

SWOT Analysis of Cassava Sector in Cameroon

Elise Stephanie Mvodo Meyo, and Dapeng Liang

Abstract—Cassava is one of the top five crops in Cameroon. Its evolution has remained constant since the independence period and the production has more than tripled. It is a crop with multiple industrial capacities but the sector's business opportunities are underexploited. Using Strengths, Weaknesses, Opportunities and Threats analysis method, this paper examines the cassava actual state. It appraises the sector's strengths (S), considers suitable measures to strengthen weaknesses (W), evaluates strategies to fully benefit from the sector numerous business opportunities (O) and explore means to convert threats (T) into opportunities. Data were collected from the ministry of agriculture and rural development and different actors. The results show that cassava sector embodies many business opportunities and stands as a raw material provider for many industries but ultimately requires challenges to be tackled appropriately.

Keywords—Business opportunities, cassava sector, rural development, SWOT analysis.

I. INTRODUCTION

CASSAVA is cultivated in more than 100 countries worldwide [4]. It holds the position of strategic crop in many tropical countries. 229,540,896 million tons of roots are produced worldwide in 2010 [8]. In Cameroon, it is a leading crop in terms of annual yield both for cash and food crop categories. It is widely consumed and processed far beyond maize and rice¹. Starting years 2000s, investors increasingly became aware of the sector's opportunities; however, its full capacity is not yet attained. The high demand of both fresh roots and derivative products is barely met, in an African sub-region where Cameroon holds the breadbasket role, supplying more than 70% of the food crops market. The strategic planning of the sector is therefore highly needed.

Strategic planning involves the development of long-term strategies to increase profitability and competitiveness of the cassava sector starting at the farm level up to the end consumer. This implies developing innovative and sustainable projects such as on-farm processing, suitable marketing mix and efficient production. The purpose of the strategic planning is to design a set of activities that allows intervening actors to achieve personal as well as national goals. The strengths of the cassava sector can be used to take advantage of opportunities in the national economic bond of activities. The sector will

achieve its goal by using its strengths and efficient strategies. Strategic development is therefore, the identification of strategies that enables the development of the sector and social environment advantages, which are opportunities and strengths. From this development, a competitive advantage can be developed. For high value, the competitive advantage should be sustainable over the long term. The first step in strategy development is to answer two basic questions of the sector: What is the sector's planning horizon and in which direction is it heading to. The planning horizon will often affect the type of directional strategy chosen.

A. SWOT Analysis

SWOT analysis is the traditional means of searching for insights into ways of realizing the desired alignments, says [21]. [5] and [24] recommend SWOT analysis to be carried on with customer's view, perception, intention and desire in mind. The result of SWOT analysis questions the sector's competences, resources and capability to stand external changes. It is worth noting that strengths on which improvement is not done could become weaknesses. Strengths upgrading, conversion of weaknesses and threats into strengths and opportunities should guide action. These attributes stand as reliable guidelines, assessing the efficiency of adopted strategies. The development of a strategy should be interactive rather than linear. SWOT analysis in agricultural sector has to be a strategic point helping to produce recommendations for future considerations [5]. The internal appraisal examines all aspects of the organization covering areas such as personnel, facilities, location, products and services while the external scans the political, economic, social, technological (PEST) and competitive environment with the objective of identifying opportunities and threats. Likely, the entry of potential competitors and vulnerability of industry's driving forces are potential threats. This is true in an organization where top managers and decision makers have relatively high control on operations and actions; considering the whole sector or a broad part of it cannot be analyzed using the same method. This paper uses the PEST classification to identify attributes both for internal and external factors. To enhance the stimulation of new strategic initiatives, Dyson used TOWS matrix putting side-by-side opportunities and strengths and weaknesses with threats; an attempt to connect the external factors with the internal to create more strategies [5].

