, grading,
- How maize price determined?
- Who are your clients?
- How are they recruited?
- Where do you operate in Ghana?
- Do you always get the required maize?
- What do you do to ensure that these standards are met by your clients?
- What challenges do you encounter in purchasing maize? In delivering to your clients?
- What do you think should be done to improve compliance of standards?
- Any achievements, lessons?
- Can you help us with some literature?



## **APPENDIX IX: Checklist for MoFA/ GIZ**

- The mandate of GIZ
- The Role of GIZ in developing standards for agricultural products
- What standards do you have for maize? Grain maize and seed maize?
- Standards for measuring units, grading and pricing maize
- The role of GIZ in enforcing these standards
- How are standards enforced?
- If standards are not enforced why?
- Are there challenges?
- What do you think should be done to improve compliance of standards?
- Any achievements, lessons?
- Can you help us with some literature?

## **APPENDIX X: Checklist for WFP Ghana Limited**

The mandate of WFP

Source of maize supply and how

Operational Areas

Do you have some special farmers who produce for you? How different are they from other farmers?

Any contractual arrangement? Verbal, Written?

Are they able to meet your standards? How are they able to meet your standards?

Do you offer any special training for them?

What are your standards in purchasing maize? Measuring units, grading, and pricing?

Price determination of maize: How do you arrive at a particular price?

Any achievement in ensuring standardization in the purchasing of maize?

What do you think can be done to improve on maize standards at the market?

Can you assist us with any literature?