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SEMI-ARID FOOD GRAIN RESEARCH
AND DEVELOPMENT
AU-SAFGRAD

Opportunities and Challenges of Maize Value Chain Development in the Sahelo-Saharan Zone of Africa : A Cross Country Analysis



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ACRONYMS AND ABBREVIATIONS

AU	: African Union
BNDA	: Banque Nationale de Développement Agricole
CAADP	: Comprehensive Africa Agriculture Development Programme
CIMMYT	: International Maize and wheat Improvement Center
CMDT	: Compagnie Malienne de Développement des Textiles
DPAS	: Direction des Productions Agricoles et des Statistiques
DTMA	: Drought Tolerant Maize for Africa
FAO	: Food and Agriculture Organisation
FCFA	: Franc de la Communauté Financière Africaine
ICRISAT	: Crop Research Institute for the Semi-Arid Tropics
IER	: Institut d'Economie Rurale
IITA	: International Institute of Tropical Agriculture
IMAS	: Improved Maize for African Soils

INERA	: Institut National de l’Environnement et de la Recherche Agricole
INRAN	: Institut National de Recherche Agricole
ITRAD	: Institut Tchadien de Recherche Agronomique pour le Développement
NEME	: Nutritionally-enriched Maize for Ethiopia
NPK	: Nitrogen, Phosphorus, Potassium
NGO	: Organization Non Gouvernemental
ONDR	: Office Nationale de Développement Rural
OP	: Organisation des Producteurs
PME	: Petites et Moyennes Entreprises
PNSA	: Programme National de Sécurité Alimentaire
SIM	: Système d’Information du Marché
SIMPA	: Système d’Information du Marché sur les Produits Agricoles
SMEs	: Small and Medium - sized Enterprises
SODELAC	: Société de Développement du Lac
SOFITEX	: Société Burkinabé des Fibres et Textiles
SONAGESS	: Société Nationale de Gestion des Stocks de Sécurité
SSA	: Sub-Saharan Africa
SWOT	: Strength, Weakness, Opportunities and Threats
UEMOA	: Union Economique et Monétaire Ouest Africaine
UNFPA	: UN Fund For Population
WEMA	: Water Efficient Maize for Africa

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FOREWORD

Emerging evidences reveal that poorly developed agricultural commodities value chains coupled with hosts of infrastructure and institutional related constraints hamper progress in achieving commodities' competitiveness and boosting intra-African trade and investments in agriculture. Commodity Value chain analysis helps to indentify actors and activities that increases transaction costs and thereby limit overall chain efficiency. Intervention supports to build livelihood resilience, in a largely agrarian economy, should address key issues of increased productivity and profitability as well as promoting inclusiveness.

Maize is a strategic (food security and income) commodity in the Sahelo-Saharan zone of Africa. It has over the years acquired a cash crop status. The demand for maize and maize products has increased; spurred by development in the poultry-livestock industry, increase urbanization and changing pattern of food consumption. Against this backdrop and in furtherance of its mandate AU-SAFGRAD conducted the study on opportunities and challenges for developing maize value chain in Africa. This present study uses primarily sourced data from sample surveys conducted in four countries (Burkina Faso, Chad, Mali and Niger) in the Sahelo-Saharan zone. The study helps to situate maize supply chain in the one in terms of its competitiveness, efficiency and reliability.

The report adds to the body of knowledge on agricultural commodities value chains development in the Continent. The use of SWOT analysis of activities of maize chain actors presents a robust diagnosis that facilitates understanding of specific interventions needed at different levels to reduce associated transaction costs. The study proffers actionable recommendations that are commodity specific and general and also, target responsibilities for successful implementation. The report is recommended for actors and stakeholders interested in understanding maize markets dynamics towards building a competitiveness of agricultural commodities in Africa and in the developing world in general.

Dr Ahmed ELM EKASS,
AU SAFGRAD Coordinator

EXECUTIVE SUMMARY

Maize is currently the most important cereal crop, in terms of production volume and area cultivated, in Sub-Saharan Africa (SSA); with estimated production and cultivated area of over 71 million tons and 36 million hectares respectively. Maize is cultivated in diverse agro-ecological zones and a key component of different farming systems. It is widely consumed across diverse socio-economic and cultural setting as basic staple, industrial crop and in livestock feed industry. Maize is seen as a dual crop, in production basins: as a food crop and a cash crop to meet the growing demand for food commodity processing and for the animal feed industry. In SSA, over 300 million people depend on maize either as source of food or feed (CIMMYT, 2015). The demand for maize in SSA has increased over the last two decade due to three key factors: (i) increase in population growth with high urbanization and associated changes in eating habits, (ii) the demand from the agri-food industry and (iii) the demand for animal feed. In order to meet the increasing demand, it is necessary to develop the maize supply chain. The analysis of the opportunities and constraints in value chain development presents a bird's eye view of the activities and players in the supply chain whose action impact on overall chain efficiency.

The cross-country study on maize value chain development in the Sahelo-Saharan zone was conducted in four countries (Burkina Faso, Mali, Niger and Chad). The chain wide analysis using SWOT analysis highlights the potentials and constraints associated with the value chain development. The study identified niches for intervention and progress at each node of the chain. The study contributes to AU-SAFGRAD's mandate of building livelihood resilience through the facilitation of research in the continent. This cross-country analysis is from the four national reports with aim to establish similarities and differences along the value chains across countries.

The comparative analysis of the value chains reveals that maize production systems are more or less the same across these countries. At the primary production level, maize production is characterized by traditional systems involving absence or low use of purchased inputs, rain-fed production systems and use of rudimentary farming implements. Most of the farmers grow maize in a context of mixed or single cropping or crop rotation, alternating maize with other agricultural commodities such as cotton.

Post-harvest activities including wholesaling and retailing are characterized by the existence of a large number of small holders involved in collection, assembling, wholesaling and retailing. Commercial activities at the wholesale level is characterized by use of informally sourced market information for price and spatial markets location. Most of the sales contracts and agreements are not written and quality and quantity standards are absent. Processing activities are dominated by Small and Medium - sized Enterprises (SMEs) that add form and time utilities to produce common processed products beer, pasta, couscous and poultry feeds.

Government incentives seldom exist in the countries covered by the study. Enforcement of policy regulations is weak and many sharp practices exist along the chains which limits the chain efficiency and raise transaction costs.

Chapter 1

1.1 Introduction

Agriculture in Sub-Saharan Africa (SSA) constitutes the main income source for nearly 90% of the active population and provides over 50% of export earnings (FAO, 2014). Maize is today the lead cereal crop in terms of production volume and area cultivated in SSA with a production and cultivated area of over 71 million tons and 36 million hectares respectively (FAOSTAT, 2016). This predominance is observed in terms of volumes produced in West Africa where the 2014 production reached 19 million tons. Despite this high level of production the Sub-Saharan Africa balance of trade in maize is in deficit. In 2014, the region imported about 300 thousand tons against 66 thousand tons of maize exports. This gap shows that the local supply is below the demand level. In fact, the food consumption of Sahel countries is mainly based on cereals which accounts for 63% of total calorie intake (Taondyande *et al.*, 2011).

Maize is one of the staple foods consumed by the majority of SSA populations. East and Southern Africa combine consumed the most maize in the Continent. Maize represents almost half of calorie and protein intakes in these countries while in West Africa, maize accounts for only one fifth of calorie intake (Macauley and Ramadjita, 2015). Over 200 million people in SSA depend on maize for food, income and livelihood. (FAO, 2015). Specifically, the contribution of maize in calorie intake per person per day is 19% in Burkina Faso (Guissou et al., 2012); in Mali, it is 35% (USAID, 2010); in Niger, intake is marginal (less than 5%) and in Chad, it accounts for 10% of the total calorie intake.

Maize consumption has increased in SSA over the past decade. The annual average increase rate per capita during the past decade was 8 % in Burkina Faso, 4 % in Mali and below 2 % in Niger and Chad (FAO, 2014). For the first two countries, this increase in maize consumption is due to the increased production in these countries (overall self-sufficient). As for Niger and Chad, this slight increase in consumption is driven mostly by imports than by the local production which remains low.

In order to meet the growing need and build competitive advantages, promoting the development of maize value chain in SSA countries has become a necessity. To this effect, several SSA countries have undertaken actions towards promoting the intensification of production and processing of maize. However, it should be noted that maize production still lags behind the demand. Productivity is low and associated transaction costs are high as there are high inefficiencies at the farm and post harvest levels. Production is characterized by low use of modern farming tools, the poor knowledge of how markets operate and poor quality of processed and marketed commodities.

As part of its supports activities to promote development of strategic commodities, AU-SAFGRAD conducted a study on analyses of the maize value chains in the Sahel-Saharan Africa zone. This action is in line with the Comprehensive African Agriculture Development Programme (CAADP) which is in the core of the efforts by African governments towards accelerating growth and eradicating poverty across the continent as enunciated in the Malabo 2014 declaration.

The structure of the report includes an analysis of the current status of the maize economy in SSA. We considered the main constraints and opportunities in the maize value chains in SSA. Following the review, we proceeded to a comparative analysis among the four countries, including prioritization of intervention links in view at improving chain efficiency (along the chain). The last part is dedicated to the formulation of recommendations to enhance the maize value chains development in the zone.

1.2 Objective of the study

The general objective of the study is to analyze a cross country comparison of the opportunities and challenges in developing maize value chain in Sahelo-Savana zone.

Specific objectives

The following specific objectives were defined, to:

- Conduct a comparative study of the chain, describing the similarities and differences at each level;
- Focus the analysis on the activities implemented and constraints facing producers, collectors, wholesalers, retailers and processors.
- Identify institutional arrangements, public-private partnerships and formal or informal links among the value chain players;
- Analyze gender and youth involvement in value adding activities in order to highlight the decision-making power relations alongside the chain;
- Make policy recommendations towards the rapid development of the maize sector in the zone.

Chapter 2.

Methodological Approach

2.1. Scope of the study

The study covered four Sahelo-Saharan Africa countries namely Burkina Faso, Chad, Mali and Niger. Among the four countries covered by the study, three are located in West Africa and one in Central Africa. A key feature of the economies of the countries is that as land locked countries they depend only on land borders with neighboring countries in facilitating exchange of goods particularly food products. The development of roads and rail infrastructure will fast track trade and transactions. *Figure 1* gives the geographic location of these four countries.

2.2 Geography of the study area

Burkina Faso is bound by Mali in the North and West, Niger in the East, Benin in the South-East, Togo and Ghana in South and Ivory Coast in South-West. The climate of Burkina Faso is a tropical climate of the Sudan-Sahel type (characterized by considerable rainfall variations ranging from mean of 350 mm in the North to over 1000 mm in South-West) with two contrasted seasons: a rainy season with precipitations between



Study countries

Figure 1 : Geographic location of the countries

300 mm and 1200 mm and a dry season. There are three major vegetation zones in Burkina Faso (Sahel¹, Sudan-Sahel² and Sudan-Guinean³). Maize is mostly cultivated in the Sudan-Guinean zone.

With a land area of 1, 267, 000 Km², Niger is one of the largest countries in Africa, it shares borders with seven countries (Algeria, Libya, Chad, Nigeria, Benin, Burkina-Faso and Mali). The Niger climate is of the Sahel-continental type which is characterized by two seasons. There are four vegetation zones (Sudan-Sahel, Sahelian, Sahel-Saharan⁴ and Saharan⁵).

Mali is also a large country in Africa in terms of land area. It has 1,241 238 km². It shares borders with 7 countries (Mauritania, Algeria, Niger, Burkina Faso, Ivory Coast, Guinea and Senegal).

