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UA-SAFGRAD

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



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ACCRONYMS AND ABBREVIATIONS

AU	: African Union
CAADP	: Comprehensive Africa Agriculture Development Programme
CSLP	: Cadre Stratégique de Lutte contre la Pauvreté
DAP	: Di-Ammonium Phosphate
DGESS	: Direction Générale des Etudes et des Statistiques Sectorielle du Ministère de l’agriculture et de la sécurité alimentaire
DPA	: Direction Provinciale de l’Agriculture
DPSAA	: Direction Générale des Prévisions et des Statistiques Agricoles
EIA	: Etat de l’Insécurité Alimentaire
FAO	: Food and Agriculture Organisation
FCFA	: Franc de la Communauté Financière Africaine
GMB	: Grand Moulin du Burkina Faso
INERA	: Institut de l’Environnement et de la Recherche Agricole

INSD	: Institut National de la Statistique et de la Démographie
KCL	: Potassium de Chloride
MASA	: Ministère de l'Agriculture et la Sécurité Alimentaire
NB	: Nota bene
NPK	: Nitrogen, Phosphorus, Potassium
ONG	: Organisme Non Gouvernemental (NGO)
PAM	: Programme Alimentaire Mondial (WFP)
PIB	: Produit Intérieur Brut (GDP)
PNSD	: Programme National du Secteur Rural
RAS	: Rien à Signaler
RGA	: Recensement Général de l'Agriculture
SDR	: Stratégie du Développement Rural
SFD	: Système Financier Décentralisé
SIM	: Système d'Information du Marché
SIMAO	: Société Industrielle Meunière de l'Afrique de l'Ouest
SAFGRAD	: Semi-Arid Food Grains Research and Development
SOFITEX	: Société Burkinabé des Fibre et Textiles
SONAGESS	: Société Nationale de Gestion des Stocks de Sécurité
SSA	: Sub saharian Africa
SWOT	: Strengths, Weaknesses, Opportunities and Threats
UGCPA	: Union des Groupements pour la Commercialisation des Produits Agricoles
UEMOA	: Union Economique et Monétaire Ouest Africaine
UNFPA	: Fonds des Nations Unies pour la Population (FNUAP)

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FOREWORD

AU-SAFGRAD's vision falls within the Comprehensive Africa Agricultural Development Programme (CAADP) framework which is at the heart of efforts by African governments to accelerate inclusive growth and economic transformation through agricultural-led development (*Malabo2014*). Emerging evidences reveal that poorly developed agricultural commodity value chains coupled with a host of infrastructural and policy related constraints are hampering progress in intra-African trade and investments in agriculture. Commodity Value chain analysis helps to identify actors and activities and to inform decision for building resilience of small holders whose livelihood and welfare are affected, directly and indirectly, by the actions of the different stakeholders. Against this backdrop and in furtherance of its mandate AU-SAFGRAD conducted the study on opportunities and challenges for developing sorghum value chain in Africa. This present study uses primarily sourced data from sample surveys in five countries ((Burkina Faso, Chad, Mali, Niger and Sudan) in the Sahelo- Saharan zone of Africa.

Sorghum is a strategic agricultural commodity in the dry zone of Africa. It is agronomically suited to dry zone, it constitutes a key component of the cropping system and an important household food staple. Due to these features it is popularly called the “great millet of the savannahs”. The analysis of opportunities and challenges of sorghum value chains development helps to situate sorghum supply chain in the zone in terms of its competitiveness, efficiency and reliability. The study adds to the body of knowledge on agricultural value chains development in the developing economies. The use of SWOT analysis of activities of major chain actors presents a robust diagnosis that lends itself to understanding specific interventions needed at different levels, across the chain, to reduce associated transaction costs and boost efficiency. The study proffers actionable recommendations that are both commodity specific and general and, also, target responsibilities for successful implementation.

The report is recommended for actors and stakeholders involved in developing agricultural commodities value chain, policy makers and development workers with interest in developing the competitiveness of African agricultural commodities.

Dr Ahmed ELMEKASS,
AU SAFGRAD Coordinator

EXECUTIVE SUMMARY

Sorghum is an important livelihood and food security crop in the sahelo-saharan zone of Africa. Its agronomic attribute of being able to withstand long period of moisture stress is a feature that has endeared it to producers in the harsh climatic zone. Sorghum is a key feature of most farming system and it is widely consumed across cultures and in different forms in the zone. In some cultures it accounts for over 40% of the food calorie intake. Sorghum, therefore, represents a viable agricultural output in alleviating poverty and hunger in the dry zone of Africa. Over the past three decades Sub-Saharan Africa's (SSA) population has grown at a rate of 2.7% per year (FAO, 2015). This high growth rate has not been matched with increase in agricultural productivity; most of the increase in food production recorded over the years has been from increase in cultivated area and this is not a sustainable option. The analysis of the opportunities and constraints in Sorghum 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. Therefore, the development of the sorghum supply chain is expected to reduce poverty and incidences of hunger in Africa.

The cross country analysis of the opportunities and challenges in the development of sorghum value chains in the Sahelo-Saharan zone was conducted in five countries (Burkina Faso, Mali, Niger, Chad and Sudan). SWOT analysis was used to highlight the internal and external factors that impact on the major actors and activities in sorghum production, marketing and processing. 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 results showed that the major constraints of the sector remain the same for all the countries, except in Chad where the credit system is much more developed. The main constraints identified are lack of government support for access to credit and agricultural inputs, lack of good transport and storage infrastructure, absence of contracting agreements between suppliers, traders and end-users. The opportunities observed are the very broad network of actors, high participation rate of women and youths in all the links of the chain, the presence of farmers' organizations and the high urban demand for processed products. Processing remains highly underdeveloped with a majority of small and medium-sized enterprises (SMEs) of the artisanal and semi-artisanal industry type. The study recommendations are to formulate and target investment policy on road infrastructure, storage, transportation and credit support to chain actors.

Chapter 1

1.1 Introduction

Agriculture in SSA is the main source of income for about 80% of the economically active population and accounts for more than 50% of export earnings. Agricultural production is structurally deficient in the Saharan zones, experiences surplus in the Sudan-region (+500 mm of water per year) and limited/random in the Sahel zone (200 to 500 mm of water) (Green Africa, 2015). Cereal production is predominant in SSA as over 80% of the total area under cultivation is devoted to cereals. Sorghum, popularly known as “great millet”, in Africa has been cultivated for millennia. It is a large grass that is heat and drought-resistant. It is consumed across cultures in different forms and constitute a significant item in most of the cultures.

In Burkina Faso, surveys carried out between 1994 and 2003 show an increase in demand for sorghum in rural areas and a sharp decline in urban areas. The decline in consumption in urban area is due to increase in consumption of rice; a better suited food items for the fast urbanizing and industrial population.

However, Sorghum consumption accounts for about 50% of total calorie intake in Burkina Faso and Niger. Specifically, it accounted for 29.5% (2003) and 43% (2005) of total household food calorie (ReSAKSS, 2011).

The increase in total area cultivated is an indication of the increase in demand for sorghum in the region while area cultivated has increased. Unfortunately, sorghum productivity has not kept pace with demand compared to other cereals. Also noteworthy are the extreme environmental conditions and low-input agricultural systems that characterize sorghum production. In arid environments, problems related to climate variability and land degradation are profound. Increased productivity is hampered by unproductive cultural methods adopted and weakness of support institutions. There is therefore a wide gap between potential and actual field yields. Also, along the value chain, there is a need to assess activities and players so as to improve chain efficiency. It becomes necessary to compare the value chains of the countries of Sahel-Saharan Africa and to propose recommendations and strategies that can be used to develop the value chains and promote chain efficiency.

The overall objective of this study is to conduct a comparative analysis of the sorghum value chain of five (5) countries (Burkina Faso, Mali, Chad, Niger and Sudan) in Sahel-Saharan Africa. This analysis examines the main constraints and opportunities of the value chain in order to formulate policy recommendations to stimulate production and value chain development in the Sahel-Saharan region.

1.2 Objectives and Methodology of the Study

1.2.1 Objectives of the Study

Overall Objective

The overall objective of this study is to make a comparative analysis of the sorghum value chain of five countries (Burkina Faso, Mali, Niger, Sudan and Chad) of Sahel-Saharan zone of Africa.

Specifically, the objectives are to:

- ◆ highlight the importance of sorghum production in the Sahel-Saharan zone in Africa;
- ◆ make a comparative analysis of the sorghum value chains of the five countries at each link in the chain, describing in each section the similarities and differences and the involvement of the gender and young people in the activities;
- ◆ identify the main constraints and opportunities of the sorghum value chain of the five countries of Sahel-Saharan Africa at each link in the chain;
- ◆ make policy recommendations in order to stimulate the development of the sorghum value chain in the Sahel-Saharan zone.

1.2.2 Methodology of the study

The study covered five (5) countries: Burkina Faso, Mali, Niger, Chad and Sudan in the Sahel-Saharan zone of Africa. The countries extend geographically from East to West, below the equator on the same band of isohyets. The geographical characteristics of each country are as follows:

Burkina Faso is a land-locked Sahelian country. It is located in West Africa in the Niger loop, with the following geographical coordinates: 9 ° 20 ‘and 15 ° 5’ North latitude, 2 ° 20 ‘ East longitude and 5 ° 30’ West longitude. With a population of 13,117,147 inhabitants in 2006 and a land area of 273,187 km². It is bound to the North and West by Mali, on the South by Côte d’Ivoire,

Ghana, Togo and Benin, on the East by Niger. The country has no outlet to the sea. Its capital city is Ouagadougou.

Mali is a vast territory with a land area of 1,241,238 km². Located in West Africa, more than two third of the Malian territory is desert. It shares the same borders with Guinea, Senegal, Mauritania, Algeria, Niger, Burkina Faso and Cote d'Ivoire. With a population of 14,528,662 inhabitants (INSTA, 2009), its capital city is Bamako.

Niger is one of the largest countries in West Africa, with an area of 1,267,000 square kilometers. It is located between 11°37' and 24°33' of North latitude and 0° 06' and 16° of East longitude, on edge of the Sahara and is in the middle of the West African Sahel. A landlocked country, it shares borders with seven other countries with Algeria and Libya in the North, Chad in the East, Nigeria and Benin in the South and Burkina Faso and Mali in the West. It has a total population of 17,138,707 (INS, 2012). Niamey is its capital city.