B. Cassava Sector

Cassava leaves represent a delicious vegetable recipe for about 33% of the population, the fresh roots can be consumed fresh (boiled) as staple food or processed into cassava

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¹ In Cameroon, maize and rice are two competitive food crops to cassava in both rural and urban population's diet.

puddings (*bobolo, miondo*), cassava cakes (*nkonda, mintoumba*), *fufu, wata-fufu, gari, lafun*, pellets, chips, starch and flour. Industrially, cassava-modified products are integrated in the production process of agro-industries, food industries, distilleries, breweries, paper mills, pharmacies, packaging industries, beauties products, bio-energy, livestock feeds, photography industries, etc.

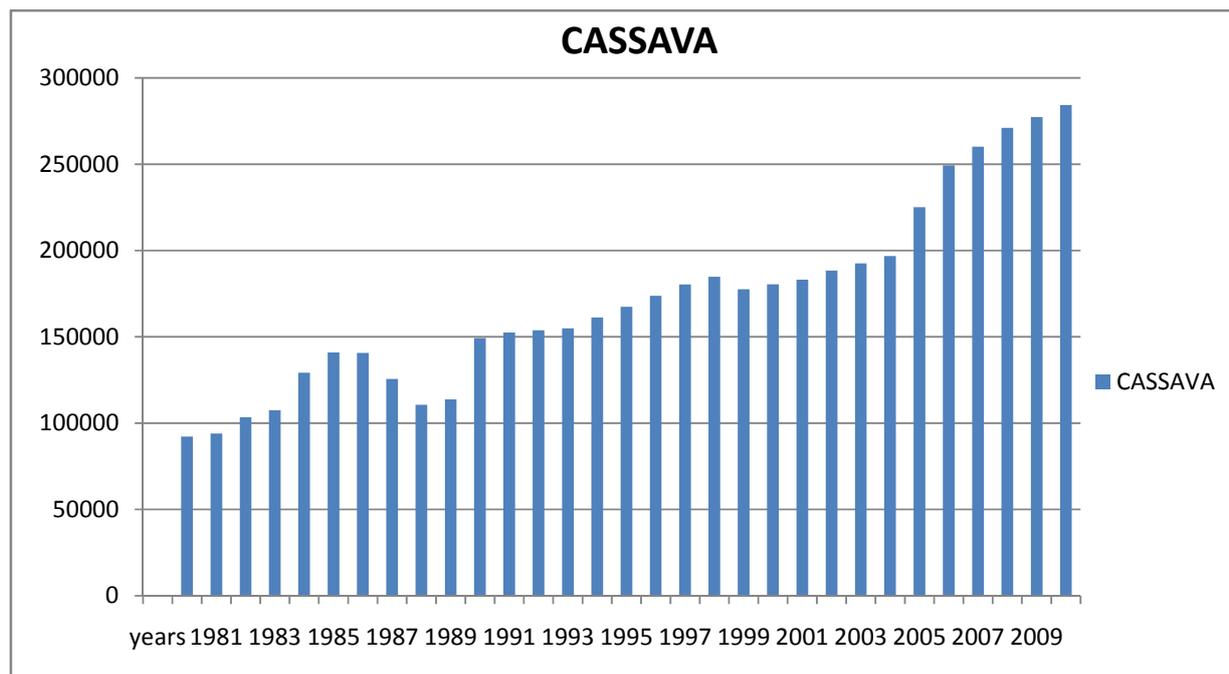
Cassava is cultivated in all-Cameroonian 10 administrative regions, with south, east, south-west, littoral, and centre as main production centers. Soils are fertile with trained and willing farmers. The average production is 1,886,795 tons annually. There are large and disposable parcels of arable lands. The sector has large surpluses. These roots are usually processed traditionally, sold in national markets and exported to neighboring countries. The absence of adequate communication, infrastructures and marketing impedes the movement of roots and causes surpluses to spoil in fields. Whereas, on one hand, communities growing cassava live in abject poverty and on the other hand, industries need cassava-modified products, failing to be satisfied nationally, they turn to importation. Approximately, 1,800,000 tons of cassava starch is imported annually. With literacy, rate of 77% and unemployment rate of 30 % [13] Cameroon has potentials to develop its cassava sector.