¹ Annual rainfall between 350 and 600 mm

² Mean annual rainfall of 600 mm

³ Annual rainfall between 800 and 1000 mm

The Malian climate is of the Sudan-Sahel type characterized by a short humid season of 4 to 5 months (June to October) and a long dry season of 5 to 9 months (October to June). Four major agro-climatic zone exist namely the pre-Guinean or sub-humid zone⁴ ; the Sudan-Guinean zone, the Sudan-Sahel zone and the Saharan zone.

Chad is a large country right in the heart of Africa with a land area of 1,284, 000 km². It shares borders with 6 countries (Libya, Niger, Nigeria, Cameroon, Central African Republic and Sudan). Its climate is of the continental Sahel type characterized by a raining and a dry season. Chad has three agro-climate zones (Saharan or desert, Sahel and Sudan-Guinean zones)

2.3. Method of Analysis

To achieve the study objectives, a two-fold analysis methodology was used:

- The first is a comparative analysis of the maize value chains among the countries at different levels of players of the value chain so as to shed light on the similarities and differences drawing from the national studies conducted by AU-SAFGRAD in 2015. This step consists of comparing the organizational patterns, functioning, practices and results of each link in the value chain among the countries. The comparative analysis help to assess the maize sector performance in each country. The analysis was based on the maize value chain studies conducted in the four countries.
- The second type of analysis is a SWOT analysis. The SWOT analysis is a strategic analysis tool. It combines a study of the strengths and weaknesses of the sector with that of opportunities and threats in its environment to help define a development strategy. Conducting the SWOT analysis requires two rapid assessments:

⁴ Rainfall between 150 and 350 mm

⁵ Rainfall below 150 mm

⁶ Annual rainfall between 1000 and 1200 mm

- ♦ External rapid assessment that identifies the opportunities and threats prevailing in the environment;
- ♦ Internal rapid assessment that identifies the strengths and weaknesses of the domain of activity.

For a sector performance evaluation, the use of the SWOT analysis is generally focused on the evaluation of the activities implemented. By identifying the factors in its environment that positively or negatively influence the conduct of the activities, the SWOT analysis enables the formulation of strategies.

Chapter 3.

Importance of the maize value chains in Sub-Saharan Africa

With more than 253 million hectares of arable land, Africa is a major producer of diverse food grains such sorghum, millet, maize, wheat and rice (FAO, 2011). The agricultural sector constitutes the driving engine of development in SSA. Subsistence agriculture is practiced by the majority of farmers. The low level of productivity inherent in this production model does not allow producers to derive the necessary income to ensure the sustainability of agriculture (Macauley and Ramadjta, 2015). Cereals (sorghum, millet, wheat, maize and rice) are major staple food items of the majority of the SSA population. In 2014, these cereals were cultivated on a land area of about 90 million ha and the yield was 140 million tons (FAOSTAT, 2016).

3.1. Status of maize production in Sub-Saharan Africa

Over the years, many countries in SSA have increased land area cultivated for maize. The increased in demand for maize and maize products at the household and industrial level have been the driving force behind the increased production. Though the traditional production basins is made up of Nigeria, Benin, Togo, Ivory Coast and Ghana. However, there are new and emerging production basin made up of Burkina, Mali and Guinea (Diallo *et al.*, 2012).

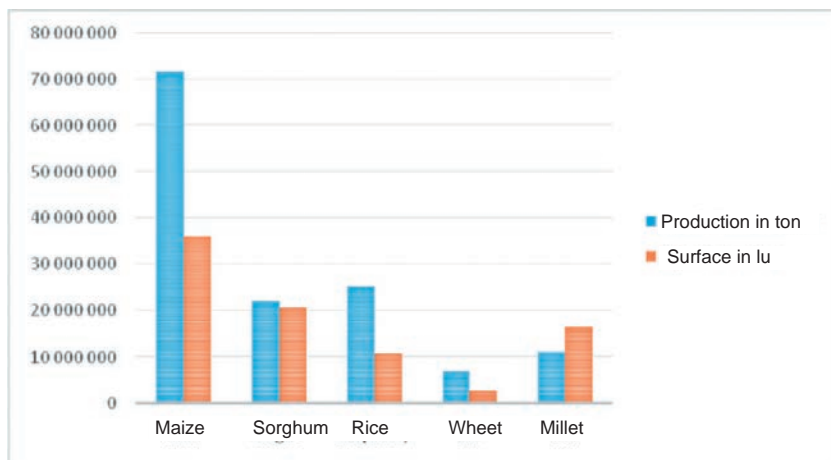


Figure 2 : Surface area and production of cereal crops in Sub-Saharan Africa in 2014

Source: from FAOSTAT data, 2016

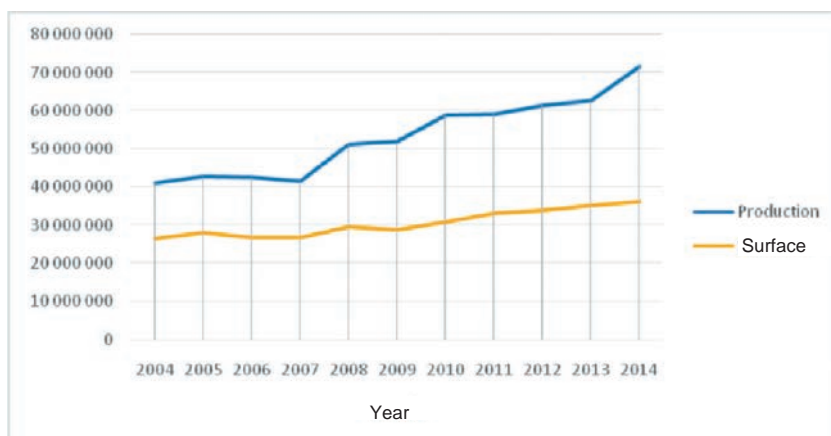


Figure 3 : Trends in maize production and cultivated area in SSA

Source: from FAOSTAT data, 2016

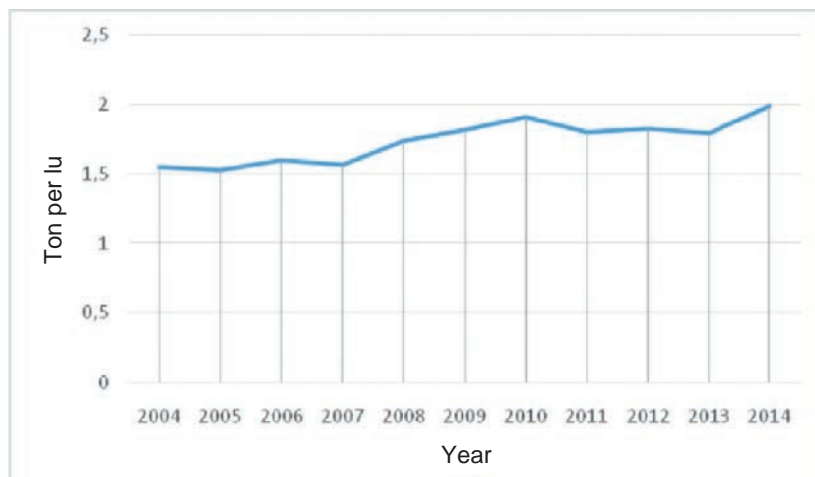


Figure 4 : Trend in maize yield in SSA.

Source : from FAOSTAT data, 2016

Food needs and the increasing demand for animal feed are the main reasons for the growing production of maize. In many SSA countries, maize is rotated in a cropping system with cotton and as such its future is partly linked with growth in rotational crops demand because of the fact that maize benefits from the after-effect of fertilizer use in cotton farming. Maize is generally produced for its grains that are used for human and animal feeding and for its straw which is used as forage for ruminant livestock. In developing countries, straw may account for up to 50 % of the total crop value, especially in years of drought (FAO, 2014).

Maize is an important cereal crop in terms of cultivated area (36 061 702 ha) and production (71 664 645 tons) in SSA. The crop covers nearly 17 % of some 250 million ha of cultivated lands in SSA (FAOSTAT, 2016). It is cultivated in diverse agro-ecological zones and diverse agricultural systems. Figure 2 represents the level of production and cultivated area of major cereals in SSA.

Maize production in SSA has virtually doubled over the past decade. Production has increased from 40 million tons in 2004 to 70 million tons in 2014. This increase is however due to increase in cultivated land which have taken

an upward trend over the past ten years rather than productivity increase. Indeed, as shown in the Figure 2, maize cultivated areas in SSA have increased from 26 million hectares in 2004 to 36 million hectares in 2014.

Marginal increase in maize production in SSA is also due to improvement in yields. Maize yields have increased reaching over 2 tons per hectare in 2014 (figure 4). This is mostly due to the use of purchased inputs and modern farming practices (improved seeds, chemical fertilizers, irrigation, etc). However, the average yield remains far below the global average (about 5 t/ha) (Macauley and Ramadjita, 2015).

The reason for such low yields has been linked to unsustainable production practices, losses due to insect pest damages, diseases and drought. In addition, the low use of farm inputs also leads to low yields. The average use of fertilizers (nitrogen, phosphate) is about 16.24 kg/ha, which represents one sixth of the global fertilizer use of 98.20 kg/ha (FAO, 2010).

3.2. Status of maize marketing and consumption in Sub-Saharan Africa

The maize demand in SSA has greatly increased over the past few years due to three key factors: (i) very rapid population growth combined with increased urbanization and changes in eating habits, (ii) the agro-industrial sector demand and (iii) the demand for animal feed⁷.

Maize is a dual objective crop in production regions: first as a subsistence crop and second as a cash crop to generate incomes through meeting the growing urban demand. In fact, maize is widely produced in SSA where nearly 300 million people use it as a food security and source of livelihood (CIMMYT, 2015).

The key role played by maize as a staple food in SSA is comparable to that of rice or wheat in Asia. The consumption rates are highest in East and Southern Africa (Macauley and Ramadjita, 2015).

⁷ The demand for cereals for animal feed notably cattle, poultry, etc., is increasing year after year.

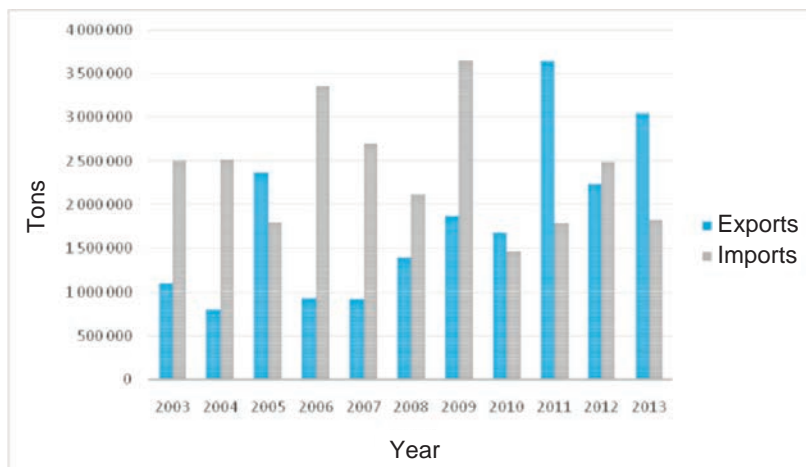


Figure 5 : Maize imports and exports in SSA

Source: from FAOSTAT data, 2016

Out of the 22 countries in the world where maize constitutes the highest source of food calorie in the national diet, 16 are in SSA (Nuss and Tanumihardjo, 2011). The contribution of maize in calorie intake per day is 19% in Burkina Faso (Guissou et al., 2012). In Mali, maize covers 35% of food consumption needs (USAID, 2010). In Niger, the contribution of maize in caloric intake is still marginal (less than 5%). In Chad, maize contributes 10% of the cereals consumed in the country.