Chad is a vast country located in the heart of Africa, with an area of 1,284,000 km², the fifth largest country in Africa. Its population was estimated in 2003 at 12.28 million inhabitants (INSEED, 2013). Chad is a central African country without access to the sea, located in the South of Libya, East of Niger, Nigeria and Cameroon, North of the Central African Republic and at West of Sudan. Its capital is N'Djamena. Geographically and culturally, Chad constitutes a crossing point between North Africa and Black Africa.

Sudan occupies an area in the central part of the Nile basin in the South of Egypt. The country is located in the Sudan-Sahelian region of Northeast Africa. Its total area has been reduced from 2,500,000 km² to 1,882,000 km² after the independence of South Sudan. It has land borders with Egypt, Libya, Ethiopia, Eretria, Chad, Central African Republic, South Sudan and a coastline of 835 km. The population in 2012 was 37,195,349 inhabitants (World Bank 2012).

- an external rapid assessment which identifies the opportunities and threats present in the environment;
- an internal rapid assessment which identifies the strengths and weaknesses of the field of activity.

In the context of an evaluation of the performance of a sector, the use of the SWOT analysis is generally focused on the evaluation of the activities. By formalizing the positive and negative points and by identifying the factors of the environment that are favorable or unfavourable in influencing the implementation of the activities, the SWOT analysis makes it possible to formulate the strategies to be considered.

Chapter 2

Importance of sorghum in the Sahel-Saharan zone

2.1 Importance of sorghum in Africa

Sorghum ranks fifth among cereals grown in Africa considering the volume of production and the size of cultivated areas. Nigeria is the largest producer in Africa with a production of about 11.7 million tonnes of sorghum, accounting for 18.5% of the world production (FAO, 2015).

The predominance of sorghum farming in the zone is partly explained by the varietal diversity of the plant and its adaptability to low rainfall (200-600 mm), marginal soils and high temperatures observed in the Sahel. The success of sorghum is also linked to the dietary habits of the Sahel populations. Indeed, it is consumed in different forms, depending on the region, country or situation in society. In general, it is used as whole grain or as flour for the preparation of porridge, couscous, bread and alcoholic beverages which are important sources of carbohydrate/calorie. It has a high carbohydrate content and its consumption provides significant quantities of calories as well as appreciable protein and lipid intakes. In the Sahel, the annual per capita consumption of sorghum varies according to producer countries.

It ranges from a minimum of 8.6 kg in The Gambia to a maximum of 96.6 kg in Burkina Faso, where it meets nearly one third of the calorie needs of 90% of rural consumers (FAO, 2011).

2.2 Importance of sorghum in Sahelo-Saharan zone of Africa

2.2.1 Production (tons) trend of sorghum from 2005 to 2014

Sorghum is one of the most important food commodities in the sahelo-saharan zone of Africa. The zone is characterized as housing the poorest population of inhabitants with high incidence of conflicts and outmigration. The crop is genetically adapted to warm and dry agro-ecologies (FAO, 2015). Sorghum is mainly grown by small scale producers, using rudimentary farm implements with little or no use of externally purchased inputs. Productivity is low and yield is highly variable subject to the harsh weather vagaries. Figure 1 shows the trend in sorghum production between 2005 and 2014 in the five countries studied. Sudan is the lead producer, with production rising from 4 million tons in 2005 to 6 million tons in 2014. It is followed by Burkina Faso which ranks second. Production in this country has increased from 1.5 million tons in 2005 to 1.7 million tons in 2014. There were however, marginal increase in production in Mali, Niger and Chad within the period.

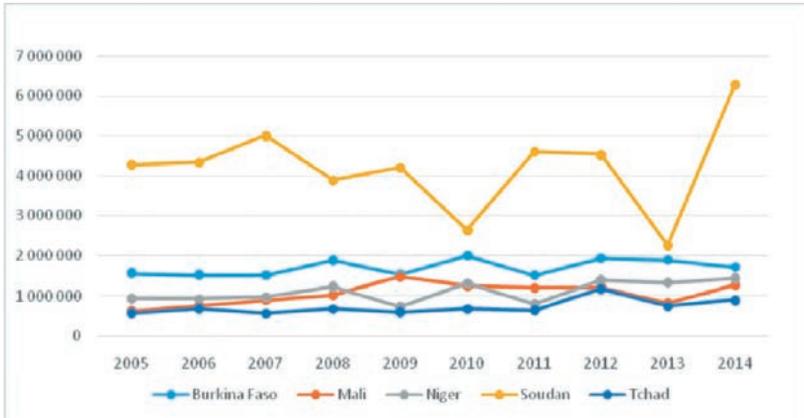


Fig. 2. Trend in sorghum production (ton) from 2005 to 2014

Source: Country Stat UEMOA, 2016 and United States Department of Agriculture, 2015

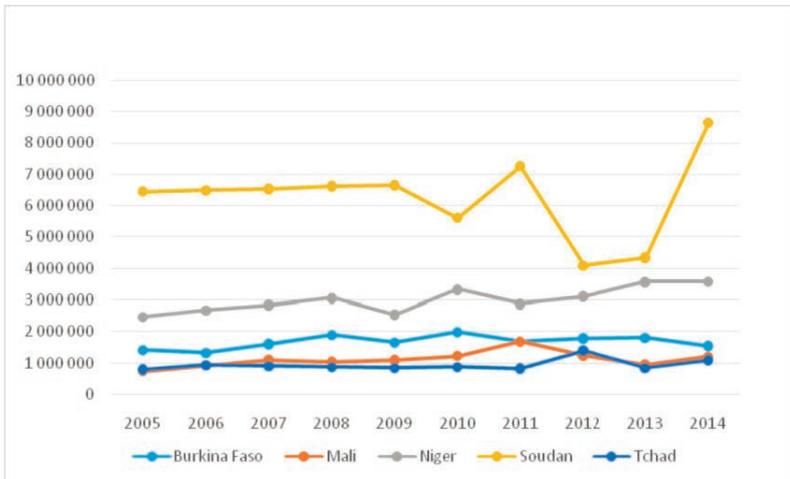


Fig. 3. Trend in cultivated area (ha) of sorghum from 2005 to 2014

Source: Country stat UEMOA, 2016 and United States Department of Agriculture, 2015.

2.2.2 Trend in sorghum cultivated area between 2004 and 2014 in Sahelo-Saharan zone of Africa

Figure 3 shows the trend in sorghum cultivated area between 2004 and 2015. The increased in cultivated area in Sudan was more than 6.5 million hectares in 2014. Compared to that in 2005.

2.2.3 Trend in yields of Sorghum between 2004 and 2014 in Sahelo-Saharan zone of Africa

Table 1 shows that there were marginal increases in the yield of sorghum in the selected countries within the period of study. The average yield per hectare is very low and below the global average yield of 2.2 tons/ha. The production system adopted is responsible for the low yield. The low yield was partly responsible for the successive food and nutritional crises that affected countries in the Sahel between 2011 and 2012 and affected several million people (FAO, 2015).

Table 1. Sorghum Yield trend from 2004 to 2014

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Burkina Faso	0.97	1.09	1.14	0.94	0.99	0.92	1.00	0.09	1.08	1.04	1.10
Mali	0.66	0.85	0.84	0.83	1.04	1.34	1.03	0.71	0.97	0.87	1.06
Niger	0.27	0.38	0.35	0.34	0.40	0.29	0.39	0.28	0.44	0.37	0.40
Soudan	-	-	-	-	-	-	-	-	0.55	0.64	0.75
Chad	0.69	0.74	0.75	0.64	0.78	0.71	0.78	0.78	0.84	0.88	0.82

Source: Data from FAOSTAT, 2016

Chapter 3

Comparative analysis of the sorghum value chains

3.1 Organization of the sorghum sector in the five countries

The organization of the sorghum value chain² is fairly similar in the five (05) countries (Figure 3). There are two types of actors: direct and indirect. The direct actors in the 5 countries are: producers, collectors, wholesalers, retailers and processors. Indirect actors (not included in this graph) are: suppliers of inputs and equipment, credit institutions and institutions in charge of research, extension, technical and financial partners.

²The type of sorghum studied is the white, red and yellow varieties that are common in the Sahelo-Saharan Zone region.

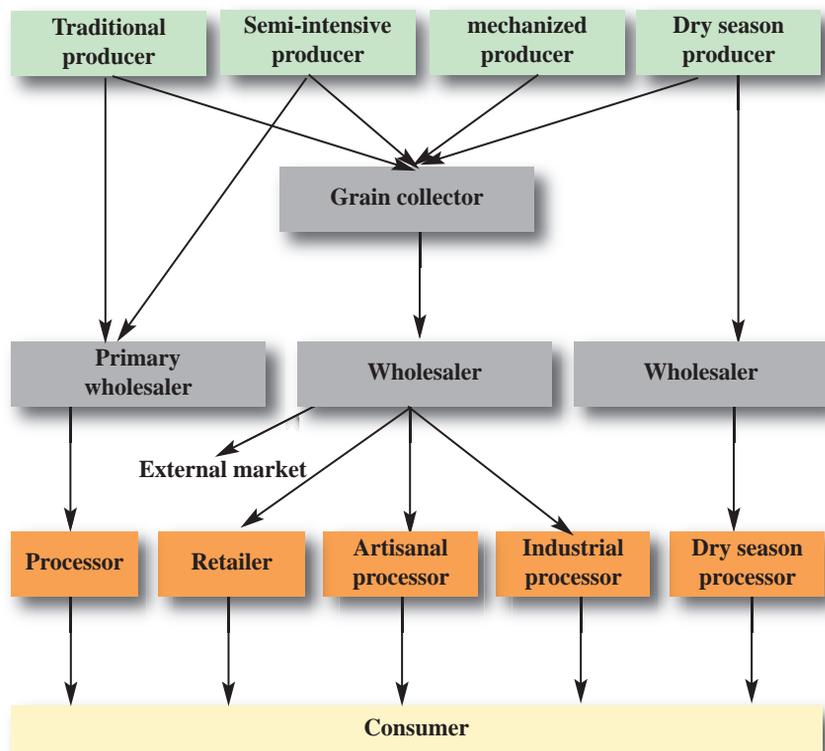


Fig. 4. Market channel of the sorghum in the five countries

Source: Field survey (2015)

3.2 Importance of sorghum in the five countries

In the five countries, sorghum cultivation and consumption are popular among rural and urban households. Sorghum is cultivated by over 80% of the small farmers in Burkina Faso and Mali and 75% in Sudan. In terms of production area and output, sorghum ranks 4th in Sudan. In Burkina Faso and Niger, it occupies the 1st rank. In Mali, it is ranked 2nd. Concerning the areas sown, sorghum in Niger represents 88% of cultivated land and 71% in Sudan. In Burkina Faso, it occupies 43% of the cultivated land. Sorghum production is mainly for home-consumption while surplus is sold in local markets in Burkina Faso (81%) and Mali (75%).