In Cameroon as well as in the Central Africa Economic Zone, there are huge market opportunities and potentials for cassava. National and regional demand, human consumption and industrial needs of fresh roots and derivative products represent many conquerable markets as well as niches. In the same line of thought, cassava derivative products are not present in the high-class markets, supermarkets and malls, training centers and caterer services. The Production, transformation and commercialization networks are still traditional, dominated by scattered and uncoordinated actors and small household processing units [7]. The inadequate transport facilities, communication, commercial and marketing knowledge, the absence of business links, represent some sector' challenges. A good commercialization network of cassava, usually left over and destroyed by animals, can improve a given community's living conditions; providing infrastructures such as hospitals, roads, bridges, schools, potable water and sanitary dispositions [3], [10] and [7]. Many actors, mostly women and private investors have taken the challenge to improve their communities using one of the main agricultural crops [cassava] and organizing activities within the framework of farmers' associations or small processing units. Nevertheless, the challenge remains the putting into place of a nation-wide unit of cassava processing with large scope and well-trained operators.

TABLE I
 SUMMARY OF GOODS MADE FROM CASSAVA DERIVATIVES

Cassava derivative products	Goods
Leaves	<i>Livestock feed</i>
Chips and pellets	<i>Ethanol</i> : liquors, medical and industrial alcohol <i>Livestock feed</i>
Flour and starch	<i>Food</i> : in bakery (cakes, biscuits); used as a general thickening agent. Starch derivatives are applied for thickening, binding, texturing and stabilizing a range of products such as canned foods, frozen foods, salads dressings, sauces and infant foods. <i>Confectionery</i> : used in the production process of sweets, jellies and gums. <i>Monosodium glutamate</i> : for the production line of taste enhancers i.e.: maggi and arome maggi. <i>Sweetener</i> : used for fructose and glucose, in the production of jams and canned fruits. Used in beverage formulations too. <i>Pharmacy</i> : For tablet production, used as disintegrating agents, binders and fillers. <i>Glue</i> : it is a preferred adhesives in many paper mills and related activities corporate such as tapes, labels, pre-gummed papers, envelopes and stamps. <i>Plywood</i> <i>Paper</i> : During the wet stage, cassava starch serves to flocculate the pulp, improve the run rate and reduce pulp loss. For coding and sizing of paper, it is used for improving the strength, binding, coding to the paper and controlling ink consumption to improve print quality. <i>Textile</i> : used in three stages of textile processing: to size the yarn, to stiffen and protect it during weaving, to improve the color consistency during printing, and to make the fabric durable and shining at finishing.
Waste	<i>Biodegradable products</i> : can be used as biodegradable polymer, a raw material for plastics and packaging industries. <i>Fertilizer</i> : As used by traditional farmers, cassava wastes can be used as fertilizer then solving waste disposal issues.
Native fresh roots	<i>Bio-energy</i>

Source: cassavabiz [23]



Source: FAOSTAT, 2012

Fig. 1 Cassava production evolution 1980-2010 (in \$1000)

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The establishment of a company processing cassava with branches nationwide can reduce the burden of cassava fresh roots. The raison d'être of this company has to be the rapid transformation of fresh roots to prevent rapid rot (due to their high cyanogens pathogens), the upgrading of cassava by-products and the improvement of the sector's practices. At community levels, this company will create incomes and employments; it could enhance transportation, communication and marketing systems. Therefore, given the internal weaknesses and external threats, how can the sector adequately exploit its strengths to create more opportunities and achieve full capacities? With the objective of making cassava an industrial good, appropriate strategies should be adopted and effective policies implemented. This will be possible with a thorough recognition of the sector capacities and challenges, internal and external environment.