Household maize consumption is increasing in SSA. In fact, the annual average increase in maize consumption per capita over the past decade is 8 % in Burkina Faso, 4 % in Mali and less than 2 % in Niger and in Chad (FAO, 2014). For the first two countries, the consumption increase is met by increased production (these countries are generally self-sufficient). For Niger and Chad, this slight increase in maize consumption is mostly met by imports as the local production is still at a low level.

Maize demand and supply in SSA are characterized by deficits and surpluses caused by the year-to-year rainfall variation in the production area.

Maize deficits are greatly filled by imports (commercial imports and food aid). *Figure 5* shows maize imports and exports in SSA over the past decade.

Figure 5 shows that SSA is poised to become a net maize exporter. From 2010, maize exports have outstripped imports. This testifies to an enhanced maize production performance in certain SSA countries. At the national level, commercial flows are intense between production areas and consumption centers, notably urban areas. A significant share of the maize produced in SSA is traded at the inter-country level (Boone et al., 2008). Such intra-African trade flows help to meet the ever growing needs of the informal and small scale agri-food SMEs/SMIs which are widespread in both urban and rural areas. The development of this sector which is critical to value addition is, however, constrained by the weak capacity of the players to generate competitive products that meets regional and international market standards (Soule and Gansari, 2010).

3.3. Programmes and projects in support of maize value chain development in SSA

Several regional projects were designed and implemented in SSA with funds from different donors to improve on-farm productivity level in the last ten years. To a large extent most of the previous interventions have focused on increasing productivity (farm output). The DTMA (Drought Tolerant Maize for Africa), IMAS (Improved Maize for African Soils), WEMA (Water Efficient Maize for Africa) and NuME (Nutritionally-enriched Maize for Ethiopia) Projects are major projects in SSA. They also develop and deploy drought-resistant and nutritionally-enriched maize varieties in SSA. These projects have significantly contributed to the dissemination of improved varieties and to seeds supply.

More than 180 drought-tolerant maize varieties were developed and released by the DTMA project and nearly 52 000 tons of seeds were produced and supplied in 13 SSA target countries in 2014 (Macauley and Ramadjita, 2014). The partners of the IMAS (Improved Maize for African Soils) project have released 11 hybrid and nitrogen-efficient maize varieties and produced 2300 tons of seeds in 2014.

Many maize varieties (drought-tolerant, nitrogen-efficient, etc.) were introduced in East, Southern and West African countries with high potential impacts (Alene et al., 2009; Kostandini et al., 2015). Similarly, as part of the ISMA (Integrated Striga Management for Africa) project, IITA, CIMMYT and their partners in Kenya and Nigeria have developed and released improved Striga-tolerant maize varieties. Some of these projects have also developed improved crop management practices, notably cereal-leguminous plant rotation so as to control the Striga and improve soil fertility (Kamara *et al.*, 2008).

Chapter 4.

Comparative analysis of maize value chain in the four countries (4) countries

4.1. Place of maize in the agricultural economy of the 4 countries

Maize consumption has shown a net progression in SSA over the last two decades. The increase results from the fact that maize is increasingly grown by farmers with higher marketable surplus. These marketable surpluses are 70%, 68%, 35 % and 45 % for Burkina Faso, Mali, Niger and Chad respectively. In terms of cereal production volumes, maize currently ranks second in Burkina Faso. In Mali and in Niger, this cereal ranks third while in Chad, it ranks fourth in terms of cereal production⁸.

⁸ The Trend of maize in terms of surface area, yield and production per country is given in Annex 1

Table 1 : Agricultural significance of maize per country

Maize agricultural performance	Burkina Faso	Mali	Niger	Chad
Classification among other cereals (in terms of volume)	2nd cereal crop	3rd cereal crop	3rd cereal crop	4th cereal crop
Proportion relative to cereal production	32%	20%	12%	11%
Farming Population producing maize	70%	68%	35%	45%
Proportion of cultivated land area	13%	20%	8%	9%
Marketed volume	15%	Less than 50%	Less than 10%	Very low
National average yield t/ha	1,5	2,5	0,7	1,3

Source: AU-SAFGRAD's country reports

4.2. Comparison of maize value chain organization

Overall, the maize sector has the same pattern of organizations in all the four countries. It is composed of direct and indirect players. Direct players are: producers, collectors, semi-wholesalers, wholesalers, retailers and processors (*Figure 6*). Indirect players are: input and farm tools suppliers, credit institutions and institutions in charge of research and extension services as well as, technical and financial players.

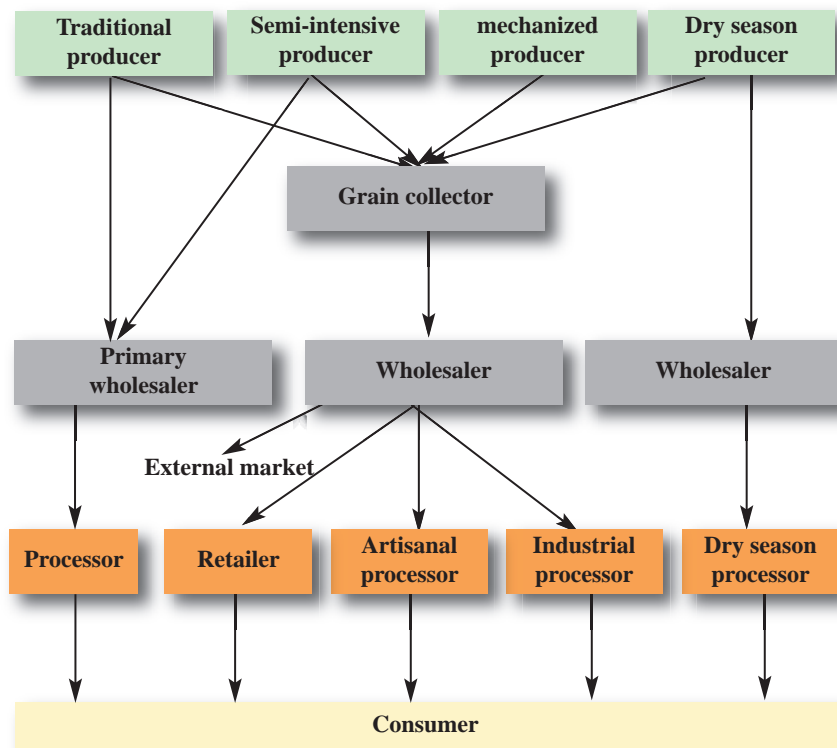


Figure 6 : Summary of maize marketing channel in the 4 countries

4.3. Comparison of maize production system

The production systems are the same in all four (4) countries. Maize is produced in intensive or extensive units under rain-fed agriculture. Cultivation along seasonally flooded plains and water ways is also very common across the countries. Animal draught is used for soil preparation while animal dungs are used by most farmers as farm yard manure in the farms. Another type of integration is the use of agricultural income for purchasing livestock for fattening and sale. This is a form of partial integration as the material exchange is minimal. The income thus generated is used for buying seeds and fertilizers for the next planting season. *Table 2* shows the main characteristics of maize production systems per country.

Table 2 : Maize production system per country

	Burkina Faso	Mali	Niger	Chad
Production mode	- Rainfed - Irrigated - Extensive - Single cropping - Traditional	- Rainfed - Irrigated - Extensive - Single cropping - Traditional	- Rainfed - Irrigated - Extensive - Single cropping - Traditional	- Rainfed - Irrigated - Extensive - Single cropping - Traditional
Agriculture-Livestock integration	yes	Yes	Yes	Yes
Sowing period	2 Periods - May – June - November	2 Periods - June – July - November	3 Periods - May - July – August - November	3 Periods - April - June – July - October – Nov
Type of variety used	-Local ** -Improved ***	-Local * -Improved ***	-Local * -Improved ***	- Local ** - Improved ***
Rotation system	Triennial system Cotton – maize-sorghum -	Triennial system Cotton – maize – millet or sorghum	Triennial system Maize – Sorghum or millet – market gardening.	Triennial system Cotton – Maize– millet/ Sorghum
women and youth involvement in	Weeding, clearing, sowing and post-harvest activities	Ploughing, sowing, clearing and post-harvest activities, transport	Storage, transport and post-harvest activities	Ridging, phytosanitary treatment, post-harvest activities
Grouping membership	Large	Large	Large	Large

Source: AU-SAFGRAD's country reports(2015); *: intensity of use

Table 2 shows that maize production systems in the four countries are similar. The fact that the countries share the same socio-economic, prevailing agro-climatic conditions and cultural realities may be responsible for this.

In terms of primary production, the traditional mode of production is the extensive type with use of rudimentary farm tools. Maize is cultivated as a sole crop and it is seldom mixed with other crops. The rainfed system is predominant but irrigation (cultivation in low lying plains) is fast expanding with increasing water stress and development of dry season farming. Two types of maize are cultivated in the 4 countries; white maize and yellow maize. White maize is mostly grown for household consumption while yellow maize is sold by the producers. The seed varieties cultivated are, in most cases, the improved varieties. The varieties give higher yields and are also early maturing and resistant to insect pest and harsh climate condition from water stress.

There are two maize growing seasons⁹ in Burkina Faso and in Mali while Chad and Niger have three¹⁰. This difference is due to the existence of developed land areas (low lying plains) that make it possible to have several production rounds. Major rotation crops in the maize growing areas are cotton and other cereal crops such as sorghum and millet. In some cases, leguminous crops (cowpea, groundnuts) are included in this traditional rotation system.

Women and youths are involved in maize production at different levels of the production chain, predominantly in sowing, harvesting and post-harvest activities.

4.3.1 Access to farm implements, inputs and land

Table 3 indicates that access to modern farm technologies and innovations remains low in all countries. The level of fertilizer and pesticides use is low and below the recommended amounts. The most commonly used chemical fertilizers are NPK and Urea.

⁹ A period during the rainy season (sowing between May and July) and a period in the dry season (sowing in November)

¹⁰ Two periods in the rainy season (April and June – July) and a period in the dry season (sowing in November)

The use of improved seeds is becoming a reality even though accessibility to these seeds is still challenging to the majority of farmers.

As for credit access, only Chad has enabling conditions for agricultural producers with the availability of government micro-finance institutions. In the remaining countries, informal credit sources and personal savings are the major source of farm business financing as access to formal credit is limited. The main issues relating to formal credit access are similar across the 4 countries. These are (i) absence of collaterals for producers; (ii) inadequate number of credit institutions; (iii) time-consuming and complex documentation required from producers.

Table 3 : Cross country comparison of access to production inputs

Maize agricultural performance	Burkina Faso	Mali	Niger	Chad
Modern farming tools	Very low	Very low	Very low	-
Type of chemical fertilizers	NPK, Urea, phosphate	NPK, Urea, phosphate	NPK, Urea	NPK, Urea
Pesticides treatment	Very low use	-	-	-
Credit access	Low	Low	Low	High
Land access mode	Inheritance, donation Borrowing, rental and purchase	Inheritance, donation borrowing, Rental and purchase	Inheritance, purchase, rental, borrowing	Inheritance, purchase and rental
Type of workforce	-Family -Salaried -Community mutual aid	-Family -Salaried -Community mutual aid	-Family -Salaried	- Family - Salaried
Market information system	Poor accessibility	Good accessibility	Poor accessibility	Poor accessibility
Fallowing:				
- Practice	Very low	Very low	Nil	Very low
- Average duration	2 years	2 years	-	2 years

Source: AU-SAFGRAD's country reports (2015), - data not available

Issues of access to land are also, fairly similar across the countries. Farm land are acquired through inheritance, donation, rental and purchase. Fallowing is at a low level in all 4 countries, for the few farmers that practice it, the average duration is 2 years. The reasons behind the disappearance of this farming practice are rural population growth, rapid urban development and climate change effects (land degradation) among others.