Table 2. Agricultural Importance of Sorghum Production per Country

Agricultural performance of sorghum	Burkina Faso	Mali	Niger	Soudan	Chad
Rank of sorghum among other cereals	1 st cereal crop	2 nd cereal crop	1 st cereal crop	4 th cereal crop	-
Share of sorghum in cereal production	40%	20%	12%	-	54%
Agricultural population growing the crop	80%	80%	-	75%	-
Proportion of area under cultivation over the whole	43%	-	88%	-	71%
Share of home-consumed production	81%	75%	-	-	-

Source: Synthesis of country reports, 2015; - Data not available

3.3 Comparative analysis of sorghum production systems

The sorghum production system is quite identical in all five countries. The mode of production is the rain-fed type, extensive, traditional using rudimentary means of production. Sorghum is grown either as a single crop or in mixed cropping with other cereals, groundnut or cotton.

3.3.1 The Sorghum Growing System

Sorghum is planted during the same period (May-June-July) in all countries. The varieties cultivated are predominantly the local variety in Burkina Faso, Niger and Mali. The rate of utilization of improved seeds therefore remains low. Preference and non availability were reported as reason for low adoption. Sorghum is grown in rotation with crops such as groundnut, cowpea and cotton and/or with other cereals (millet, maize). This cropping system allows sorghum to benefit from the after - effect of fertilizers used for cotton and nitrogen fixed

by leguminous plants such as cowpea. To improve soil fertility and increase production, some farmers that have the means practice crop-livestock integrated farming. They use the crop residues to feed their livestock mainly ruminants while animal labour is used for tillage. In turn, manure from barns is used to improve soil fertility.

3.3.2. Modes of access to land

The modes of access to land are the same for all countries. Inheritance, gift and lease are common means through which farm land is acquired. Inheritance is the most important source of acquiring land. Access to land is also achieved through gifts / bequests and borrowing and to a lesser extent by purchase or lease.

3.3.3. Labour use

The most important labour type used is family labour. The small sizes of holdings and the labour intensive production method adopted are indicative of high family labour use. Women and youths are very involved in production and find themselves at all levels in the production activities with predominance during planting and post-harvest activities. Women and youths people are involved in farming operations such as planting, weeding and post-harvest activities in Burkina Faso, Mali and Chad. In Niger and Sudan, women and young people are mainly engaged in post-harvest activities such as storage, bagging and transportation.

Table 3. Comparative analysis of sorghum production systems in the 5 countries

	Burkina Faso	Mali	Niger	Soudan	Chad
Production mode	-Extensive type - Mixed and / or single -Rain-fed -Traditional	-Extensive type -Traditional -Rain-fed -single	- Extensive type - Mixed and / or single - Rain-fed	- Extensive type -Traditional -Semi-mechanized - Mixed and / or single	-Extensive type -Traditional - Mixed and / or single
Group membership	Strong	Strong	Strong	-	Strong
Activities involving mostly women and youths	Weeding, planting and post-harvest activities	Ploughing, planting, weeding and post-harvest activities, transportation	Storage, transportation and post-harvest activities	Bagging, storage and transportation.	land preparation, chemical application, post-harvest work such as winnowing, drying
Integration crop-livestock	Yes	Yes	Yes	Yes	Yes
Planting Period	2 Periods May-June	3 Periods May, June and July	2 Periods June and July	2 Periods May-June	2 Periods May and June
Type of variety used	-Local*** - Improved *	-Local*** - Improved *	-Local*** - Improved *	-	-
Rotation system	Triennial system cotton-sorghum-sorghum	Triennial system Millet-sorghum-cotton	Triennial and biennial system Millet-Sorghum-Cowpea and Sorghum-Cowpea	-	Biennial system Rainfed sorghum + cow-pea
Mode of access to land	Inheritance, gift Loan, lease and purchase	Inheritance, gift Loan, lease and purchase	Inheritance, Purchase, lease, loan	Inheritance, purchase, lease and loan	Inheritance, purchase and lease

Source: Summary of country reports, 2015; - data not available *, intensity of use

3.3.4 Access to inputs, equipment and loan

The study reveals that the use of chemical fertilizers such as NPK, urea and phosphate is low though some farmers in Burkina, Mali and Chad use it at sub-optimal application level. NPK and urea were found to be in use in Niger and Sudan. The proportion of areas fertilized with mineral fertilizers (NPK, urea) in relation to total cultivated areas remains low. In Burkina Faso for example, it was found that less than 19% of the total cultivated land received chemical fertilizer and less than one-third of the area planted received organic manure. The fertilizer sector is characterized by (i) highly variable supply (ii) local production almost non-existent (iii) high price variability.

In all countries, it is noted that pesticides application used in the control of pests and diseases are low and not according to recommended level. Access to agricultural loan is developed in Chad whereas in Burkina Faso, Mali and Sudan, producers have limited access to formal financial institution loan.

In Burkina Faso, Mali and Niger, the level of access to modern agricultural machines and equipment is very low.

Producers have access to market information (MIS) that allows them to monitor agricultural inputs and commodity prices, commodity availability and sorghum quality. Producers are organized into groups or associations in order to benefit from the support and advice, training and community solidarity.

Table 4. Use of inputs, access to credit and market information

	Burkina Faso	Mali	Niger	Soudan	Chad
Type of chemical fertilizers	NPK, Urea, phosphate	NPK, Urea, phosphate	NPK, Urea	-	NPK, Urea
Pesticides treatment	Very low use	Very low use	-	-	-
Access to Credit	Low	Low	High	Low	Low
Access to modern equipment and innovation	Very low	Very low	Very low	-	-
Market information system	Low accessibility	Low accessibility	-	-	Good accessibility

Source: Summary of country reports, 2015; - data not available

3.3.5 Participation of women in sorghum production

Women are involved in sorghum production activities. *Table 5* below shows the involvement of women in the various sorghum cropping operations in all 5 countries. Major activities for women include weeding, sowing, tillage, harvesting and post-harvest activities. On the other hand, soil preparation and pesticides application are activities with very little involvement of women. In Burkina Faso and Mali, women carry out weeding, ploughing, seeding, fertilizer application and post-harvest activities. In Niger, women participate in all cultural tasks except soil preparation, ploughing and pesticides application. In Chad, women are involved in tillage activities such as ploughing and weeding, planting and post-harvest activities except grain transportation. In Sudan, women participate more in post-harvest activities such as harvesting, winnowing, bagging and transportation.

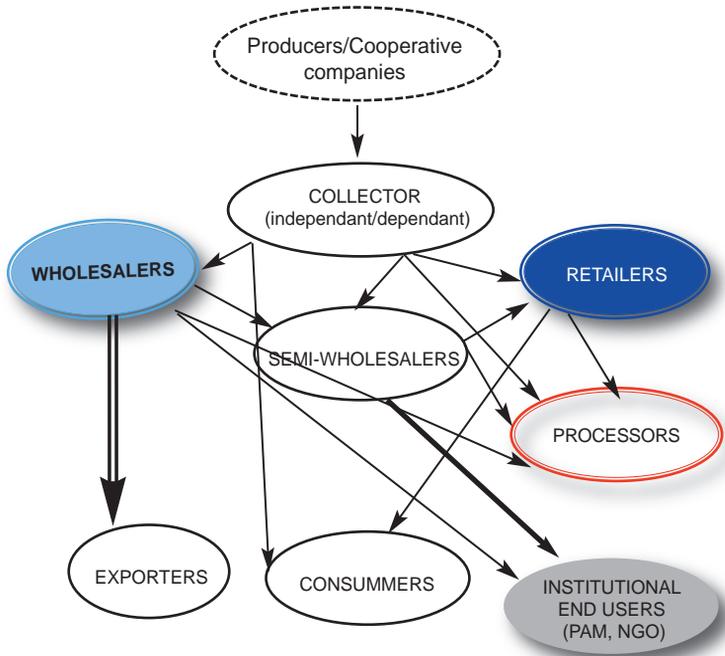
Table 5a. Women's participation in sorghum production

Activity	Burkina Faso	Mali	Niger	Chad	Soudan
Soil Preparation	-	-	-	-	-
Ploughing	X	X	-	X	-
Sowing	X	X	X	X	X
Weeding	X	X	X	X	X
Earthing-up	-	X	X	-	-
Spreading of fertilizers	X	X	X	-	-
Phytosanitary treatment	-	-	-	-	X
Harvest	X	X	X	X	X
Ginning/winnowing	X	X	X	X	X
Bagging	-	-	X	X	X
House transport	X	X	X	-	X

Source : Summary of country reports, 2015

3.4 Comparative analysis of the marketing activities

In the five (05) countries, the sorghum value chain, like with other cereals, involves several types of intermediaries. The key market intermediaries, based on volume of produce handled and stage in the chain they operate are collectors, retailers, and wholesalers.



Source: from Country reports, 2015

Figure 5: Sorghum Marketing Channel

3.4.1 Collectors and the collection activities of sorghum

The collection of sorghum is quite similar for all the countries. Collectors buy sorghum from producers at farm-gate and from local/village markets. Depending on the source of funds, they are called dependent or independent collectors. The independent collector has his own capital, buys the product according to his own selection criteria (price, quality etc.). On the other hand, the dependent collector is usually bound by clauses, informal agreements or contract with one or more wholesalers to whom they deliver the product; they serve as buying agents for wholesalers. Women and young people are very present in the collection in Burkina Faso, Niger and Chad. In Sudan however, women are not visible but young people are affiliated to the various tasks of collection.

3.4.1.1 Pricing mechanisms at the level of collectors

The pricing mechanism is the same in Burkina Faso, Mali, Niger and Sudan. It takes into account the market price, the period and the distance travelled/transport cost to ensure the collection. It was observed that there were some form of collusion in Chad; where collectors work together to set the prices, taking into account the prices distributed by the market information system.