This paper's objective is to broaden literature on cassava so that planning and marshalling the sector's resources be done efficiently and effectively. Providing a SWOT analysis can improve the understanding, the direction and scope of the sector over the long-term.

II. MATERIAL AND METHODS

SWOT analysis is the commonest, simplest and probably the most used strategic management tool that provides insights of a given entity at a precise time. It is used for the identification and evaluation of companies, ventures, sectors or organization's essentials and environments. This paper's focus point is cassava sector in Cameroon. All existing attributes (social, economic, governmental, environmental, and infrastructural) within it, serve for the analysis of internal factors (Strengths and weaknesses). The external attributes

falling outside this scope but within Cameroonian governmental and business ability are categorized either opportunities or threats. The classification of an attribute as a strength or weakness is by itself subjective and there is a need to specify the objectives on which the analysis focuses on, which in this paper are to present the current sector's state and examine the possible outcomes of investment.

Starting 1980s, public administration decision makers, in regional and sector development, adopted the SWOT analysis method which originates from the business management literature for efficient policies and strategies. For sustainable energy development in Macedonia, [11] successfully applied it. For effective policies and strategies adoption of waste disposal in Lucknow, an Indian municipality [19] employed it. [15] Carried a SWOT analysis on agriculture in the republic of Serbia. The author studied the capacities, conditions and productivity of the agriculture sector. The study used statistical tools to assess the evolution of certain production factors such as resources (work force, land, and livestock), productive results (the yields and total production of significant crops) and economic results (domestic product of agriculture). However, the study fails to include infrastructure assessment, the government's role and policies implications; the role of competing sectors, industrial and trade, was not analyzed but needed to given the fact that their activities scope heavily depend on agriculture. This paper's SWOT analysis comprises two main components:

Strengths and weaknesses stand for the internal factors of cassava sector in Cameroon while Opportunities and threats report all sector external elements that can petty or significantly influences the sector.

The SWOT list is developed following a participatory approach (bottom-up) complemented with some policy recommendations, so that the results are common understanding of reality and set of common strategic actions. The following questions served as route light during build-up process:

- What are the existing Strengths and how to consolidate them?
- Which policies or changes can toughen weaknesses?
- How to fully exploit the opportunities?
- How to minimize the threats effects?

Knowingly that a strategy is a set of options, during data scanning, these subsequent questions prove to be useful:

- What is the sector's direction?
- Which markets should the sector compete in and what kinds of activities are involved in such markets?
- How can the cassava sector perform better than the competition?
- What assets, finances, relationships, technical competences, facilities are required to compete?
- Which external factors affect the business ability to compete?
- What are the values and expectations of those who have power in and around the business?

Data were collected during an internship research with the Cameroon ministry of agriculture and rural development. Private communications, focus group discussions, unstructured interviews and field inspections were used as data collection methods. Scanning the Ministry of Agriculture and Rural Development (MINADER) Strategic documents, consultation with ministry officials, the National Program for the Development of Roots and Tuber (PNDRT) officials, heads of communities growing cassava, farmers, women and sector associations, traders, businessmen and exporters ease the collection of primary and secondary data.

III. RESULTS

The results are ranked according to their importance.

A. Strengths

There are classified in terms of economic, social and disposable land.

Economic strengths: cassava is a cultural and wide spread commodity. Traditionally, it is consumed and sold either fresh or processed. It can be used for human, livestock and industrial purposes. As shown in Table I, Cassava-natives and modified products can serve as input for numerous commodities. Due to its strategic position, as the leading economy and breadbasket of Central African Economic Zone, Cameroon supplies approximately 70% of neighboring countries' food demand (Gabon, Equatorial Guinea, and Congo). Since the early 1980s, High-yield, early maturity, pest and diseases resistant varieties have been gradually introduced and the production roots value tripled (Fig 1). Processing units are progressively making use of technical equipments (grinders, ovens, and bakers).