4.3.2 Farm labour use

Family labour constitute the major source of farm labour used in maize production. Occasionally, paid labours are employes/engaged and their engagement can either be permanent or temporary for certain agricultural tasks. The temporary/casual labourers are mainly employed for specific (task time-bound critical operations) such as sowing, weeding and harvesting, The daily wage rate paid are highly variable depending on activity and also the country (XOF 2000 in Mali, XOF 1000 to 1500 in Burkina Faso).

Also, in Burkina Faso and in some communities in Mali, community cooperative labour assistance is used so as to avoid hiring salaried laborers. Such mutual aid is a cultural form of solidarity in the farming and rural areas. With some exceptions, it is practiced following gender-based labor division patterns. It appears that men are generally called upon for weeding and crop maintenance and women for sowing, harvesting and transport. This form of mutual aid is not observed among maize producers in Niger and Chad.

4.3.3 Women's participation in maize production activities

Maize production involves men, women as well as children, from the sowing period up to harvesting. *Table 4* shows farming activities where women are deeply involved in maize production in the 4 countries.

Table 4 : Women's participation in maize production activities

Farming activity	Burkina Faso	Mali	Niger	Chad
Clearing				
Land preparation				
Tillage		X		
Planting	X	X	X	X
Weeding	X	X	X	X
Ridging		X	X	
Fertilizer application	X			
Pesticide application				
Harvesting	X	X	X	X
Threshing and winnowing	X	X	X	X
Bagging			X	X
Transport to home	X	X		

Source: AU-SAFGRAD's country reports (2015)

Table 4 highlights that women's involvement in maize production is intense in sowing, weeding and harvesting activities in the 4 countries. Land preparation activities (clearing, cleaning, tillage, etc.) are exclusively done by the men in the 4 countries, except Mali where women are often involved in tillage.

In Burkina Faso, women also participate in fertilizers applications and transporting harvested crops from farm to home. In Mali and Niger, in addition to the above-mentioned tasks, women are involved in ridge/mould making. Moreover, it is observed that women are seldom involved in pesticides treatment; this activity is the preserve of men.

The level of female involvement in post-harvest activities is fairly similar from country to country with slight differences. Harvesting, threshing, winnowing and milling are done by women, basically in homestead. In Niger and in Chad, in addition to threshing and winnowing, women take care of bagging, sorting and grading while in Burkina Faso and Mali, they are also

responsible for transporting the harvest from farm to their houses.

In fact, in the 4 countries, women are more involved in sowing, harvesting and post-harvest activities. Among the 4 countries, Chad stands out for the low participation of women in maize production.

4.3.4 Sources agricultural information for producers

The availability of agricultural information is critical to efficient decision-making and enhancement of competitiveness. Farmer to farmer interaction and radio messages constitute the main agricultural information sources for rural households in the 4 countries. Government institutions give radio and other mass media information on rainfall and critical dates for sowing, weeding and harvesting. In Mali and Burkina Faso, commodity prices are also broadcasted on radio and TV.

There are technical information services provided by agricultural extension institutions to inform farmers on technical requirements and operation timing. There are also, specialized agencies providing market information systems (MIS). These MIS (SONAGESS and Afrique verte in Burkina Faso, SIMPA of DPAS in Chad) provide real time information. Additionally, the maize producers living in cotton producing areas benefit from information and extension services from cotton companies (SOFITEX in Burkina Faso, CMDT in Mali, and SODELAC in Chad). All producers have access to commodity price information on markets through exchanges among producers (farmer to farmer). Other producers have access to agricultural commodity prices on the various markets through their Farmer Organization or through their warranty activities.

4.4. Cross country comparison of government support services

In the countries covered by the study, government support services received by farmers are not commodity specific. It is in general provided within the framework of a comprehensive mechanism put in place by the authorities for cereal crops development. The authorities of the 4 countries support the farmers to boost cereal production through subsidies and even free distribution of improved seed varieties, as well as subsidized cost of tilling and fertilizers (50% in Mali).

The survey, conducted among maize producers within the framework of the maize value chain analysis in each country, has shown that the farmers are well aware of these government incentives though most lack her capacity to access them. *Table 4* presents the various types of supportive actions undertaken.

In addition to the measures taken by governments in terms of inputs and equipment provision, some of the producers receive advisory services.

The government of Mali and Chad have put in place specific financial structures to facilitate farmers' access to farm credit. In Mali, the government through a security fund, supports agricultural producers by creating a bank pool led by the National Agricultural Development Bank (BNDA). The pool combines public and private banking system funds and finances agricultural activities by giving out loans to individual producers and farmers' organizations.

Table 5 : Different types of government support by country

	Burkina Faso	Mali	Niger	Chad
-Fertilizer subsidizing	-Fertilizer subsidizing (50% of the price)	-Fertilizer subsidizing	-Sensitization and information	- Sensitization and information
-Improved seeds subsidizing	-Improved seeds subsidizing	-Sensitization and information	-Technical guidance	-Technical guidance
-Distribution of farming tools		-Technical guidance	-Hydro-agricultural developed land management	-Hydro-agricultural developed land management
-Renting of farming tools	-Sensitization and information	-Hydro-agricultural developed land management	-Agricultural bank	-Agricultural bank
-Training and sensitization	-Technical guidance		-Farming tools renting	-Farming tools renting
-Technical guidance	-Agricultural banks		-Training and sensitization	-Training and sensitization
	-Pricing		-Technical guidance	-Technical guidance

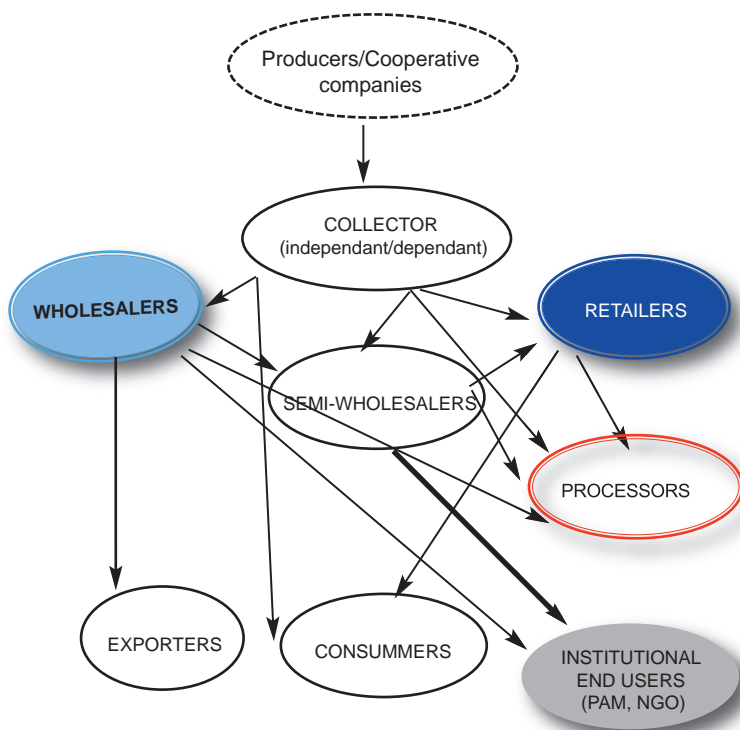
Source: AU-SAFGRAD's country reports

In Chad, a ministry in charge of microfinance was created to support financial accessibility for farmers. The government has undertaken through this ministry, to move towards poverty reduction at short term, by granting loans to the poor segments of the population.

4.5. Comparative analysis of maize marketing in the countries

In the 4 countries, maize marketing, like for other dry food grains, involves several categories of market actors. Depending on the volume sold and financial capital, the players include collectors, retailers and wholesalers.

Figure 7 : Maize marketing Channel in the study are



4.5.1. *Collection networks*

Maize collection in the 4 countries is carried out through pyramidal and highly structured market networks. A market network or chain is a commercial system made up of different players with different functions that are undertaken for economic reasons interdependently by the players. Among the functions carried out, we have collection, financing, assembly, brokerage, packaging, accommodation of actors, price information provision, storage, transportation etc. At the top of network is the head who is a wholesaler and owner of the capital. His or her residence and warehouses are generally located in urban centers.

A second type of marketing network involved collectors and wholesalers. The collectors are dependent collectors as they are financed by the wholesalers. They are usually located in the municipalities close to the producers or primary markets. They receive commissions for procurement on behalf of one or more wholesalers or middlemen. They are responsible for collection and as such, they receive money and grain storage bags and also instructions on maize prices, quantities and quality from the wholesalers.

Finally, there are independent collectors who buy cereals with their own funds, store them over some period and resell to the wholesalers and processors. Some of these independent collectors work with producers from whom they directly collect the commodity of farm gate or village market level. There are no formal contracts between them, but relationships that are based on mutual trust and confidence or kinship.

4.5.2. *Comparative analysis of collectors in the 4 countries*

The maize collection mechanism is the same in all four countries. Collectors are men and women that gather small quantities especially in the rural markets or producers locations that take place on a weekly basis. They are also involved in farm level purchase. The collectors are not specific to types of cereals collected, they collect multiple cereals. The number of collectors is highly variable and a collector may cover several weekly markets in his or her zone.

There are two types of collectors in the 4 countries: independent collectors and those working for a wholesaler. Independent collectors have their own capital, purchase the commodities on the basis of their own criteria (price, quality etc.). Dependent collectors are most often linked through agreements or contracts to wholesalers to whom they deliver the goods. Dependent collectors often receive funds from wholesalers. Women and youth involvement in the maize collection process was observed to be very high at different levels, depending on countries.

The pricing mechanism at collector level follows the same process in all four countries. The collectors set the selling price on purchase prices and other associated costs incurred. The season/time of sale affects the price on market basis (wholesaler and retailer). In addition, other parameters such as distance and the purchase period are taken into consideration by the collectors in setting the price. For the agent (dependent) collectors, the wholesalers usually impose a price ceiling that the collectors should not exceed.

4.5.2.1 Storage infrastructure and transportation means of collectors

Three types of storage infrastructure exist at the level of collectors: warehouses, sheds (kiosks) and homes (rooms). The warehouse which is the most appropriate storage infrastructure, is generally owned by the big collectors, usually the independent types.

One of the main challenges facing the collectors is that of storage lack a suitable storage structure. The storage structures used are often dilapidated which causes the deterioration in quality of the stored products and infestations from pests. This reduces the quantity, quality and economic value of stored grains.

Table 6 : Comparison of maize collection arrangements across the countries

Maize agricultural performance	Burkina Faso	Mali	Niger	Chad
Collection system	-purchase from producer - Local or weekly markets	-Purchase from producer -Local or weekly markets	-Purchase from producer -Local or weekly markets	-Purchase from producers -Local or weekly markets
Type of collectors	Dependent and independent	Dependent and independent	Dependent and independent	Dependent and independent
women and youths involvement	yes	yes	yes	yes
Pricing mechanism	-Market price -Periodicity -Distance travelled	-Market price -Periodicity -Distance travelled	-Market price -Periodicity -Distance travelled	-Market price -Market information system

Source: AU-SAFGRAD's country reports (2015)

Table 7 : Transportation method and storage infrastructure for maize collection per country

	Burkina Faso	Mali	Niger	Chad
Storage infrastructure	-Shed -House	-Shed - House	- Shed - House	-Warehouse - Shed - House
Transportation means	-Bicycle -Motorbike -Cart	- Cart -Motorbike	- Cart - Motorbike	- Cart -Motorbike
Quality criteria	-Cleanliness -Grain size	- Cleanliness - Grain size	- Cleanliness - Grain size	- Cleanliness - Grain size
Government support	-Color No support	- Color No support	- Color No support	- Color - Credit access facilitation - Technical advisory services

Source: AU-SAFGRAD's country reports (2015)

Most collectors have their own storage and transportation means in the villages. Animal driven carts and motorbikes are used in collecting and assembling produce in each community. Others rent temporary storage space.