Table 5b. Comparison of sorghum collection system by country

	Burkina Faso	Mali	Niger	Soudan	Chad
Collection system	- Purchase with the producer - Local or weekly markets	- Purchase with the producer - Local or weekly markets	- Purchase with the producer - Local or weekly markets	- Purchase with the producer - Local or weekly markets	- Purchase with the producer - Local or weekly markets
Type of collectors	Dependent and independent				
Existence of female collectors and youths	yes	yes	Yes	yes	yes
Pricing mechanism	- Market price - Periodicity - Distance travelled	- Market price - Market Information System			

Source: Summary of country reports, 2015; - data not available

3.4.1.2 Collection, Transport and Storage Infrastructures and Loss Minimization Mechanisms

The most commonly used means of transportation are bicycles, motorcycles, donkey driven carts and tricycles. For storage infrastructure, collectors use their houses and sheds to store the products.

During collection and storage operations, losses are significant. The sources of the losses are related to the transportation and storage method and structure. Both quality and quantity losses are observed during storage and transportation. To minimize these losses, collectors develop minimization strategies: use of non-standard measurement units, use of good quality bags, pesticides treatment in warehouses, improvement of transportation conditions and taking precautions at the storage level in Mali and in Sudan.

3.4.1.3 Government support, access to market information and quality criteria for collectors

Market information systems exist in Burkina Faso (SIM SONAGESS and SIM *Afrique verte*), in Mali it is SIM (OMA). In Sudan, information on the market is broadcast on radio and television. To check the quality of products, collectors use metal probes to pierce and sample grains in bags and visual observation to assess the quality. Quality criteria are the cleanliness, dryness, size and colour of the grains. These criteria are used in all the countries studied.

Table 6. Collection, Transport and Storage Infrastructures and Sorghum Loss Minimization Mechanism by Country

	Burkina Faso	Mali	Niger	Soudan	Chad
Main sources of loss	-Transportation - Storage	-Transportation -Storage -Weighing -Sorting out	Niger - Transportation - Storage	- Transportation - Storage	- Transportation - Storage - Sorting
Loss and Risk Minimization Mechanism	- Use of bags of good quality - Reduction of the purchase price depending on the risk (road conditions) - Use of measurement unit	-Use of bags of good quality -Pesticide treatment in warehouses	- Use of good quality bags	- Use of good quality bags - Storage, precaution at the transportation level.	- Use of bags of good quality Pesticides treatment in warehouses
Storage infrastructure	- Shed - House	- Shed - House	- Shed - House	- House	- Warehouse - Shed - House
Means of transport	- Bicycle - Motorbike - Cart	- Cart - Motorbike	- Cart - Motorbike	- Cart - Motorbike	- Cart - Motorbike

Source: synthesis of country, 2015; - data not available

Table 7. Comparison of Access to Information, Government Support and Quality Criteria

	Burkina Faso	Mali	Niger	Soudan	Chad
Governmental Support	No support	No support	No support	No support	-Facilitation of credit - Technical advice
Access to information on the prices	SIM (SONA-GESS, <i>Afrique verte</i>)	SIM (OMA)	-	- Radio - TV	-
Quality criteria	- Cleanliness (presence of wastes) - Grain Size - Colours	- Cleanliness (presence of waste) - Grain Size - Colours	- Cleanliness (presence of wastes) - Grain Size - Colours	-	- Cleanliness (presence of wastes) - Grain Size - Colours

Source: Synthesis of country reports, 2015; - data not available

3.4.2 Comparative analysis of wholesalers

Wholesalers are important and critical link in the marketing of sorghum based on the relative quantity handled and their influence on price of produce. The wholesalers have more resources and are better organized than the other players. Relationships between wholesalers and collectors can result in contracts and / or informal agreements. In Burkina Faso and Mali, wholesalers establish formal contracts with collectors in most cases. In Niger and Chad, collectors are linked to wholesalers through informal arrangements. Most wholesalers do not receive direct government support except in Chad where wholesalers benefit from facilitation to have access to credit and technical assistance.

3.4.2.1 Wholesalers transportation, infrastructure and sources of loss

Wholesalers use trucks, carts and tricycles as means of transporting sorghum in Burkina Faso, Mali and Chad. In Sudan, the means of transportation for wholesalers is the truck and the cart.

The products are most often stored in warehouses and sheds. Sorghum losses at wholesalers' level are common during transportation, storage and cleaning in Burkina Faso, Mali and Niger. In Sudan most losses at wholesalers levels is during transportation and storage.

Table 8. Mechanisms for collection, transportation and storage of sorghum wholesalers in the countries

	Burkina Faso	Mali	Niger	Soudan	Chad
Type of relationship with collectors	- Contract - Without contract	- Contract - Without contract	- Informal agreement	-	- Formal agreement
Government support to wholesalers	No support	No support	No support	No support	- Facilitation to Credit access - Technical advice
Activities involving women and youth	- Cleaning - Collection - Handling - Bagging	- Broker - Collection - Cleaning - Handling	- Cleaning - Collection - Handling - Bagging	-	- Handling, - Secretary work - Collection - Broker, - Guard services
Type of mean of transportation	- Truck - Cart - Tricycle	- Truck - Cart - Tricycle	- Truck - Cart - Tricycle	- Truck - Cart -	- Truck - Cart - Tricycle
Storage Infrastructure	- Warehouse - Shed	- Warehouse - Shed	- Warehouse - Shed		- Warehouse - Shed
Source of loss	- Transportation - Storage - Cleaning	- Cleaning - Transportation - Storage	- Cleaning - Transportation - Storage	- Transportation - Storage	- Cleaning - Transportation - Storage

Source: synthesis of country reports, 2015; - data not available

3.4.2.2 *The pricing mechanism, insurance system and quality criteria for wholesalers*

The pricing mechanism always follows the law of supply and demand. The imperfection of cereal markets leads to frequent fluctuation of prices mainly dictated by wholesalers. In Burkina Faso, Mali and Chad, quality criteria are based on grain cleanliness, size and colour. Wholesalers do not take out insurance to minimize risks in any of the countries.

Table 9. Pricing mechanism, insurance system and quality criteria for wholesalers

	Burkina Faso	Mali	Niger	Soudan	Chad
Pricing mechanism	- Market price - Periodicity	- Market price - Periodicity	- Market price - Periodicity	- Market price - Periodicity	- Market price
Product quality criterion	- Cleanliness (presence of waste) - Grain Size - Colours	- Cleanliness (presence of waste) - Grain Size - Colours	- Cleanliness (presence of waste) - Grain Size - Colours	- None	- Cleanliness (presence of waste) - Grain Size - Colours
Insurance system	None	None	None		None

Source: Synthesis of country reports, 2015; - data not available

3.4.3 *Comparative Analysis of the retailers*

Retailers are located downstream in the marketing channel. They are characterized by the relatively small quantities bought and sold directly to consumers and end users. The mode of sale remains similar for all countries. Retailing activity is dominated by women located in markets, homestead location and commercial areas in the countries.

3.4.3.1 *Transportation and pricing mechanism adopted by retailers*

Transportation method involve use of carts, motorcycles and bicycles.

Grains are stored in home locations and sheds (kiosks) in Burkina Faso, Mali and Chad. Retailers set prices based on the price of the wholesaler. Retailers are not supported by government and generally do not have access to credit.

Table 10. Comparison of Logistics and Pricing Mechanisms at the Retailers at the Level of the Countries

	Burkina Faso	Mali	Niger	Soudan	Chad
Mode of sale	- In bulk - Essentially by women	- In bulk - Essentially by women	- In bulk - Essentially by women	-	- In bulk - Essentially by women
Type of transportation means	- Cart - Moto - Bicycle	- Cart - Moto - Bicycle	- Cart - Moto	- Cart - Moto	- Cart - Moto - Bicycle
Storage Infrastructure	- Shed - House	- Shed - House	- Shed	-	- Shed - House
Pricing Mechanism	Increase of Purchasing prices from wholesalers	Increase of Purchasing prices from wholesalers	Increase of Purchasing prices from wholesalers	-	Increase of Purchasing prices from wholesalers
Access to Loan	Low	Low	Low	No access to loan	Low

Source: Synthesis of country reports, 2015; - data not available

3.5 Comparative Analysis of Sorghum Processing

The processing sector of sorghum remains largely underdeveloped in the zone. A small portion of sorghum produced is processed for home consumption.

3.5.1 Comparative Analysis of the Types of Processed Products

The processing is still artisanal in its great majority, but we also encounter semi-modern processors. The processed products are diversified and varied according to the country. Processed products include local beer, semolina,

pastries and biscuits. In Burkina Faso and Mali, processed sorghum is used as livestock feed. The fermentation of sorghum into local beer is common in Burkina Faso and Chad.

3.5.2 Comparing contract types, certification, women and youths involvement

To ensure a steady supply of the raw material, processors most times contract with suppliers. In Burkina Faso, Niger and Sudan, this type of contract remains informal. For the most part, Malian processors have a formal agreement. In Chad, suppliers are not bound by any contract to processors.

As regards to quality standards, only Malian processors have a quality label/standards for certain processed products. For all countries, there is a very high involvement of women and youths in processing activities such as mills, production of sorghum beer and sales of produce.

Table 11. Supply mechanisms and main characteristics of sorghum processors in the 5 countries

	Burkina Faso	Mali	Niger	Soudan	Chad
Supply	- Wholesalers - Collectors - Producer Groups	- Wholesalers - Collectors - Producer Groups	- Wholesalers - Collectors - Producer Groups	- Wholesalers - Collectors - Producer Groups	- Wholesalers - Collectors - Producer Groups
Type of processors	- Artisanal - Semi-modern - Industrial	- Artisanal - Semi-modern	- Artisanal - Semi-modern	- Semi-modern - Industrial	- Artisanal - Semi-modern - Industrial
Processed products	- Local beer - Semolina - Cattle feed	- Cattle feed - Semolina - Flour	- Couscous - meals eg <i>Déguè</i> , - Flour - Cake, - Biscuit,	- Semolina - Flour - Cake - Biscuit	- Local beer - Couscous - Flour - Cake - Biscuit
Governmental support to processing	No support	No support	No support	No support	Facilitation to access credit

Source: synthesis of country reports, 2015; - data not available

Table 12. Types of contracts, certification and gender involvement with sorghum processors in the 5 countries

	Burkina Faso	Mali	Niger	Soudan	Chad
Type of Supplier Agreement	Informal Agreement	Formal Agreement	Informal Agreement	Informal Agreement	None
Quality Certification	None	Presence of a label for certain products	None	None	None
Involvement of women and youth	Strong involvement	Strong involvement	Strong involvement	Strong involvement	Strong involvement

Source: synthesis of country reports, 2015; - data not available

3.6 Main constraints in the sorghum value chain in Sahelo-Saharan zone Africa

The analyses of the strengths, weaknesses, opportunities and threats (SWOT) of the sorghum value chain across the countries is presented below:

3.6.1 Constraints of sorghum production

The SWOT analysis highlights constraints common to all countries but also constraints that are specific to each country.