Social strengths: Cassava is easy to grow, with farming techniques and knowledge passed-by through generations. Large amount of improved planting materials are available. Cameroon has large number of unskilled and motivated workers; with an unemployment rate of 30% and the wide spread of informal sector, the cassava segment can absorb most of these young talented potentials. Many women associations cultivate it for the improvement of their localities. Government use agriculture sector [cassava] to restrain rural-urban migration and political instability. It is a family and women crop, and an alternative to solve children malnutrition.

Disposable land: Cameroon has large and fertile fields. Cassava is weather tolerant; it is able to grow in poor and damaged soils, and scarce or erratic rainfall environment. It can be cultivated in intercropping farming system.

B. Weaknesses

Weaknesses are grouped as technology, infrastructure, industrial, marketing, environmental and governance.

Technology weaknesses: The development of the sector is still in infant stage, cassava fields are usually limited to less than 2 hectares for about 11tons /ha of yield. This scenario is due to limited use of high yield, pest resistant and early maturity varieties of planting materials. Some cassava diseases such as roots rot, mosaic and whiteflies hinder production [1], [2] and [12]. Some cassava varieties are highly perishable (deteriorate within 48 hours) and therefore call for an enhanced after-harvesting processing and storing technology (Table I). The sector's full dependence on natural conditions: weather, light, rain, and sun further expresses how urgent technology and innovation are required. In some difficult-to-reach places in East, Center and South regions, farmers only use local planting materials. Many cassava roots remain unharvested whereas companies need cassava-modified starch in urban areas.

Infrastructure weaknesses: many farming communities are enclave, with absence or inadequate transportation limiting access to the cultivated fields, poorly maintained or lack of roads and bridges, high transportation costs; the highest per kilometer within Africa [10]. There are scarce information networks/centers and communication among actors is limited. Many rural communities do not have access to energy supply or potable water, lack hospitals, schools and heavily rely on forest products for energy sources.

Industrial weaknesses: in-difficult-to-access communities, most cassava farmers lack economic knowledge; more than half of farms are abandoned, go un-harvested while they live in abject poverty not knowing that, cassava efficiently exploited can considerably improve living conditions. About 90% of sector's actors are Women (between 18 to 50 years old), whereas the rest is composed of aging and unskilled workers. The Cameroonian land law does not attribute land to women; consequently, cultivated fields are limited. Cassava

farming is still on subsistence scheme. There is absence of bulk production, employment creation and processing cooperates. Transformation is carried out with reduced, archaic means and by small household units.

Marketing weaknesses: cassava and its derivatives are still considered as traditional foods hence, they lack product modernization and standardization (in terms of taste, conditioning, weight, lengths and expiry date), weak pricing mechanisms, lack of advertisement and public relations, erratic supply for processing, unsatisfactory marketing channels, poor infrastructures, market communication and information. High competition from rice and maize sector where imports are subsidized and products have longer life span.

Environmental and medical weaknesses: the inappropriate process of high cyanogens (bitter) varieties of cassava lead to some diseases *i.e.:* goitre, konzo and neurotic troubles. Misusage of cassava wastewater, disposed into rivers and lakes, destroy aquatic beings; peels and hazardous wastes also damage air and soil around traditional processing factories of *gari, fufu, wata-fufu, mintoumba, miondo* and *bobolo*. Appropriate information on how to handle these and eliminate cyanogens can quickly solve the issue. A substantial profit can be derived from processing waste into energy sources, biodegradable, fertilizer and livestock feed (Table I), [9] and [22].

Governance weaknesses: there are limited government support, un-adapted incentives, lack of administrative motivations and unsatisfactory number of scientific research bodies. Farmers face difficult-to-comply-conditions to access credits and financial assistance, cassava farmers association's actions are uncoordinated. There is insufficiency and un-adapted crop statistic, un-adapted taxes, no agriculture accounting, no agriculture law or legal system for farmers and farming related dispute settlements.