Collectors in Burkina Faso, Mali and Niger receives no support from their respective governments unlike those in Chad. In Chad, the National Rural Development Office (ONDR); National Food Security Programme (PNSA) and Lake Development Company (SODELAC) support the collectors' activity in terms of credit access (facilitation) and technical advice (storage advisory services).

4.5.2.2 Main sources of loss and loss minimizing practices

Losses at collector's level are observed during the following operations:

- Sorting and grading during the purchase of the commodity from farmers.
- Transportation: the poor state of roads and use of poor quality bags also cause losses during transportation.
- Storage: storage infrastructures are not generally up to standards; this often allows commodity attacks by insects and other pest.

The collectors met in the respective countries do not resort to formal insurance for loss limitation. However, the collectors have developed strategies and initiatives towards reducing losses. All the initiatives found in the countries are described in Table 8.

Table 8 : Measures adopted in reducing storage losses at collectors' level

Practices aimed at reducing losses	
Burkina Faso	<ul style="list-style-type: none"> - Use of good quality bags - Risk-based purchase price reduction (state of roads) - Use of a measurement tool that increases the quantity, - Weight reduction (reduction in quantities)
Mali	<ul style="list-style-type: none"> - Use of good quality bags - Treatment against insects in warehouses
Niger	<ul style="list-style-type: none"> - Use of good quality bags - Treatment against insects in warehouses
Chad	<ul style="list-style-type: none"> - Use of good quality bags - Purchase of dry grains, accurate measurement - Preservation with chemicals - Bag volume reduction at the time of selling - Bag probing, use of measurement containers

Source: AU-SAFGRAD's country reports (2015)

Maize collection activities in the countries are limited by a number of factors, some of the major limitations are (i) Low purchasing power of collectors and absence of financial support to purchase large quantity at harvest (ii) high price variability (iii) poor state of roads and transportation means and (iv) absence of good storage structures in most rural markets.

4.5.3. Comparative analysis of wholesalers' activities across the countries

The wholesalers are by far the most important and influential player in the dry cereal marketing system. The wholesaler wields a very powerful influence in maize marketing system. They can influence the prices to a considerable extent. There are several types of cereal wholesalers that can be grouped under two categories: (a) wholesalers that are based in production zones and (b) those based in urban centers. It is the urban based wholesalers that provide the bulk of funds for cereal collection and assembling, as well as transportation from production zones to consumer markets. The urban center wholesalers are located in urban

markets and many of them have collection networks in rural locations that buys in bulk from the rural collectors/farmers. The urban wholesaler are most times the driving engine of the commercial maize system because they are the ones that finance the collection networks.

In Chad and Niger, most wholesalers have formal contracts with the collectors unlike in Burkina Faso and Mali where the relationship between these two types of actors is informal. Wholesalers are generally supplied by the collectors based on trust or kinship relationships.. The wholesalers also collaborate with farmer groups youth and women's cooperatives that supply them with commodities based on verbal agreements. However, their main supply sources remain the collectors. It is common practice for a wholesaler to have one or more collectors in the same market.

Most wholesalers in Burkina Faso, Mali and Niger reported that these are no government financial assistance by way of credit to support their transaction activities. However, in Chad credit facilitates and adversary service on efficient storage techniques are provided by public agencies.

In all four countries, female and youths were involved in varying degree in wholesale activities. However, majority of the wholesalers are men. Women and youths are mostly involved in sales operations as workers employed by the wholesaler for collection, cleaning, loading or goods delivery. Women are mostly collectors and cleaners.

In all four countries, wholesalers are the only intermediaries that have a high capital outlay in grains trade. This enables them to not only purchase huge stocks of local commodities but also to influence prices and quality standards. Unlike collectors, wholesalers have storage warehouses and often own trucks for maize collection and transportation to warehouses and factories of processors. The storage duration is highly variable depending on demand and prices. Some wholesalers store maize over a long period (5 to 6 months) and then sell it at higher prices to the retailers, processors or exporters and take advantage of market opportunities.

4.6. Comparison of maize processing across the countries

In all four countries, processing units get their supplies from wholesalers, collectors and farmers' group. The processing mill sets quality standard for purchase grains and when they use buying agents the agents negotiate prices based on the quality requirements. Common quality requirements include cleanliness, absence of foreign matters, absence of mold and moisture in the grains. The relationship between suppliers and processors are of the informal type, however, in some instances, there are formal contracts to secure future supply.

Table 11 : Comparison of Maize retailing activities

	Burkina Faso	Mali	Niger	Chad
Selling Mode	-Bulk selling -By women basically	-Bulk selling -By women basically	-Bulk selling -By women basically	-Bulk selling -By women basically
Type of transportation means	-Cart -Motorbike -Bicycle	-Cart -Motorbike -Bicycle	-Cart -Motorbike	-Cart -Motorbike
Storage infrastructure	-Shed -House	-Shed -House	-House	-Warehouse -House
Pricing mechanism	Purchase price increase at wholesaler level	Purchase price increase at wholesaler level	Purchase price increase at wholesaler level	Purchase price increase at wholesaler level
Credit access	Low	Low	Low	High

Source: AU-SAFGRAD's country reports (2015)

The majority of processing units are small sized enterprises of the artisanal to semi-modern type. Industrial units for maize processing are very few in the four countries. Maize processing is at the primary stage and mainly restricted to threshing and milling activities. Products from maize include flour, semolina, local meals (maize cakes, biscuits, pasta) and livestock feeds. Most of the products from maize meals and flours are not branded but sold as generic products.

Table 12 : Main characteristics of maize processors per country

	Burkina Faso	Mali	Niger	Chad
Supply source	-Wholesaler -Collector -Producer Grouping	-Wholesaler -Collector -Producer Grouping	--Wholesaler -Collector -Producer Grouping	-Wholesaler -Collector -Producer Grouping
Type of supplier contract	Informal Agreement	Informal Agreement	Informal Agreement	Informal Agreement
Type of processors	-Artisanal -Semi-modern -Industrial	- Artisanal -Semi-modern	- Artisanal -Semi-modern	- Artisanal -Semi-modern -Industrial
Processed commodities	-Semolina - cattle feed - Local meals - Flour	-Cattle feed -Semolina -Flour - Local meals	-Couscous -‘Degue’ lumps, -Flour -Cakes, - Biscuit,	-Local beer -Couscous -Flour -Cakes - Biscuit
Quality Certification	None	Label for some commodities	None	None
Women’s and youth involvement	Deep involvement	Deep involvement	Deep involvement	Deep involvement
Government support for processing	No support	No support	No support	Credit access facilitation

Source: AU-SAFGRAD’s country reports (2015)

Artisanal maize processing is the preserve of women. The youths are employed in industrial and milling units.

The independent processor may have direct agreement with a supermarket that displays his or her commodities on the shelves. Unsold commodities are returned to the processor. The industries may have contract-based relationships with the user.

The processing sub-sector is gradually evolving due to activities of NGO's and some development partners. It remains however embryonic due to poor structuring of the sector, absence of appropriate equipment and also poor grain quality that hinder the marketing of satisfactory products. In addition to this, barriers to the development of the maize value chain development are: price fluctuation, low market integration, inadequate road infrastructure and difficult access to credit.

4.7. Comparative analysis of margins realized by players across the countries.

Table 13 shows net margins per kg of maize transferred at the level of the various players involved in the maize marketing. The Table indicates that all the actors recorded positive returns on investment from maize value adding activities.

In terms of production, Burkina Faso's farmers get a net profit margin of XOF 49 /kg while those of Mali earn XOF 18 F/kg of maize produced. Maize marketing involves several categories of actors. The margin realized depends on capacity of the various actors in terms of volume of stocks handles. Though the same trader may sell several cereals, the charges vary on the basis of sold volumes and market opportunities. Profits also vary depending on the

Table 13 : Profit margins per kg of maize for the maize sector in the 4 countries

Net profit margin /kg in XOF	Burkina Faso	Mali	Niger	Chad
Producer	49	18	np	np
Collector	14	12	np	np
Wholesaler	52	5	np	np
Retailer	31	10	np	np
Processor	np	np	np	np

Source: AU-SAFGRAD's country reports (2015); np: data not provided in the country

period/season (harvest time or lean period) and type of operator. In Burkina Faso, profit margins at different level are XOF 14, 52 and 31 respectively for collectors, wholesalers and retailers. In Mali, a profit margin of XOF 10 to 15 was noted for collectors; XOF 5 for wholesalers and XOF 10 for retailers. All these profit margins show that the trade is profitable to all operators involved in it.

However, with the little margin per kg, the traders increase their income by increasing sold volumes.

The highest profit margin in Burkina Faso was observed at wholesaler level (XOF 52) while in Mali, farmers earn more (XOF 18). Profit margins among actors do not vary much in Mali compared to Burkina Faso where the gap between the highest margin and the lowest is XOF 38. The availability of a reliable high value market is a needed incentive to increase production at the farm level. A stable distribution niches with fair prices would motivate producers.

There is relatively little value-adding activities carried out by processors due to the low level of development of the maize processing sector. However, the processing sector has ample room for progress and genuine prospects for improving the maize value chain. The promotion of the processing sector requires better processing techniques (processing, packaging, etc.) and marketing techniques. Branding and labelling of products is necessary for traceability and to ascertain quality and health safety standard of food items. This traceability factor is a reliability and confidence benchmark of the product for the consumers.

Chapter 5.

Main constraints and opportunities in the maize value chain in the four countries

In this section, we will discuss the main constraints and opportunities found at each link of the maize value chain.

5.1. Constraints and opportunities in maize production in the 4 countries

The analysis of the maize production system helps to detect some development opportunities available. The main maize production opportunities in the four countries surveyed are given in Table 14.

Among these opportunities, one can first mention the existence of an ever growing demand for maize for both human and livestock feeds industry. In fact, the high rate of population growth and urbanization in the continent is an incentive to increase production from the associated increase in demand.

The existence of institutional support R&D structure in the countries provides opportunity for development of the maize value chain. The national research centers (INERA in Burkina Faso, IER in Mali, INRAN in Niger and ITRAD in Chad) and other international research institutes with mandate for maize research (ICRISAT) provide opportunity for research support. The research centers have developed production technologies and maize varieties that are high productive, tolerant to the harsh climatic condition and adapted to different agro-ecological zones. These improved varieties give good prospects to sustainably scale-up maize production. There is also the availability of a massive pool of local skilled workforce that are involved in production and other value adding activities along the maize chain.

Maize production is hampered by climate change effects, loss of soil fertility associated with land degradation, inadequate and erratic rainfall. In the face of the current trends in climate change in SSA, it is estimated that the production of major cereals would decline by as much as 20 % by the mid-century (Schlenker and Lobell 2010).