3.6.1.1 Common constraints

These include low use of modern agricultural inputs, low access to formal credit, low use of improved seeds (most varieties are traditional varieties) as well as low mechanization and decreased fertility of soils.

3.6.1.2 Constraints specific to one or several countries

In Niger, the cultivated varieties are of the local type and are sensitive to stem borers and *cecidomya*. In the Sudan, as major constraints are different from other countries, one can note inadequate training and the lack of appropriate extension programs, late planting with low yields, high use of local varieties with low yields, infestation by weeds (Striga) and a scarcity and high cost of labour. In Chad, specific constraints are the lack of organization of sorghum value chain producers, a high proportion of non-agricultural activities, conflicts between heirs on agricultural lands, lack of legal status on land and the poverty of farm households.

Table 13. Production Constraints by country

Country	Burkina Faso	Mali	Niger	Soudan	Chad
Production constraints	<ul style="list-style-type: none"> -Low use of inputs (improved seeds, fertilizers, organic matter) - Low level of mechanization; - lack of mastery of cropping techniques, - Low access to financing; - soil poverty; 	<ul style="list-style-type: none"> -Low availability of quality seeds -Low input subsidy sorghum (fertilizer) - Lack of a regular quality offer * - Low credit access - Low consumption of urban households * - Instability of sales of sorghum - Weak producer organization -Low access to inputs and excessive cost 	<ul style="list-style-type: none"> -Production very dependent on climatic hazards -Low use of improved technologies -Low crop systems productivity -A difficult access to modern agricultural inputs - Local varieties sensitive to stem borer and <i>Cecidomya</i> * - Production non-aligned on demand 	<ul style="list-style-type: none"> -Instability of production linked to climate risk * - Inadequate training and lack of appropriate extension programs * - Late seeding causing low yields * - Soil exhaustion due to lack of crop rotation * - Low use of fertilizers - High use of local variety with low yield* -Low productivity -Infestation by weeds (<i>Striga</i> spp) * - Excessive dependence of producers on local seeds -Scarcity and high labor cost* 	<ul style="list-style-type: none"> -No specific organization of sorghum producers * - Strong proportion of non-farming activities* - High proportion of non-fallow in some producers - short fallow period -Conflict between heirs on agricultural lands -Lack of legal status on land * -Low income level * -Low use of mineral fertilizers

Source: Synthesis of country reports, 2015; * country-specific constraint.

3.6.2 Sorghum marketing constraints (see table 14)

Table 14 shows sorghum marketing constraints

Table 14. Marketing constraints

Constraints	Burkina Faso	Mali	Niger	Soudan	Chad
Collectors	<ul style="list-style-type: none"> - Lack of organization of market -Lack of space in the markets* - Lack of financial resources - Poor quality of road infrastructure - Insecurity on roads* 	<ul style="list-style-type: none"> - Poor offer* - Products sold in bulk by producers - Significant price fluctuation in the markets - Poor quality of roads - Lack of means of transportation 	<ul style="list-style-type: none"> - Problem of trust between collectors * - Financial losses - Non-fulfilment of commitments for delivery of goods and purchase orders* -Poor own financial means 	<ul style="list-style-type: none"> -Significant use of tradition storage methods -Poor quality of warehouses -High cost of road transport -Long road trip for collection operations * -Limited capacity of means of transportation -Lack of transport and storage infrastructure 	<ul style="list-style-type: none"> - Unclear definition of standards and quality - Informal collectors' network* -Lack of insurance system to reduce losses* - Poor ownership of means of transportation - Use of precarious storage infrastructures - Quality of products not determined - Inadequate personal funds to finance collection activities
Wholesalers	<ul style="list-style-type: none"> - Price volatility - Prices offered by SONAGESS create market failure - Insecurity on roads -Lack of financial means -Non standardized measuring tool 	<ul style="list-style-type: none"> -Bad conditions of roads -Irregular offer - Inadequate working capital - Poor access to loan services - Poor support from government to traders. 	<ul style="list-style-type: none"> - Lack of transport and storage infrastructures - Inadequate funds -Road harassments by police and customs officers and at borders* -Difficult access to public grain procurement 	<ul style="list-style-type: none"> -Limited role of women in marketing * -Inadequate, absence of coordination in macroeconomic and sectoral policies* -Inadequate social and physical infrastructures 	<ul style="list-style-type: none"> - Oral purchase agreement with collectors* - Oral supply agreement with collectors - Unclear definition of standards and quality control criteria* - Poor capacity to control

... / ...

Table 14 continued

Constraints	Burkina Faso	Mali	Niger	Soudan	Chad
	<ul style="list-style-type: none"> - Advance on loans to collectors/ farmers not paid back* -Price fluctuation 	<ul style="list-style-type: none"> - Poor organization of marketing actors* 	<ul style="list-style-type: none"> contracts because of political interferences* 	<ul style="list-style-type: none"> - Poor competitiveness linked to poor productivity -High marketing costs linked to drop in prices* -Variability of size, color and cleanliness of grains impacting marketing -Heavy taxes levied by the government on the agricultural sector* 	<ul style="list-style-type: none"> loss sources* - Warehouses roughly built and poorly equipped*
Retailers	<ul style="list-style-type: none"> -Waste sorting -Slump in sales -Lack of storage infrastructure 	<ul style="list-style-type: none"> - Absence of working capital -Poor access to loan 	<ul style="list-style-type: none"> -Absence of storage infrastructure -Lack of financial means -Heavy and various taxes levied by government* 	<ul style="list-style-type: none"> -Absence of storage infrastructure -Absence of State in price regulation and fixing* 	<ul style="list-style-type: none"> - Quality not really taken into account in pricing * - Very small profit margin - Poor packaging before selling - Poor quality control

Source: Country reports summary, 2015; *country specific constraints

3.6.2.1 Constraints common to all countries

The constraints common to the 5 countries include: absence and high cost of efficient produce transportation means. Key infrastructural challenges include poor state of roads, lack of storage infrastructure (warehouses) and lack of financial resources for all actors of the different actors in the value chain. Absence of organization of actors involved in marketing, harassment by police and customs officers on the roads and at the borders.

3.6.2.2 Constraints specific to each country or to several countries

o Collectors

Inadequate and poor storage structure in markets of Burkina Faso, erratic supply of grains in Mali, the issue of trust between collectors, failure to fulfil delivery commitments (contract compliance) in Niger, long distances and poor road system for collection operations, an informal network of collectors and absence of an insurance system to reduce losses in Chad.

o Wholesalers

Non-repayment of credit advances to collectors / farmers in Burkina Faso, poor organization of marketing actors in Mali, difficulties in accessing public procurement markets for cereals due to political interference in Niger, the limited role of women in marketing, inadequacy or lack of coordination of macroeconomic and sectoral policies, high cost of marketing, and the heavy taxes levied by the government in Sudan. There are also oral and informal purchase agreements with collectors, unclear definition of standards and quality control criteria, low capacity to control loss sources, inadequacy and poor quality of storage warehouses in Chad.

○ Retailers

High and multiple taxes in Niger, the absence of the State in price-fixing regulation in Sudan, and failure to take into account quality of the product in fixing prices in Chad.

3.6.3 Sorghum processing constraints (see table 15)

3.6.3.1 Common constraints

In all the 5 countries analysed, the constraints common to processing sorghum include the absence of organization of the actors, inadequate financial means (access to loan), price instability in the market, poor quality of processed products (ignorance of quality standards).

3.6.3.2 Specific constraints

There are also differences in the constraints identified across country. These include high losses in processing in Mali, non-innovative processing units and lack of high-performance and adapted equipment in Niger, absence of high value markets, strong presence of pests and other contaminants such as mites and mussels in raw materials and the high cost of processing in Sudan, low employment capacity and presence of low-capacity mills in Chad.

Table 15. Sorghum processing constraints

Contraints	Burkina Faso	Mali	Niger	Soudan	Chad
Processing	<ul style="list-style-type: none"> -Lack of organization -Lack of financial means 	<ul style="list-style-type: none"> -Primary processing -Products are not cleans -Instability of prices on the market -Lack of product quality standards -Low access to credit - Poor packaging quality. -High losses in processing* 	<ul style="list-style-type: none"> - Non-innovative processing units * -Difficulties to move processed products despite the existence of a potential market - Inadequate financial capital for processing units -No enough high-performance and adapted materials* 	<ul style="list-style-type: none"> - Lack of uniform grade quality grain required supplies - Absence of logistics markets* -Lack of political support to processing* - Strong presence of parasites like nutritional myths, mussels in raw material* High cost of processing* 	<ul style="list-style-type: none"> - Processed products not labelled - Low employment capacity (2 persons maximum) * - Uncontrolled pricing mechanism - Ignorance of milling capacity by millers - Supply agreement almost non-existent - Small number of women millers* - Local beer brewing method completely traditional - The means of transport being limited to bulk carriage - Low availability of storage infrastructure and poor equipment - Strong presence of low capacity mills* - Limited capacity to finance on own funds.

Source: country reports summary, 2015; * country specific constraints

3.7 Opportunities for the value chain (see table 16)

The sorghum value chain presents many development opportunities for the five countries and for each actor in the sector.

3.7.1 Concerning production

3.7.1.1 Common opportunities

Opportunities common to all countries include the increase in consumer demand at national level, the existence of innovative varieties and techniques, and the existence of a sub-regional market in the Sahel countries

3.7.1.2 Specific opportunities

They include:

- existence of a demand for peri-urban poultry farming, a beginning of organization of the actors with the creation of an exchange and consultation framework between actors (CIC-B) in Burkina Faso;
- sorghum as a substitute for maize in the formulation of poultry feed in Niger;
- existence of insurance companies in Sudan, access to credit, subsidy of agricultural inputs, availability of agricultural land;
- the State program for farm mechanization, the tractor ploughing subsidy and access to market information through mobile telephony in Chad.