C. Opportunities

In the course of the research, cassava sector is revealed to have numerous opportunities

International Roads: Cameroon has built these recent years, international roads connecting Chad, Nigeria, the republic of Congo and Gabon. They enormously improve transportation and commercialization of perishable and seasonal goods (cassava) as well as derivatives (Table I). Cassava is a highly consumed commodity in all these countries.

Strategic position in the Gulf of Guinea: Cameroon is the breadbasket of Central Africa and provides around 70% of the agricultural needs. its strategic geographical location links western and central Africa. Its south-west, littoral and south regions have access to the Atlantic Ocean and enormously smooth water transport of goods among Cameroon and its neighboring countries.

New market segments: there is an increasing demand of cassava traditional derivative products by African native living in other parts of the world. The industrial sector: agro-industries, food industries, distilleries, breweries, paper mills, pharmacies, packaging industries, beauties products, bio-energy, animal feeds, and photography industries as shown in Table I, require mass production. Companies producing modified-cassava products require regular supply. There exist niches too: the humanity market, the training and military centers, the supermarkets and malls, the value added and processed urban snack...

Partnerships: there are potential technology and capacity transfers from partnerships with the European Union, developed countries and emergent countries like China, Thailand and Brazil.

Company creation process: The new approach of company creation in Cameroon is gradually attracting more FDI as well as numerous national investments. It is now possible to create a company in less than a week compared to approximately one year before. The increasing interest of international research bodies (IFAD, FAO, IITA), government, Cameroonian Diasporas to invest in the sector, and other ethnic group diet attraction can boost the creation of many efficient and well-equipped processing units.

Colonial inheritance: the country's bilingualism (French and English as official languages), with dual legal systems and membership to both Francophonie and Commonwealth can attract investors and penetrate markets niches in both English and French speaking communities.

Motivated and challenging neighbor: sharing borders with Nigeria, the African leader in terms of cassava fresh roots and industrial derivatives production, can boost technical innovation and technology transfers. In addition, its economic and social improvements can serve as an up-pulling challenge.

February 2008 hunger riots: Since 2008 riots of hunger, all over the country, there has been observed an attraction to the agricultural sector, from government officials, urban dwellers, as well as over-sea Cameroonians.

Economic operators wish 10% substitution of cassava flour in bread production process. Economic operators wish to introduce cassava starch, flour and other derivative products into their production system [4]. Cassava peels and waste can be used to heat ovens (energy supply, Table I) if only a regular supply could be maintained in the long term.

Other competitive crops constraints: water unavailability can enable cassava to grow where rice, wheat and maize, the sturdy competitive staple foods, in population diet and in the production of starch, cannot. In addition, the removal of market subsidies in cereals (rice and maize) could help

cassava gain more market share with a price competitive advantage and economic of scale.

D.Threats

Government less concern: government plans, initiatives and policies pay less attention to the cassava sector.

Limited research: research centers are limited and less interested in cassava. Many research works, public actions and crop development initiatives focus on rice, maize and cash crops.

Absence of a corporate and legal system: there is an absence of a nation-oriented cassava transformation company as well as an agricultural legal and accounting system.

Low price of substitute goods: rice, potatoes and maize. Importations are subsidized, thus negatively affecting the cassava sector.