Table 14 : Constraints and opportunities in maize production in the 4 countries of study

Opportunities	Constraints
<ul style="list-style-type: none"> ▪ Dominant crop – livestock Integration; ▪ Existence of research centers and innovative techniques; ▪ Availability of favourable soil and climatic factors; ▪ Availability of skilled workforce; ▪ Presence of farmer organizations; ▪ Development of new urban centers (increasing demand); ▪ Processing development and emerging livestock feed industry 	<ul style="list-style-type: none"> ▪ Extensive and traditional production system; ▪ Inadequate rainfall; ▪ Poor adoption of improved varieties; ▪ Farm land degradation; ▪ Low use of chemical fertilizers; ▪ Low use of pesticides; ▪ Low agricultural credit accessibility; ▪ Lack of modern agricultural equipment; ▪ Low MIS accessibility ▪ Absence of support infrastructure such as roads and market

Source: AU-SAFGRAD's country reports (2015)

The major constraint to increasing productivity remains the use of outdated and rudimentary means such as the use of outdated farm inputs. The farmers have little or no access to credits, fertilizers and pesticides. Maize production is particularly limited by use of adequate pesticides treatments despite the high disease incidence from pests and parasitic plants. In addition, the adoption of improved maize varieties has remain low in the countries. The problem of limited financial capacity of farmers; low availability of improved seeds; lack of information on available and affordable seeds are issues associated with low productivity.

Another major constraint observed in maize production is the low level of mechanization. The agricultural mechanization system is weak in these countries, the average tractorization rate in the area is 11 tractors per 100 km² (FAO, 2014). This low level of mechanization in African agriculture means that production method are most time manual and burdensome. This not only discourage youths involvement but also raise the production cost and reduce land productivity. Also, inadequate government incentives is a barrier to maize value chain development. There is little or no governmental policy support to incentivize production or other value-adding activities. Where the policy exist, implementation and enforcement are low that the producers do not feel the impact. Public investment in production (agricultural research financing, extension services, innovation release, infrastructure etc) are at a low level, which is another barrier to improvieng maize production.

5.2. Constraints and opportunities in maize marketing in the 4 countries

The maize marketing sector is confronted with daunting challenges that raise transaction cost and limits efficiency of the transaction activities. First, there is little or no distinct and functional organization to encourage horizontal linkages and integration. The chain actors, most times, act independently and does not receive inputs of information from either upstream or downstream players. The absence of a strong linkage among the players results to inefficiencies in coordination and reduction of bargaining power and margin realized.

This situation encourage concentration of power on few actors that have negotiation advantages. The absence of a genuine maize price regulation policy which leads to permanent price volatility. Also, like the farm level constraints, absence of infrastructural supports such as market structures, good road and transportation infrastructure etc limits efficient marketing activities. Another hindrance is the lack of government support to maize marketing players. *Table 15* shows all constraints observed in maize marketing in the four countries involved in the study. There exist marketing opportunities from UEMOA tax and commercial policy harmonization and integration programmes. The programmes cover:

- (i) Inter-regional trade facilitation;
- (ii) Public-private partnership development in infrastructure building;
- (iii) Current tax and administrative policy reforms (governance reform, public expenditure effectiveness improvement) ;
- (iv) The new approaches to industrial and local development policies;
- (v) The new framework for food product biosafety and quality standards
- (vi) The new programmes on market information dissemination and access facilitation.

Table 15 : Constraints and opportunities in maize marketing in the 4 countries

Opportunities	Contraintes
<ul style="list-style-type: none"> ▪ Very wide collection network ; ▪ Large gender and youth participation in collection activities; ▪ Access to Market Information System (MIS) ▪ Existence of a cross border market ▪ Development of processing SMEs ▪ Urban development 	<ul style="list-style-type: none"> ▪ Weak organization of collectors; ▪ Absence of maize price regulations; ▪ Inefficient markets; ▪ High maize price fluctuation; ▪ Lack of road infrastructure; ▪ Poor state of roads; ▪ Lack of good quality storage infrastructure; ▪ Lack of government support for traders; ▪ Absence of contracting among collectors, wholesalers and retailers; ▪ Absence of an insurance system

Source: AU-SAFGRAD's country reports (2015)

In addition to these opportunities, there is a wide maize collection network with high involvement of women and youth in maize marketing. A market information system, cross border market development and emergence of an industrial fabric for maize processing do exist indeed.

5.3. Constraints and opportunities in maize processing

The processing sector remains underdeveloped across the countries. It is marked by small-scale and artisanal level processing. Major produce are local meals and livestock feeds. There is little or no contract agreements with suppliers and retailers (customers). Quality standards are not strictly followed and payment of price premium are used to reward good quality supply of maize seeds used as raw materials. Most processors use locally fabricated mills and capacity utilization is low. There is little or no government support package to encourage processor or to reduce competition. Most of the processors lacks the requisite technical capacity to operate and maintain the mills. A huge processing opportunity exist in the area from increased production and supply of grains and availability of a large urban market for produce. In all four countries, the processing sector is characterized by the strong female presence.

Table 16 : constraints and opportunities in the processing systems of the 4 countries

Opportunities	Contraintes
<ul style="list-style-type: none"> ▪ Wider supply network; ▪ Diverse processed commodities; ▪ Potential demand for processed commodities; ▪ Strong gender and youth participation in the processing sector 	<ul style="list-style-type: none"> ▪ Mostly artisanal enterprises ▪ Lack of government support; ▪ Low use of modern equipment; ▪ Absence of contracts with suppliers; ▪ Lack of quality standards

Source: AU-SAFGRAD's country reports (2015)

Chapter 6.

Conclusion and policy recommendations

Maize is the most widely grown staple crop in Sub-Saharan Africa. In 2014, it was cultivated in 34 million hectares for a production of 70 million tons (FAOSTAT, 2016). Maize production has experienced net increase starting from the 1980s. This increase has generally followed the upward population growth trends.

To meet the growing food demand due to the on-going demographic transition, great efforts are required towards accelerating production and productivity growth. While it is estimated that large arable land areas are still available in SSA, it is necessary to intensify production as increase of production has to come from increased intensification rather than increase in hectareage cultivated. This required yield increase through investment in productivity enhancing methods such as financing, research, training, advisory services and technical innovations. There is a need for a chain-wide approach to achieve this.

Improving market access conditions is therefore a major issue to be addressed if we are to accelerate agricultural growth. Price and income stabilization through a mix of public and private mechanisms constitutes a mean for securing the producers' environment.

In the 4 countries, the maize marketing channel is similar as with the marketing of other grains. The primary actors are the producers, collectors, wholesalers, processors and retailers. While maize collection activities are usually carried out by localized, rural-based collectors either as wholesalers' agents or independenttrng a range of markets across the countries and region. The wholesalers has a high command of price and quantities purchase from different markets. Most times they set the quality standard and has a strong forward and backward influence on other actors. Processing activity is still in the developmental stage. Most processing activities are small scale or artisanal level. Most of the products include local food and livestock feeds. Processed commodities are not labelled and most processors are not aware of existing quality standards.

Based on the findings the following recommendations are proffered to develop maize value chains in the zone and in Africa in general. (*See table 17*)

Table 17 : Prioritization of recommendations towards enhancing the development of maize value chain

Value chain link	Priorities in the value chain development
Production	<ol style="list-style-type: none"> 1. Access to quality farm inputs (improved seeds, fertilizers) should be enhanced, 2. Credit access should be facilitated 3. Agricultural producers should be trained in technical and the modern management techniques 4. The contracting approach among producers, traders and processors should be promoted;
Storage	<ol style="list-style-type: none"> 1. Credit access should be facilitated 2. Appropriate storage infrastructure should be developed 3. Training on storage (techniques, standards and guidelines) should be delivered 4. Access to storage inputs (bags, post-harvest phytosanitary chemicals) should be improved ; 5. Storage standards should be promoted; 6. Community storage systems should be promoted
Processing	<ol style="list-style-type: none"> 1. Credit access (farming tools, storage, etc.) should be improved 2. Subsidies should be given for the procurement of industrial equipment 3. Lobbying/advocacy should be conducted towards local /regional consumption 4. Certification systems should be put in place; 5. Local maize-based commodity valuing and consumption should be promoted; 6. Processed commodities should be diversified.
Marketing	<ol style="list-style-type: none"> 1. Credit access for marketing in particular should be facilitated for wholesalers and collectors; 2. Regional networking (or professional organizations) in the maize sector should be promoted 3. Existing Market Information Systems (MIS) should be supported and consolidated 4. Commercial capacity of producer and trader organizations should be developed; 5. Regional cereal stock markets (UEMOA, ECOWAS) should be developed

Source: AU-SAFGRAD's country reports (2015)

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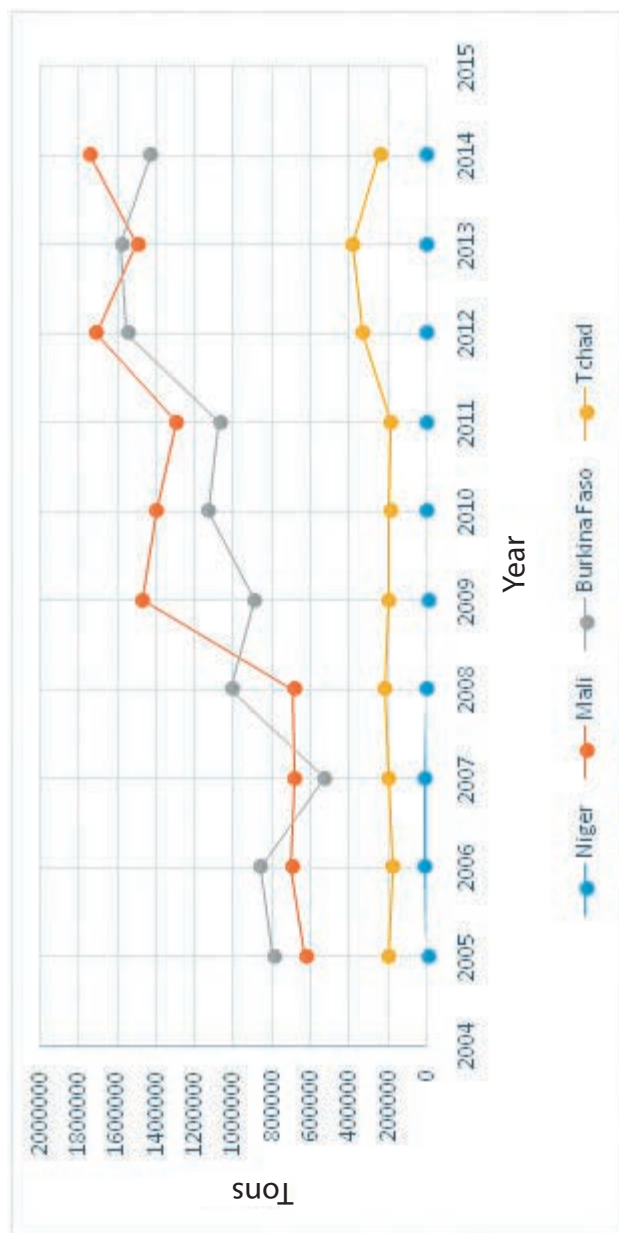
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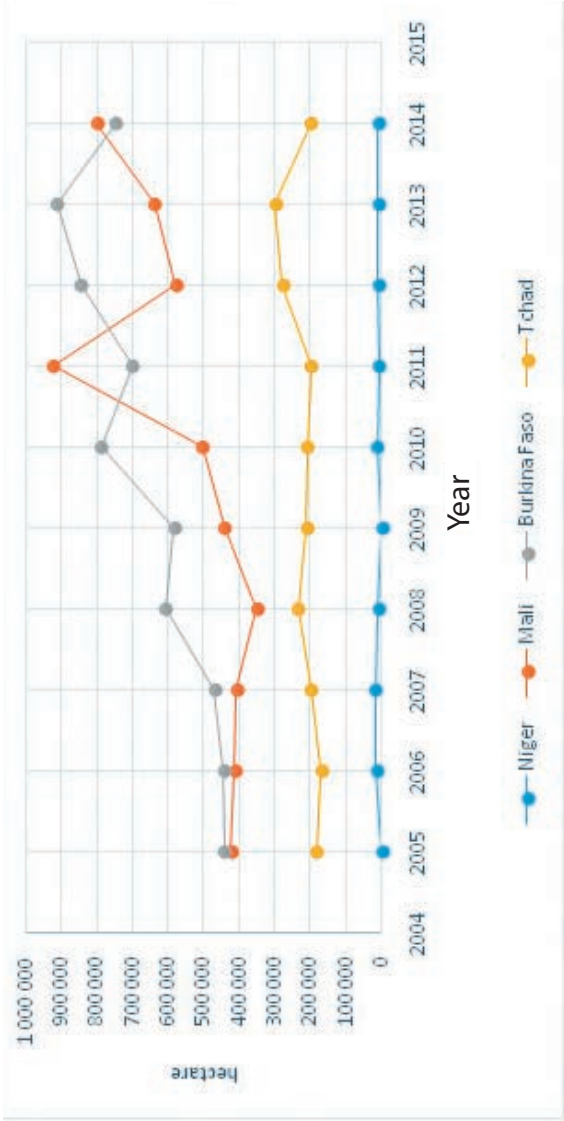
Annexes