3.7.2 Concerning commercialization

3.7.2.1 Common opportunities

For all the actors involved in marketing (collectors, wholesalers and retailers) the opportunities are:

- Trade liberalization;
- Development of small sorghum-based products processing units.

3.7.2.2 Specific opportunities

- Suppression of taxes on sales by the government, more adapted access to loan, collaboration with suppliers and tax exemption in Sudan,
- Good understanding of the concepts of standards and quality in Mali.

3.7.3 Concerning processing (see table 16)

Major opportunities similar to the processing sector are the development of processing units, the existence of a potential market for processed sorghum products. The difference in opportunities per country is mainly the use of mass media to communicate with customers in Sudan and on know-how on varieties in Chad (cf table 17 p. 56).

Table 16 : Opportunities at the levels of production, marketing and processing

Opportunities	Burkina Faso	Mali	Niger	Soudan	Chad
Production	<ul style="list-style-type: none"> -High consumption at national level -Diversified market: several outlets including peri-urban poultry farming* -Existence of a sub-regional market * -Inducement to a value chain structuring -Creation of an exchange and consultation framework between the actors of the sector * -Commitment of the State in the sector organization process 	<ul style="list-style-type: none"> -Existence of varieties and water and soil conservation techniques -Existence of innovations for harvesting and post-harvest 	<ul style="list-style-type: none"> -High consumption of sorghum in Niger -Sorghum-based processed products as foods indicated for diabetic people -Sorghum, a substitute for maize in poultry feeds* -Research on sorghum acquired in terms of technologies and techniques 	<ul style="list-style-type: none"> -Development of insurance companies* -Sensitization of farmers on meteorological data and information. -Transition from subsistence production to commercial sorghum production. -Sorghum as a popular crop for consumers 	<ul style="list-style-type: none"> - Possibility of access to credit * - Possibility of access to wage labor - Subsidy on agricultural inputs * - Availability of agricultural land * - State program for farm mechanization* - tractor ploughing subsidy* - Access to information on markets through SIM or by mobile telephony*
Commercialization	<ul style="list-style-type: none"> -Increasing domestic demand -Existence of a sub-regional market -Low marketing rate -Source of income for actors 	<ul style="list-style-type: none"> -Liberalization of marketing in the country * -Strong demand for large quantities to make the national security stock by the State and the technical partners -Existence of high processing capacity mills 	<ul style="list-style-type: none"> -Development of small processing units for sorghum-based products* -Availability of sorghum supplies in neighbouring countries such as Benin and Nigeria -Existence of sorghum production potential 	<ul style="list-style-type: none"> -Suppression of sales taxes by the government* -more adapted access to loans* -Offering services to farmers -Efficient supply chain management 	<ul style="list-style-type: none"> - Good understanding of the concept of standards and quality * - Significant number of community markets - Strong presence of trade support services - Availability of government support services

Source: Country reports summary, 2016

Table 16 : continued

Opportunities	Burkina Faso	Mali	Niger	Soudan	Chad
Processing	Development of processing units	-Existence of a research and food technology laboratory - Strong demand for human food	-Existence of a potential market for products processed from local sorghum agricultural products	Use of social media to communicate with customers* - Collaboration with suppliers* - Integration of smallholders in the supply chain - tax exemption *	- Strong local beer brewing activity - Know-how on varieties*

Source: Country reports summary, 2016

3.8 Comparative analysis of support policies

Government support policies are not specific to sorghum producers. It is generally part of the general framework put in place by the public authorities to benefit all farmers. To boost agricultural development, the public authorities of the five countries of the study support farmers through subsidies or even free distribution of improved variety seeds, subsidized tractor ploughing and subsidized sale of chemical fertilizers (50% in Mali). These actions are well known to producers to date. *Table 17* presents the different types of support provided

In addition to measures taken by governments in terms of inputs and equipment, producers receive guidance and training, the importance of which varies from one country to another.

The governments of Mali and Chad, unlike those of Burkina Faso and Niger, have set up specific financial structures to facilitate farmers' access to finance. Indeed, the Malian government through a guarantee fund supports agricultural producers through the creation of a banking pool led by the National Agricultural Development Bank (BNDA).

In Chad, a ministry in charge of microfinance was created to support farmers' access to finance. Concerning Sudan, support to producers identified includes capacity building for actors and management of irrigation schemes.

Table 17. Comparative analysis of support policies per country

	Burkina Faso	Mali	Niger	Soudan	Chad
Support policy	<ul style="list-style-type: none"> ▪ Subsidy for fertilizers ▪ Subsidy for improved seeds ▪ Distribution of equipment ▪ Renting agricultural equipment ▪ Training and awareness raising Technical coaching 	<ul style="list-style-type: none"> ▪ Subsidy for fertilizers (50% of price) ▪ Subsidy for improved seeds ▪ Sensitization and information ▪ Technical coaching ▪ Agricultural banks Price setting 	<ul style="list-style-type: none"> ▪ Subsidy for fertilizers ▪ Sensitization and information ▪ Technical coaching Management of irrigation schemes 	<ul style="list-style-type: none"> ▪ Training and sensitization technical coaching ▪ management of irrigation schemes 	<ul style="list-style-type: none"> ▪ Sensitization and information ▪ Technical coaching ▪ Management of irrigation schemes ▪ Agricultural banks ▪ Renting agricultural equipment ▪ Training and sensitization ▪ Technical coaching

Source: country reports summary, 2015; - data not available

Chapter 4

Conclusion and recommendations

4.1 Conclusion

The comparative analysis in the 5 Sahelo-Saharan zone countries shows that there are a lot of similarities, but also specificities in the various node of the sorghum value chain in all the countries. This region of Africa shares the same eco-climatic conditions and fairly similar modes of production.

Concerning marketing sector, the actors also present the same collection and network connection system. Concerning processing, the sector is still underdeveloped, characterized by a supply of lower quality processed products and below a growing demand. Consequently, the result is that the sorghum sector in these countries needs to develop strong policies to improve its performance. In all these five countries, the policies to be implemented are almost the same: (i) introduction of new technologies, (ii) strengthening agricultural training and capacity building, (iii) improved varieties, (iv) access to credit, (v) assistance in storage facilities, (vi) development of means of transport, (vii) agricultural mechanization, (viii) improvement of marketing and distribution channels.

Public investment will undoubtedly help increase performance of the sorghum value chain.

Indeed, there are still many constraints that continue to impede competitiveness of the sorghum sector; but its overall potential is enormous. The exploitation of this potential could contribute to a significant improvement of the living conditions of the populations of the region. To ensure that sorghum production goes beyond its primary objective (subsistence production), it is necessary to organize the actors of the sector to allow fluidity of information, transfer of technology between actors, advisory support, stakeholders' interdependence, added value at each link in the chain, and easy access to financing.

At the end of this study, some recommendations are formulated for each stakeholder in the value chain.

4.2 Recommendations

◆ Producers

- Disseminate/extend the results of research (improved varieties, technical routes) through a real research promotion policy by means of fairs, open houses of research institutions and a multiplication of test farms.
- Facilitate access of producers to financing by reducing the conditions for lending and encouraging producers to invest more in new production technologies
- Revitalize the market information system by disseminating prices in real time and on a regular basis through mass media and mobile telephony;
- Finance research institutions to develop knowledge and technologies which are adapted to the current climate change context ;
- Intensify sorghum production by facilitating access to modern inputs (improved seeds, pesticides and fertilizers);

- Accelerate agricultural mechanization;
- Distribute certified seeds to farmers through their cooperatives
- ◆ **Collectors**
 - Organize collectors in network through an interconnection of collectors involved in sorghum marketing.
 - Improve road infrastructures especially those linking major production areas to major consumption centers;
 - Promote signing purchase contracts between collectors, wholesalers and retailers on the basis of the quality and quantities required;
 - Reduce taxes paid by collectors (market levies);
 - Remove fraudulent barriers and put an end to secret commissions;
 - Promote the acquisition of specific transport equipment adapted to the players of the various links in the chain;
 - Improve access to financing for the collectors of the sector
 - Train collectors on more efficient grain cleaning and sorting techniques to remove sand and other essential impurities from sorghum;
 - Implement an effective road security mechanism;
 - Improve transport systems through the development of road infrastructure that will allow a better routing of sorghum.
- ◆ **Wholesalers**
 - Establish a mechanism to finance wholesalers' working capital;
 - Encourage wholesalers to set up an adapted and up-to-date information system on sorghum prices;

- Strengthen texts on the movement of goods and properties by reducing police and customs harassment on roads and at borders;
- Sensitize on integrating a pre-financing component for producers and processors;
- Limit entry taxes to the sorghum sub-regional market;
- Support the construction of storage facilities for sorghum for wholesalers;
- Facilitate regional export opportunities through improved maintenance of a major road section and long distance service roads, and information and export promotion centers in the markets.

◆ **Retailers**

- Facilitate access of all sorghum retailers to community credit;
- Put in place pricing regulatory policy (cereal exchange and purchase counter);
- Encourage the construction of certified storage infrastructures by supporting the construction of warehouses that meet quality standards;
- Provide support mechanism to retailers (access to credit and technical assistance);
- Sensitize retailers on standardization of units of measure and quality management;

◆ **Processors**

- Promote purchase contracts signing between traders and producers on the basis of the quality and quantities required by customers;
- Assist promoters in identifying appropriate and technically cost-effective equipment to upgrade existing artisanal facilities;
- Promote semi-industrial and industrial units to improve the quality of processed products and develop their export;

- Establish a credit system favorable to processors by encouraging financial institutions to consider the processors' investment needs;
- Subsidize modern equipment through the introduction of a policy to reduce taxes on processing equipment;
- Encourage contract signing strategy between the actors in the processing sector by subcontracting some activities
- Establish a certification system and quality standard assessment of processed products;
- Assist processors in disinfestation of raw materials.

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Annexes

Annex 1.

SWOT analysis of sorghum production in Burkina Faso

Positive

Negative

Internal

STRENGTHS

- Investment incentives
- Political will to develop the sector
- High margin of progress;
- adaptation of varieties to production areas
- tolerance to drought spells
- existence of improved high yielding varieties;
- Capacity to create employment in a rural environment
- Participation in food security in rural areas;
- Source of income for actors

WEAKNESSES

- Extensive production system
- Low input use
- Absence of irrigation
- Low productivity of local cultivars
- Low financial resources;
- lack of knowledge on varieties by producers
- lack of control of technical routes
- Quality of finished products
- cost of seed supply;
- Absence of credit line to support producers;
- Low variety responses to afertilizers

External

OPPORTUNITIES

- Strong domestic consumption
- Diversified market: several outlets, including peri-urban poultry farming
- Existence of a sub-regional market
- Development of processing units;
- Encouraging the structuring of a value chain;
- Creation of an exchange and consultation framework between the actors in the supply chain;
- State involvement in the sector organization process

THREATS

- Climate change
- Prevalence of traditional practices;
- Soil degradation;
- Landlocked production areas;
- Lack of organization of the sector

Source : country document

Annex 2.