hypothetically access them. This situation limits the production since 90% of cassava farmers are women. The country's geographical strategic location is a valuable opportunity but the high cost of transportation needs to be tackled efficiently [3], [7], and [10]. Cassava sector can benefit from the large share of unemployable manpower only if incentives are put to place to motivate youngsters; giving way to new opinions, creativity, innovations, deals, women empowerment, motivation and competition. The strengths will toughen significantly if some policies are adopted and applied to improve weaknesses. Tackling the limited yield setback, government could subsidize the fertilizer market enabling farmers with limited finance to boost their production. It can increase research bodies' budget to ease the high yield, pest and diseases resistant, early maturity varieties distribution all over the country [6]. In addition, farmers' field school and training should be recurrent in order to equip farmers with improved techniques of production and processing. The limited cultivated area issue could be solved if the government amends the law restraining women disposability on land and putting in place credit and financial incentives enabling them to make use of employable workers. The need of technology and innovation is more stressed considering diseases, storage and weather constraints. To strengthen them, adaptable refrigerated stores can be built around production, processing and commercialization locations to reduce the perishability rate. Moreover, as climate change is gradually noticed in the region, technological simulation can be introduced to assist farmers protecting and increasing their yields [14], [16], [17] and [18]. To resolve the infrastructure limitation, the prices of telecommunication (telephones and internet) need to decrease. Many rural communities lack potable water and energy, these factors are ultimate conditions to increase rural efficiency. A proper strategies adoption improves customer-producer relationship, satisfaction and profit. New roads are built and should be extended; this could reduce transport costs and time. Government and NGOs can organize information campaigns and training sessions to inform the public of the sector's huge opportunities and its possible limitations.

The opportunities part, presenting the positive external factors, is highly exploitable compliance to some conditions. The international roads will only bring along benefits if actors establish useful connections with neighboring countries businesses. There is increase demand of starch and flour, chips and pellets as well as traditional delicacies. Cameroonian producers and marketers should endeavor to understand these potential market's economic environment and law, rules and regulations, the prevailing habits, customer's needs and competition. The actors should make full use of the country's strategic position, access to the Atlantic Ocean, the connecting position between the western and central parts of Africa, the bilingualism and its dual legal system. Mass Production, modernized transformation and profitable commercialization have to be the ultimate objective underpinning the sector policies and its implications [20] and [6]. Transformation technology should be readily available and affordable by small units. High standards and urban derivative products should be

TABLE II
 SWOT ANALYSIS SUMMARY

STRENGTHS	WEAKNESSES
Economic	Technology
Social	Infrastructures
Disposable land	Marketing
	Industrial
	Environmental and medical
	Governance
OPPORTUNITIES	THREATS
International Roads	government less concern
Strategic position	Limits in research
New market segments	no accounting and legal system
Partnerships and cooperation	Low price of substitute goods
Company creation process	
Colonial inheritance	
challenging neighbor	
2008 hunger riots	
Economic operators wish	
competitive crops constraints	

IV. DISCUSSION AND CONCLUSION

SWOT analysis is one of the most effective tools used to assess the level or the development of a given sector. Cassava sector embodies many opportunities, has its strengths and weaknesses/threats need to be minimized. How to maintain or consolidate the cassava sector internal factors namely strengths? The strengths' results part reveals that human as well as animals need cassava, both for consumption and industrial need. To consolidate this strength, mass production is required as well as the introduction of new and urban products [7], [17], and [20]. The non-application of technology and innovation are factors limiting the production level. There exist large disposable arable lands but women

developed in order to make cassava products competitive; eliminate large quantity of waste and increase life span. The sector ought to effectively exploit the opportunity of technology transfer, programs and aids derived from cooperation and partnerships. Company creation process has been significantly simplified; Cameroon cassava operators can then emulate Nigeria, Ghana and Côte d'Ivoire and innovate. The introduction of cassava starch, flour, chips and pellets in many products made in Cameroon can upgrade the sector provided that, a company processing one or some of the by-products is established and ensures a regular supply. Then, how to minimize the negative external factors? We propose more researches that focus on cassava given its huge amount of opportunities. Financial institutions (agricultural bank, now in launching process) should enable agri-business and farmers' easy access to credit and loans. On the other hand, farmers, producers, processing units and related actors have to design bankable projects. Government's intervention on staple foods has to be fair and appropriate; if action is taken towards rice, wheat and maize, adaptable actions should be towards other (cassava) in other not to impede their evolution. Key actors should work together to uncover more opportunities instead of each one from each group working just for the satisfaction of personal needs. Synergies occur and many opportunities uncover if they come together (farmers, processors and traders) to share information and exchange experiences, views and expectations in a sincere way.

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