Annex 1: Trend in maize production (tons) from 2005 to 2014 in the four countries



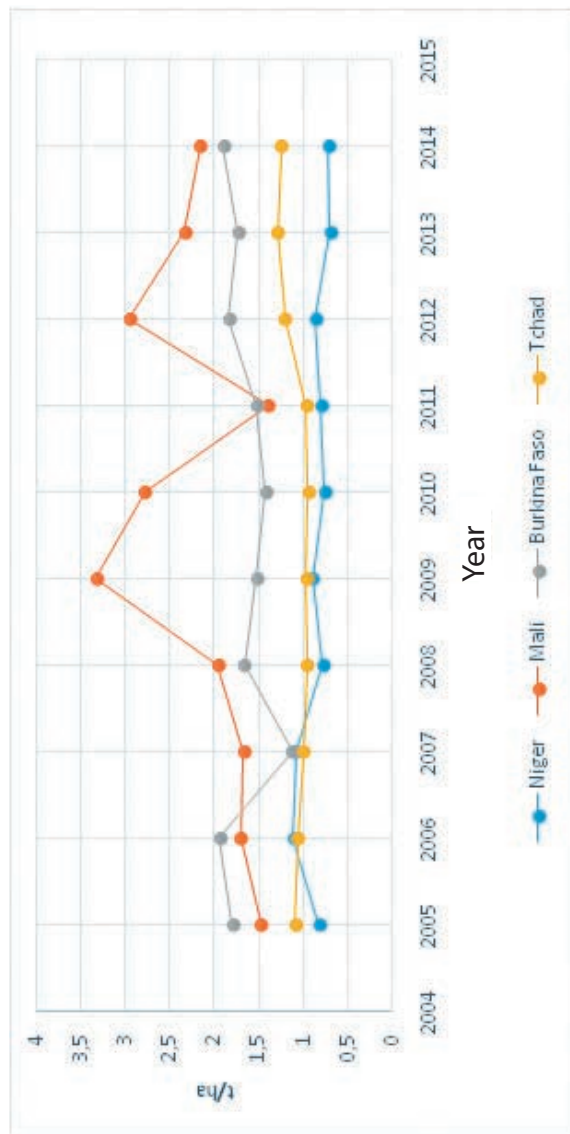
Source: CountryStatUEMOA

Annex 2: Trend in maize surface areas (ha) from 2005 to 2014 in the four countries



Source: CountrystatUEMOA

Annex 3: Trend in maize yields (t /ha) from 2005 to 2014 in the four countries



Source: CountrystatUEMOA

Annex 4: Education level and equipment used by maize producers in the four countries

Countries	EDUCATION LEVEL			EQUIPEMENT		NON-AGRIC ACTIVITY
	None	Primary	Secondary +	Draught	Motorbike	
Burkina Faso	70%	23%	7%	70%	5%	32%
Mali	55%	41%	4%	39%	-	22%
Niger	75% *	22% *	3% *	15%	-	30%
Chad	62% **	36% **	2% *	-	-	0%

Source: AU-SAFGRAD'S Country Reports (2015)

*INS Niger ** INSEED Chad

Annex 5: Grouping membership patterns of producers

	Burkina Faso	Mali	Niger	Chad
Proportion of producers belonging to a cooperative or grouping	45%	100%	100%	np
Membership requirements	<ul style="list-style-type: none"> - Membership fees (XOF 500 to 1000) - Annual contribution (XOF 1000 to 2000) - Participation in collective work 	<ul style="list-style-type: none"> - Membership fees (XOF 500) - Annual contribution (XOF 6000) - Fees 	<ul style="list-style-type: none"> - Membership fees (XOF 500) - Annual contribution (XOF 6000) - Fees 	<ul style="list-style-type: none"> ■ Membership fees (XOF 500 to 5000) ■ Participation in collective work ■ Annual contribution
Services rendered by or intervention areas of the grouping	<ul style="list-style-type: none"> - Mutual aid in farm work - Preparation of credit dossiers - inputs credit granting - support for marketing - Sensitization and training 	<ul style="list-style-type: none"> - Mutual aid in farm work - Inputs granting (seeds, fertilizers) - Sensitization and training 	<ul style="list-style-type: none"> - Mutual aid in farm work - Inputs granting (seeds, fertilizers) - Sensitization and training 	<ul style="list-style-type: none"> - Farming Activities - Storage - Contributions and collective farms - Livestock breeding

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 6: Production system in the three provinces

	Burkina Faso	Mali	Niger	Chad
Main rotation	Cotton – maize – cereals – leguminous plants	Cotton – Maize – cereals – leguminous plants	Maize – Cereals – Market gardening	-
Non - agricultural activities	32%	22%	30%	0%
Single cropping	98%	100%	100%	100%
Agriculture /lives- tock integration	100%	100%	100%	100%
Sowing period	May - June	June - July	3 periods - May - July – August - November	3 periods - June– July - October – Nov - April
Harvesting period	October - November	October - November	July - Sept – October March	October- Nov
Improved seeds use rate	80%	85%	100%	90%

.../...

Annex 6: (continued)

	Burkina Faso	Mali	Niger	Chad
Women's employment of women in production	100%	100%	100%	100%
Fallowing Presence				
Average duration	10% 2 years	8% 2 years	0% -	12% 2 years

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 7: Mode of maize farmland acquisition among surveyed producers

	Inheritance	Borrowing /Rental	Donation	Purchase
Burkina F.	87%	7%	6%	0%
Mali	92%	2%	5%	1%
Niger	np	np	np	np
Chad	np	np	np	np

Source: AU-SAFGRAD's country reports (2015)

Annex 8: ModMaize seeds use patterns

	Burkina Faso	Mali	Niger	Chad
Improved seeds use rate	90 %	80%	70%	np
Improved varieties used	<ul style="list-style-type: none"> - Barka - SR21 - Bondofa - Wari - Massongo 	<ul style="list-style-type: none"> - Tiématié - Kogoni - Sotubaka - Appolo - Dembanyuman - Jorobana - Mali hybrid 7 	<ul style="list-style-type: none"> - CET - P3 Kollo 	
Seeds supply sources	<ul style="list-style-type: none"> - Agricultural Service - Market - Seeds producers - Grouping 	<ul style="list-style-type: none"> Self- production Farmer Organization Seeds Producer Market/shop NGO Extension Services 	<ul style="list-style-type: none"> Agricultural Service Market 	<ul style="list-style-type: none"> SODELAC Market CECADEC
Improved seeds use constraints	<ul style="list-style-type: none"> - High cost without sub-sidy - Unavailability 	<ul style="list-style-type: none"> - Cost of seeds - Unavailability 	<ul style="list-style-type: none"> ▪ High cost of seeds ▪ Unavailability 	

Source: AU-SAFGRAD's country reports (2015)

Annex 9: Credit access and use pattern comparison

	Burkina Faso	Mali	Niger	Chad
Level of credit access	Very low	Very low	Very low	Very low
Access Sources	<ul style="list-style-type: none"> - IMF (People's Fund) - Cotton Company (SOFITEX) - Third party (traders, Family) 	<ul style="list-style-type: none"> - IMF (village Fund, CO-FESEFA, CAFO Jiginew) - Cotton Company (CMDT) - Third party (traders, fellow producer 	<ul style="list-style-type: none"> - IMF - Third party (traders, fellow producers) 	<ul style="list-style-type: none"> ▪ Credit and Savings Fund ▪ FINADEV ▪ CECADEC ▪ Micro-Credit Ministry ▪ NGO ▪ Third
Credit access challenge	<ul style="list-style-type: none"> - Absence of collateral - Inadequate number of IMF - Time-consuming procedure 	<ul style="list-style-type: none"> - Time-consuming procedure - Absence of collateral 	<ul style="list-style-type: none"> - Inadequate number of IMF - Absence of collateral - Bureaucracy 	<ul style="list-style-type: none"> - Absence of collateral - Bureaucracy
Credit use	Inputs purchase Workforce salaries	Inputs purchase Workforce salaries Food purchase	Inputs purchase Workforce salaries Food purchase	Inputs purchase Workforce salaries Food purchase
Reimbursement Modality	Cash In-kind	Cash In-kind 80%	Cash In-Kind	Cash In-kind

Source : AU-SAFGRAD'S Country Reports (2015)

Annex 10: SWOT analysis of maize production in Burkina Faso

Positive	Negative
<i>Internal</i>	
STRENGTHS <ul style="list-style-type: none"> • Political will to develop the sector • Investment incentives • Good coverage of domestic needs with national production; • Availability of inputs (fertilizers, improved seeds); • Maize production development but under irrigation; • Production mechanization; 	WEAKNESSES <ul style="list-style-type: none"> • Extensive production system • Low input use • Poor soil fertility • Low productivity of local varieties; • Poorly organized producers ; • Low prices; • Declining basic extension service network
<i>External</i>	
OPPORTUNITIES <ul style="list-style-type: none"> • Growing national demand • Diversified market • Development of processing units; • Possibility to export to Niger 	THREATS <ul style="list-style-type: none"> • Climate change • Predominance of traditional practices ; • Land tenure insecurity; • Land degradation

Annex 11: SWOT analysis of maize production in Mali

STRENGTHS	WEAKNESSES
<p>Maize responds well to chemical and organic fertilizer use (relatively high yields).</p> <p>Maize is gradually replacing sorghum in household diet.</p> <p>Maize cobs and stalks are used for diverse purposes (human consumption, animal consumption, fencing, fuel, handicraft,).</p>	<p>Low availability of quality seeds in villages and weekly markets.</p> <p>Production is mainly for household consumption.</p> <p>Lack of sustained quality supply.</p> <p>Producers have low access to credit, which hinder their production capacity.</p> <p>Maize sale prices are instable and greatly influenced by wholesalers.</p> <p>Weak organization of producers thus restricting their ability to influence policy-making at the national level in order to improve access to inputs at a lower cost.</p> <p>Producers lack capacity to relate to the various markets and commercial partners.</p>
OPPORTUNITIES	THREATS
<p>There are varieties and water and soil conservation techniques that help to increase maize yields. Also, there are harvest and post-harvest innovations that help to reduce losses and impurities in the grains harvested and improve the quality of the commodity while linking up the producers to high value –adding markets.</p> <p>Subsidized fertilizers facilitate access for producers in terms of both quantity and quality.</p>	<p>The major challenge facing the producers is rainfall variability which Negatively influences production decisions.</p> <p>Soil degradation and population growth</p>