SWOT analysis of sorghum production in Mali

Strengths	Weaknesses
<ul style="list-style-type: none">• Sorghum is well adapted to the ecologies of Mali (poor soils, low rainfall, high temperatures).• Sorghum is a staple food for several communities in the country.• Sorghum grains and stems are used for various purposes (human consumption, animal consumption, fencing, energy, crafts).	<ul style="list-style-type: none">• Low availability of quality seeds and preference of producers for traditional varieties.• Low input subsidy for sorghum (fertilizers) compared to rice and sorghum /maize???.• Lack of a regular quality offer. Producers have low access to credit limiting their production capacity.• Poor image of sorghum in the urban households' consumption pattern.• Selling prices for sorghum are unstable and are greatly influenced by wholesale traders.• Poor producers' organization limiting their ability to influence policies at the national level and improve access to low cost inputs• Producers lack the capacity to link to various markets and trading partners.
Opportunities	Challenges
<ul style="list-style-type: none">• There are varieties and water and soil conservation techniques to increase sorghum yields to 2-3 tons / ha.• There are also innovations for harvesting and post-harvest that reduce impurities in harvested grains and improve product quality while linking producers to high value-added markets.	<ul style="list-style-type: none">• The major challenge facing producers is the rainfall variability that negatively influences production decisions.• Land degradation due to demographic pressure.

Source : country document

Annex 3.

SWOT analysis of sorghum production in Niger

Strengths	Weaknesses
<ol style="list-style-type: none">1. Sorghum producers, men and women, have traditional knowledge and experience in sorghum production.2. Existence of producers' organizations in sorghum production areas3. Existence of local and improved sorghum varieties well adapted to the agro-ecological conditions of the country.4. Producers are aware of the existence of modern agricultural inputs.5. Existence of a significant potential of well-adapted valley lands for sorghum (fossils of Dallols, Goulbis of Maradi and Zinder, Maggia and Tarka, rivers of Komadougou, Lake Chad and the undeveloped zone of the Niger River).	<ol style="list-style-type: none">1. Sorghum, a rainfed crop too dependent on climatic hazards.2. Low use of improved sorghum-based technologies.3. Low productivity of sorghum-based cropping systems due to low utilization of improved technology package.4. Difficult access to modern agricultural inputs for sorghum producers.5. Local varieties sensitive to stem borer and <i>cecidomyid</i>.6. Sorghum producers do not produce according to the needs of downstream actors.7. Other potential market opportunities for sorghum promotion are not well developed (brewery, poultry feed).8. Prices are not remunerative for sorghum producers.
Opportunities	Threats
<ol style="list-style-type: none">1. After millet, sorghum is one of the main dry cereals consumed in Niger.2. Development of small processing units for sorghum-based products.3. Processed sorghum-based products are said to be appropriate for diabetic meals.4. Sorghum, a substitute for maize in poultry feed.5. Research on sorghum has interesting results in terms of technologies and techniques	<ol style="list-style-type: none">1. The adverse effects of climate change on rainfall.2. Reduction year after year of the supervisory system in terms of supervisor and number of supervised farmers ratio and also the means given to supervision agents3. Sorghum imported from Benin or Nigeria is of better quality

Source : document pays

Annex 4.

SWOT analysis of sorghum production in Chad

Strengths

Weaknesses

Internal

- Involvement of women and young people in all cropping activities, predominantly in winnowing, replanting and water carrying for women, then threshing and conveying for young people;
- Good involvement in sorghum cultivation (75% of opinion for full-time agricultural work);
- Globally young producers (69% of the age group 20-34)
- Strong integration of agriculture and livestock. Non-integration cases are reported in a single village (figure);
- Strong solicitation of wage labor (97% of opinion);
- Presence of support structures in villages or in the neighbourhood
- No specific organization of sorghum producers;
- Large proportion of off-farm activities (75% of opinion);
- High proportion of non-fallow with some producers (figure);
- Short fallow period (figure);
- Conflict between heirs on agricultural land;
- Lack of legal status on land;
- Low income ;
- Low use of mineral fertilizers in sorghum cropping.

Opportunities

Threats

External

- Sorghum from Eastern Logone and Mandoul regions has a geographical indication "Khalhalla hana Bodo", which means "Bodo sorghum";
- Possibility of access to credit (table);
- Possibility of access to wage labor;
- Subsidy on agricultural inputs (table);
- Availability of agricultural land (28% favorable opinion on the free occupation of land);
- State program for agriculture mechanization;
- tractor ploughing subsidy ;
- Access to information on markets through the SIM or mobile telephony.
- Farmer-breeder conflict;
- Agricultural land grabbing;
- Difficulty controlling agricultural schedules due to climate change phenomenon;
- Rural exodus (young people leave for cities);
- Demographic pressure;
- High interest rate of credit (20%);
- Very low credit amount;
- Delay in granting credit (not at the desired period, yet cropping activities are linked to rainfall);
- Poor management of tractors (poor ploughing, late access)

Source : country document

Annex 5.

SWOT analysis of sorghum production in Sudan

Strengths	Weaknesses
<ol style="list-style-type: none">1- Suitable for marginal areas as it can withstand drought.2- Offer a source of animal feed.3- Farmers are experienced in production of sorghum.4- The main source of food and income.5- Women are involved in the process.	<ol style="list-style-type: none">1- Instability of production due to natural risk and hazard causes.2- Inadequate training and lack of proper extension programs.3- Late sowing results in yield reductions (sowing is delayed until it rains).4- Soil exhaustion due to the lack of crop rotation.5- Lack of fertilizer application to reduce cost of production.6- Use of traditional low-yielding cultivars.7- Low productivity.8- Infestation by weeds (Strigaspp.).9- Over-reliance on farmer saved seeds.10- Scarcity and high cost of labour.
Opportunities	Threats
<ol style="list-style-type: none">2- Awareness of the farmers of the weather data and information.3- Chance to transit from subsistence production to commercial sorghum production.4- Appropriate sorghum cultivars are also being produced.	<ol style="list-style-type: none">1- Tendency to shift all the risks (Production and Post-harvest Handling) to the farmers.2- Unpredictability of weather, yields and qualities.3- Inadequate rural land tenure.4- Poor capacity to forecast yield and crop production.5- The horizontal expansion resulting in land degradation.6- Weak extension, training, research linkages.7- Government policy has for decade neglected the traditional rain-fed sector.8- There are major operational problems in the strategic grain reserve.9- Conflicts between farmers and livestock breeders.

Source : country document

Annex 6.

SWOT analysis of sorghum marketing in Mali

Strengths

- Cereals are the staple food of the population.
- Varieties well appreciated by the populations exist and are produced by the producers.
- There are large-scale production areas (cotton areas) that offer large quantities of sorghum.
- Sorghum marketing is not taxed.

Weaknesses

- Storage capacity in production areas is low.
- Sorghum prices are volatile in the production and consumption markets.
- Sellers provide mixed products (different colors), not clean (lots of impurities).
- Poor access to credit services.
- Poor government support to traders.
- Poor organization of marketing actors

Opportunities

- Cereal trade is liberalized in the country.
- The State and the partners need large quantities to build up the national security stock and to help vulnerable people.
- Existence of high processing capacity mills

Challenges

- Roads are in bad conditions and access to production areas is difficult in the rainy season.
- Offer is irregular in the supply markets.

Source : document pays

Annex 7.

SWOT analysis of sorghum marketing in Burkina Faso

Positive		Negative	
<i>Internal</i>			
Strengths		Weaknesses	
<ul style="list-style-type: none">• Marketing actors' grouping;• Processors' grouping• Political will to develop the sector• Market dynamism• Stakeholders' dynamism• Increasing production		<ul style="list-style-type: none">• Multiplicity of intermediaries• Low access to financing• Obsolete storage infrastructures• Mass products• Non-transparency of market• Lack of quality standards• Outdated agricultural equipment• Inadequate storage facilities• Decline of product quality after storage• Lack of performance of processing units• Lack of trust in financial structures	
<i>External</i>			
Opportunities		Threats	
<ul style="list-style-type: none">• Increasing domestic demand• Existence of a sub-regional market• Low market rates,• Source of income for actors.		<ul style="list-style-type: none">• Road insecurity• Supply fluctuation and poor quality of raw materials;• Inadequate supervision structures of processors;• Price instability	

Source : country document

Annex 8.

SWOT analysis of sorghum marketing in Niger

Strengths	Weaknesses
<ol style="list-style-type: none">1. Existence of a traditional marketing framework for cereals in large production areas, in terms of internal and external collectors' networks.2. Trade channels for dry cereals collection and distribution are well-known.	<ol style="list-style-type: none">1. Atomicity of sorghum supply in the production area.2. Irregular national cereal production, including sorghum.3. Low level of collective organization of producers for the commercialization of agricultural products.4. No real grain market in Maradi and Zinder5. Transaction settlement issues because cereal traders do not have bank accounts, and settlements and transfers are usually in cash.6. Inadequate capital for wholesalers, collectors and retailers.

Opportunities	Threats
<ol style="list-style-type: none">1. After millet, sorghum is one of the main dry cereals consumed in Niger.2. Development of small processing units for sorghum-based products.3. Processed sorghum-based products are said to be appropriate for diabetic meals.4. Sorghum, a substitute for maize in poultry feed.5. Availability of sorghum supply sources in neighboring countries such as Benin and Nigeria	<ol style="list-style-type: none">1. Very bad roads and paths connecting cereal collection areas.2. Inadequate bank financing if granted.3. Cereal price rises due to harassment on roads and at borders incurring additional costs.4. Lack of transparency and fairness in public procurement contracts for cereals due to political interferences in awarding such contracts.5. Heavy and multiple taxes on wholesalers and retailers

Source : country document

Annex 9.