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 12: SWOT analysis of maize production in Niger

STRENGTHS	WEAKNESSES
<ol style="list-style-type: none">1. Both male and female producers have good land, water and experience in the area of maize production.2. Existence of producer organizations in the zone3. Existence of improved productive maize that are well adapted to the agro-ecological conditions of the country.4. Producers are aware of the existence of modern agricultural inputs.	<ol style="list-style-type: none">1. Small surface areas for maize farming2. Weak extension services: inadequate number of extension workers and working materials.3. Maize production is only for eating.4. Low productivity of maize farming systems due to the low level of improved technology package use.
OPPORTUNITIES	THREATS
<ol style="list-style-type: none">1. After millet and sorghum, maize is one of the dry cereals consumed in Niger.2. Existence of a great potential of low-lands that are good for maize farming (Dallols fossils, Maradi and Zinder Goulbis, Maggia and Tarka, Komadougou, Lake Chad and River Niger unplanned zone river systems).3. Development of small scale maize-based commodity processing units.4. Sorghum research has recorded good achievements in terms of technologies and techniques	<ol style="list-style-type: none">1. The adverse climate change effects on rainfall.2. Significant year-to-year decline in the extension worker to farmer ratio.3. Sorghum is a substitute for maize in poultry feed preparation.4. The maize imported from Benin and Nigeria is of better quality

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 13: SWOT Analysis of maize production in Chad

Positive	Negative
<i>Internal</i>	
<ul style="list-style-type: none"> - The geographic location of the maize produced in the Mayo-Kebbi West region; - all surveyed producers are involved in agricultural activities on a full time basis; - Women's and youth's involvement in all farming activities; - Women's and youth's involvement in post-harvest activities; - Great possibility of freely using farm-lands and inheriting; - Good crop- livestock integration on both sides of the two regions that were studied; - Abundant family and salaried workforce; - Crop rotation. 	<ul style="list-style-type: none"> - Seeds collection from own production; - Low practice of irrigated maize production, except in the Lake region.
<i>External</i>	
<ul style="list-style-type: none"> - The two maize production basins namely the Lake and Mayo-Kebbi river have priority access to farming inputs (seeds and mineral fertilizers) ; - Rich soil in Lake Chad polders; - Dry season maize production without bringing in water but with the rise of soil water through capillarity; - Possibility of accessing credit; - Government support; - Agricultural mechanization policy. 	<ul style="list-style-type: none"> - Limited access to farming inputs; - Lack of organization of maize producers; - Expensive salaried workforce; - Unavailability of workforce in certain villages ; - Threats in case of non – reimbursement of loans.

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 14: SWOT analysis of maize marketing in Mali

STRENGTHS	WEAKNESSES
<p>Food grains are staples to the populations.</p> <p>Some cereal varieties are well appreciated by people and are produced by farmers.</p> <p>There are great production zones (cotton producing zone) which provide huge quantities of maize.</p> <p>Maize is used as animal feed (especially poultry).</p> <p>Maize marketing is tax free.</p> <p>They set the purchase price on rural markets.</p>	<p>Weak storage facilities in production zones.</p> <p>Maize prices are volatile on both production and consumer markets.</p> <p>Traders supply mixed products (of different colors), unclean (containing a lot of impurities).</p> <p>Low access to credit services.</p> <p>Weak government support to the traders.</p> <p>Weak organization of marketing players.</p>
OPPORTUNITIES	THREATS
<p>Cereal trade is liberalized in the countries.</p> <p>The State and partners are asking for huge quantities to build up the national buffer stock and assist the vulnerable groups.</p> <p>Existence of high processing capacity mills</p>	<p>The roads are in poor state and access to production zones is challenging in the rainy season.</p> <p>Erratic supply markets.</p>

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 15: SWOT analysis of maize marketing in Burkina Faso

Positive	Negative
<i>Internal</i>	
STRENGTHS <ul style="list-style-type: none"> • Existence of marketing Groupings • Political will to develop the maize sector • Dynamic market; • Existence of a local market (SONAGESS) • Dynamism of players; • Existence of semi-industrial and industrial unites 	WEAKNESSES <ul style="list-style-type: none"> • Multiple middle men • Low funding access; • Low productivity of the human capital despite recent positive developments (training, extension services, education and health) • Dilapidated storage facilities • Low and volatile prices; • Utilization of local units • Insufficient storage facilities ; • Dilapidated transportation means • Poor quality of the product; • Weak coordination among players; • Absence of contracts among players; • Post-harvest losses
<i>External</i>	
OPPORTUNITIES <ul style="list-style-type: none"> • Growing maize and by-products demand • Exports • Low marketing rates; • Possibility of using maize flour for pancake making and pastry 	THREATS <ul style="list-style-type: none"> • Road insecurity • Fluctuating supply and poor quality of the raw materials; • Lack of physical infrastructure: dilapidated roads, high transport cost and low level of rural electrification (and costs relating to infrastructure and energy) • Barrier to exporting.

Source: country documents

Annex 16: SWOT analysis of maize marketing in Niger

STRENGTHS	WEAKNESSES
<ol style="list-style-type: none">1. Existence of a traditional cereals marketing framework in the lead producer zones, in the form of collector networks from within and across borders.2. Commercial dry cereals collection and distribution circuits are well known.3. Good connections with the main cereal markets in neighboring countries	<ol style="list-style-type: none">1. Non – existence of a genuine and appropriate cereal market in Maradi and Zinder.2. Issues relating to settlement of transactions as cereal traders do not have bank accounts and settlements are generally in cash.3. Inadequate capital for wholesalers, collectors and retailers.
OPPORTUNITIES	THREATS
<ol style="list-style-type: none">1. After millet and sorghum, maize is one of the main dry cereals consumed in Niger.2. Development of small - sized maize-based commodity processing units.3. Availability of sorghum supply sources in neighboring countries such as Benin and Nigeria.	<ol style="list-style-type: none">1. Poor state of roads and rural paths supplying cereal collection zones.2. Inadequate bank financing if granted.3. Increase in cereal prices due to road and border harassment that generate extra costs.4. Sorghum, a potential substitute for maize in the composition of poultry feed.5. Heavy and multiple taxes confronting wholesalers and retailers.6. Erratic cereal supply in the countries.

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 17: SWOT analysis of maize marketing in Chad

Positive	Negative
<i>Internal</i>	
STRENGTHS <ul style="list-style-type: none"> - Direct purchase contract with big maize producers (44%); - Supply agreement with the big producers and collectors (72%); - Good understanding of maize wholesalers vis-à-vis the producers; - Good quality standards; - Government support - Requirement to use released seeds; - Good understanding of the supply and demand law; - Requirement to have good quality maize grains; - Support service delivery to collectors. 	WEAKNESSES <ul style="list-style-type: none"> - High proportion of wholesalers that have no relationships with the collectors (41%); - Low female involvement (66% of unfavorable opinions) and youth involvement (65% of unfavorable opinions) ; - high interest rate lending practices requesting in-kind reimbursements; - Low proportion of wholesalers having their own transportation means (35%); - Weak relationships with end users (48% of unfavorable opinions) ; - Verbal supply agreement with collectors; - Unclear definition of standard and quality verification criteria; - Makeshift storage facilities (warehouses and sheds); - Losses during transportation.
<i>External</i>	
OPPORTUNITIES <ul style="list-style-type: none"> - Good understanding of the notion of standards and quality by the producers ; - Large presence of support services; - Availability of government support services. 	THREATS <ul style="list-style-type: none"> - No insurance system to compensate the collectors in case of duly reported loss; - High cost of transportation; - Fraudulent barrier and slandering by uniformed workers; - Price fluctuation on the market; - Competition with imported cereals; - High cost of warehouse rental; - Loss of stored commodities in warehouses; - Non - compliance with standards and quality criteria by certain producers.

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 18: SWOT analysis of maize processing in Mali

STRENGTHS	WEAKNESSES
<p>The consumption of processed commodities is expanding in urban households.</p> <p>Existence of the Mali Federation of Processors (FENATRA).</p> <p>Existence of highly performing varieties for processing (flour- rich varieties)</p>	<p>Processing is at the primary level only.</p> <p>Commodities are mixed and are not clean.</p> <p>Prices vary extensively on the market.</p> <p>No quality standards of commodities were defined.</p> <p>Low credit access</p> <p>Poor packaging.</p> <p>High level of losses during processing operations.</p>
OPPORTUNITIES	THREATS
<p>Existence of a food research and technology laboratory.</p> <p>High demand for maize for human consumption and cattle.</p>	<p>How to ensure good quality control at purchase and sale.</p> <p>Low adoption of released processing technologies.</p> <p>Low integration of markets.</p>

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 19: SWOT analysis of maize processing in Niger

STRENGTHS	WEAKNESSES
<ol style="list-style-type: none">1. Existence of artisanal and semi-industrial processing units for local agricultural products.2. The evidenced experience of women in local agricultural product processing units.3. Good quality of processed commodities in nutritional, hygienic and packaging terms.	<ol style="list-style-type: none">1. The value chain-based approach is not used in the cereal sector whereas processing is the driving engine of a value chain.2. Processing units do not act within the framework of innovation platforms.3. Outlet constraints to processed products despite the existence of a potential market.4. Inadequate financial capital of processing units.5. Insufficient materials that perform well and are adapted to the setting.
OPPORTUNITIES	THREATS
<ol style="list-style-type: none">1. Maize comes third after millet and sorghum as the most commonly consumed dry cereal in Niger.2. Existence of a sorghum production potential3. Existence of a potential market for processed local agricultural commodities including maize.	<ol style="list-style-type: none">1. Weak financial leeway of female processors;2. Non - existence of an appropriate cereal market in Maradi and Zinder.3. Poor state of roads and rural feeder roads in cereal collection zones.

Source: AU-SAFGRAD'S Country Reports (2015)

Annex 20: SWOT analysis of maize processing in Chad

Positive	Negative
<i>Internal</i>	
<ul style="list-style-type: none"> - Quality standards required for commodities to be processed (70%); - High employment capacity (70%); - Good understanding of the supply and demand law; - Deep youth involvement (100% of opinions) and medium women's involvement (50% of opinions) ; - Average proportion of processors having storage warehouses (45%); 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> - Unclearly defined operations with collectors; - High rate of people with the opinion that no quality standards of products are required (25%); - Lack of supply agreement; - Existence of processors that do not have storage facilities (15%); - Mixed relationships with end users; - Low capacity for using mills; - Low maize processing for commodities other than flour; - High loss rate during packaging; - High loss rate during storage; - Unawareness of other post-harvest loss sources (100%); - unlabeled processed commodities; - Unawareness of milling capacity by the millers; - Non - use of independent producers and contracted farmers; - No mention of training for the women and youths involved in processing activities; - Transportation means limited to motorbikes; - Low availability of storage facilities and their poor equipment; - Low core financing capacity.
<i>External</i>	
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> - Existence of government support services; - Habit to shell maize before milling which attracts consumers. 	<p>THREATS</p> <ul style="list-style-type: none"> -Low availability of cereals to be milled during the lean period; - No contract with the partners; - A lot of losses during transportation;

Source: AU-SAFGRAD'S Country Reports (2015)



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