SWOT analysis of sorghum marketing / Collectors of Chad

Internal

Strengths	Weaknesses
<ul style="list-style-type: none">- Use of SIM to fix prices (57% favorable opinion, figure);- Strong involvement of women (86% affirmative) and young people (100% affirmative);- Integration of the market logic (law of supply and demand) in the pricing mechanism;- Direct support from collectors to producers (71% of affirmative opinions, figure);- Good knowledge of producer support services (Figure);- Good knowledge of the main causes of post-harvest losses (figure).	<ul style="list-style-type: none">- Unclear definition of standards and quality standards;- Informal collectors' network;- Absence of insurance system to reduce losses;- Low involvement in harvesting and post-harvest activities with producers;- Poor ownership of means of transport (figure);- Use of precarious storage infrastructures (figure);- Lack of precision on the desired product qualities;- Undefined relations with end users (figure);- Inadequate personal funds to finance collection activities

External

Opportunities	Threats
<ul style="list-style-type: none">- Large number of community markets, ranging from 3 to more than 6;- Strong presence of support services;- Availability of government support services.- Sorghum from Eastern Logone and Mandoul regions has a geographical indication "Khalla hana Bodo", which means "Bodo sorghum".	<ul style="list-style-type: none">- Farmer-breeder conflict;- Agricultural land grabbing;- Product availability (sorghum) hampered by the climate change phenomenon;- High tax rates in community markets;- Very low credit;- The granting of credit does not always coincide with the period of harvest;- Difficult access to the means of transport;- Shortage of products at some times of the year;- Loss of products stored;- High storage costs;- Non-compliance with quality standards by producers;- Low availability of labor.

Source : country document

Annex 10.

SWOT analysis of sorghum marketing/wholesalers of Chad

Internal

Strengths	Weaknesses
<ul style="list-style-type: none">- Participation in operations with collectors (figure);- Strong involvement of women and young people in the wholesalers' activities;- Direct purchase on the markets in addition to using collectors as suppliers;- Seeds as criteria determining standards and quality;- Good understanding of the law of supply and demand;- Quality requirement for sorghum grains;- Support services provided to collectors;- Direct relationship with end users;- Possessing a vehicle as means of transport.	<ul style="list-style-type: none">- Oral purchase agreement with collectors;- Oral supply agreement with the collectors;- Unclear definition of standards and quality control criteria;- Low capacity to control loss sources;- Roughly built and poorly-equipped warehouses

External

Opportunities	Threats
<ul style="list-style-type: none">- Good understanding of the concepts of standards and quality by the producers;- Large number of community markets, ranging from 3 to more than 6;- Strong presence of support services;- Availability of government support services.- Sorghum from the Eastern Logone and Mandoul regions has a geographical indication "Khallana Bodo", which means "Bodo sorghum".	<ul style="list-style-type: none">- Farmer-breeder conflict;- Product availability (sorghum) hampered by the climate change phenomenon;- high tax rates on community markets;- Fraudulent barriers and rackets by people in uniform;- High transport costs;- Price instability in the market;- Competition of imported cereals;- High store rental costs;- Shortage of products at some times of the year;- Loss of products stored in warehouses;- Non-compliance with standards and quality by some producers.

Source : country document

Annex 11.

SWOT analysis of sorghum marketing / retailers of Chad

Internal

Strengths	Weaknesses
<ul style="list-style-type: none">- Involvement of women (50%) and youth (75%) in sales-retailing activities;- Good relationship with other stakeholders in the sorghum value chain (85% of retailers surveyed);- A quarter of retailers (25%) said they supply sorghum to processors;- A quarter of retailers (25%) admitted that they meet customers' standards and quality requirements;- Selling sorghum in processed form (80% in local beer, 38% and 15% in husked grains);- Adaptation to the law of the market (50% of the retailers surveyed set the prices according to the market);- Quality control by making direct observations	<ul style="list-style-type: none">- Weakness in taking into account quality in fixing prices (5% on board);- Selling sorghum raw grains (45% on board) does not make it possible to draw sufficient added value;- High proportion of non-involvement in processing activities (30%);- Inadequate pre-market packaging (only 7% of retailers reported winnowing sorghum before placing it on the market);- Poor quality control by suppliers / wholesalers (only 2% do so);- Poor knowledge of the importance of seeds in sorghum grain quality.

External

Opportunities	Threats
<ul style="list-style-type: none">- Diversification strategy: sale of products other than sorghum. Example 42% reported selling peanuts in addition to sorghum and 45% said they are retailers and processors at the same time;- Access to manual means of transport: 77% have access to bulk carriage (photo 17);- Availability of young people as workforce (75% use them);- Local beer made from sorghum appreciated by consumers (33% affirmative).- Sorghum from the Eastern Logone and Mandoul regions has a geographical indication "Khalla hana Bodo", which means "sorghum of Bodo"	<ul style="list-style-type: none">- Development of value chains of agricultural commodities such as sesame and peanut (fig.);- Poor integration of the law of the market in the retailers' activity (only 50%, figure);- Difficult access to the means of transport;- Inadequate and insufficient storage infrastructure;- High tax rate;- High cost of transport;- High winnowing cost;- Price fluctuations on the market.

Source : country document

Annex 12.

SWOT analysis of sorghum marketing in Sudan

Strengths	Weaknesses
<ol style="list-style-type: none">1- The market mechanisms that enhance the trading of sorghum are supported by the Unions and co-operatives.2- Improved sorghum cultivars are developed.3- There are some women co-operative at the Blue Nile State.	<ol style="list-style-type: none">1- Although women are major players in agricultural operations, their role in marketing is limited.2- No record keeping for production by farmers.3- Inadequate complementarities and co-ordination of macro-economic and sector policies.4- Inefficient use of human resources capacities.5- Inadequate social and physical infrastructure.6- Reduced competitiveness due to low productivity and high marketing cost, which results in lower prices for farmer.7- Variability in kernel size, colour and cleanliness which affects marketing.8- Heavy taxes were imposed on agricultural sector by state government and local authorities.
Opportunities	Threats
<ol style="list-style-type: none">1- The government has abolished all taxes on sale.2- Access to low interest loans has to be practiced.3- Crop-weather index system has to be initiated and implemented.4- Re-evaluate investment decisions.5- Try to offer services to farmers.6- Efficient supply chain management.7- Collaboration with suppliers.8- Integrate small holders into supply chain.9- Agriculture is official tax-exempted.	<ol style="list-style-type: none">1- Unknown sorghum quantities are illegally smuggled to neighbouring countries.2- Some commercial banks are reluctant to finance agriculture.3- Lack of strategic planning for different agricultural sub-sector.4- Persistent neglect of the role that small producers can play in achieving food security.5- Competition from subsidized imported goods.6- Weakness of laws governing the lease.7- Federal government trade policy is fragmented and erratic.8- Informal cross border trade.9- Increased transportation and trading costs.

Source : country document

Annex 13.

SWOT analysis of sorghum processing in Mali

Strengths	Weaknesses
<ul style="list-style-type: none">- Consumption of processed products is growing in urban households.- Existence of a Federation of Processors of Mali (FENATRA).- Existence of high-performance varieties for processing (floury)	<ul style="list-style-type: none">- Processing is only primary.- The products are mixed and are not clean.- Prices vary widely on the market.- There are no product quality standards.- Poor access to credit- Poor packaging quality.- High losses in processing
Opportunities	Threats
<ul style="list-style-type: none">- Existence of a food research and technology laboratory.- Strong demand for human food	<ul style="list-style-type: none">- How to ensure good quality control when buying and selling.- Poor adoption of processing technologies.- Poor market integration.

Source : country document

Annex 14.

SWOT analysis of sorghum 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. Sound experience of facilitators of local agricultural processing units.3. Good quality of processed products in nutrition, hygiene and packaging.	<ol style="list-style-type: none">1. The cereal value chain approach is not appropriate, whereas processing is the locomotive.2. Processing units do not operate in a context of innovation platform.3. Difficulties to deliver processed products despite the existence of a potential market.4. Inadequate financial capital of processing units.5. Inadequate performing and adapted materials.
Opportunities	Threats
<ol style="list-style-type: none">1. After millet, sorghum is one of the main dry cereals consumed in Niger.2. There is potential for sorghum production3. There is potential market for products processed from local agricultural products, including sorghum. <ol style="list-style-type: none">1. Sorghum-based processed products are excellent diabetic meals.2. Sorghum is a potential substitute for maize in poultry feed.	<ol style="list-style-type: none">1. Poor financial capacity of women involved in processing;2. No real grain market in Maradi and Zinder.3. Very bad roads and paths connecting the cereal collection zones.

Source : country document

Annex 15.

SWOT analysis of sorghum processing in Chad

Internal

Strengths	Weaknesses
<ul style="list-style-type: none">- Good relationships with wholesalers and retailers;- Strong involvement of young people in processing activities;- Delivery contracts with collectors, even though oral;- Sorghum from the Eastern Logone and Mandoul regions has a geographical indication "Khalla hana Bodo", which means "Bodo sorghum";	<ul style="list-style-type: none">- Processed products not labelled;- Low employment capacity (2 persons at most);- Pricing mechanism not under control;- Ignorance of milling capacity by millers;- Supply agreement virtually non-existent;- No contract/binding agreement with independent producers and farmers;- Only few women millers;- No mention is made about training women and young people involved in processing activities;- Local beer brewing procedure totally traditional;- Means of transport are only bulk carriage;- Poor availability of storage infrastructures and poor equipment;- Low capacity mills;- Limited capacity to finance on personal funds

External

Opportunities	Threats
<ul style="list-style-type: none">- The habit of hulling sorghum before milling it is more important for consumers;- Strong local beer brewing activity;- Know-how of producers who distinguish varieties according to use (consumed in the form of a "ball" or used for local beer brewing)	<ul style="list-style-type: none">- No local beer bottling resulting in the practice of important tasting;- Theft of flour from millers;- Availability of product (sorghum) hampered by the climate change phenomenon.

Source : country document

Annex 16.

Strengths

- 1- Familiar Sudanese product.
- 2- Growing market as consumption is increasing.
- 3- Not genetically modified.
- 4- Presence of branded mills

Weaknesses

- 1- Lack of consistent, uniform quality grain supplies.
- 2- There are no logistic markets.
- 3- Extension of existing processing technology unavailable.
- 4- Unclear governmental policies.
- 5- Presence of nutritional myths, moulds, etc.
- 6- High processing cost.

Opportunities

- 1- Use social media to communicate with customers.

Threats

- 1- Competition of wheat and rice products that are becoming more and more familiar (Substitutes).

Source : country document



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