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Oil palm production: Actors, roles and activities in the value chain.

Yolar Blandine Ngwangkfu
Fon Dorothy Enwgali
Tohnain Nobert Lengha



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Yolar Blandine Ngwangkfu

Department of Rural Socio-Economics and Agricultural Extension, Faculty of Agronomy and Agricultural Sciences, University of Dschang, West Region of Cameroon.

Corresponding Author's Email: ngwangkfublandine@gmail.com

Fon Dorothy Enwgali

Associate Professor, Department of Rural Socio-Economics and Agricultural Extension, Head, Department of Agri-Business, Faculty of Economics and Management, University of Dschang, West Region of Cameroon.

Email: dengwali@yahoo.fr

Tohnain Nobert Lengha

Lecturer at the Department of Rural Socio-Economics and Agricultural Extension, Faculty of Agronomy and Agricultural Sciences, University of Dschang, West Region of Cameroon.

Email: tohnole@yahoo.com

Abstract

Purpose: Oil palm is the highest oil producing plant, with an average yield of 3.5 tons of oil/ha/year. In 2006, palm oil became the world's most important edible oil with 37 million tons produced, accounting for 25% of the total oils and fats production. The study on the Oil palm production: Actors, roles and activities was conducted in the Littoral region of Cameroon with the used of multi-stage sampling technique.

Methodology: The target population for this study were smallholder growers/processors and marketers involved in the oil palm value chain and the sample size was four hundred (400) assuming that the growers/processors and marketers in the Littoral region are more than 100000 distributed within two divisions. The study made used of primary and secondary data sources. The methods used for the study were interviews, focus group discussions, sources documents analysis and participatory observation. A simple descriptive statistical method was also used for the study.

Findings: Findings indicated that the main actors identified in the field were the input suppliers, nurseries, growers/processors, marketers and consumers.

Recommendation(s): The study therefore recommends that the state through the local authorities such as the council could set up fixed prices for oil palm products, create farm to markets roads, and provide farmers with quality seedlings and fertilizers. And also growers should constitute themselves in to common initiatives groups and cooperatives.

Key words: *Oil Palm, Production, Value Chain, Actors, Roles and Activities.*

1. Introduction

The oil palm plants, *Elaeis guineensis*, originally a native of western Africa, have been used by local people as a source of edible oil for thousands of years. In the 19th century, oil palm was brought from Africa to Southeast Asia by Dutch and British colonists and by the early 20th century its economic potential as an alternative crop was recognized by rubber planters in Malaysia. Seed selection resulted in the development of commercial varieties that have been grown on an increasingly wide scale since the 1930s. Following the decrease in demand for natural rubber after the 1950s, many rubber plantations were converted to oil palm and much of the modern development of the crop has taken place in Malaysia since its independence in 1957. The decision to replace rubber by oil palm in Malaysia proved to be perceptive as it coincided with the beginning of a huge increase in demand for oil crops that continues to this day (Corley and Tinker, 2015).

The natural habitat of oil palm is the tropical rainforest with 1780–2280 mm annual rainfall and a temperature range of 24–30°C (Corley and Tinker, 2003). Palm productivity benefits from direct sunshine, the lower incidence of cloud cover over much of Southeast Asia is thought to be one reason why oil palm yields are higher there than in West Africa (Dufrene *et al.*, 1990). Oil palm seedlings are typically raised in a nursery for one year before planting out. Planting densities range from 110 to 150 stems per hectare. Ground cover crops are used to reduce weed growth and prevent soil erosion. Fruit production responds well to soil nutrients and trees produce more fruit when fertilized (Basiron, 2007).

Yields often vary with landscape terrain, but patterns are inconsistent: sometimes the highest yields are from higher ground and sometimes from valleys (Balasundram *et al.*, 2006). Palms mature rapidly and fruit can be harvested as soon as 2–3 years after planting (Basiron, 2007), although trees aged 9–15 years are the most productive, after 25–30 years, trees become too tall to harvest and are replaced (BisInfocus, 2006). Oil palm has the highest yield of any oil seed crop, averaging 3–4 tonnes of mesocarp oil per ha per year in the major palm oil producing countries, with an average annual oil yields of about 3.7t/h (Murphy, 2014).

Oil palm is by far the highest oil producing plant, with an average of 3.5 tons of oil/ha/year. Extracted from the mesocarp of the fruit, crude palm oil (usually referred to as CPO) represents 95% of the total oil production of the oil palm which also provides palm kernel oil. Since 2006, palm oil has become the world's most important edible oil with about 37 million tons produced that year, representing 25% of the total oils and fats production (Oil world Ista GmbH Mielke, 2007).

In the wild, the oil palm fruit occurs in two forms, *dura* (with a large kernel) and *pisifera* (having no shell and yet sterile). *Tenera* is a hybrid from *dura* and *pisifera*, and the most cultivated variety because it produces fruits with higher oil content. It is the preferred commercial variety cultivated by agro-industries in Cameroon and smallholders close to the agro-industrial areas (Hoyle and Levang, 2012). Cameroon's smallholders with less than 5ha of palm represent more than 75% of the oil palm growers but provide only half of the production due to constraints faced in the value chain, (Aboubakar *et al.*, 2014).

Agricultural value chain like the oil palm value chain describes the full range of value-adding activities required to bring a product or service through the different phases of production,

including procurement of raw materials and other inputs, assembly, physical transformation, acquisition of required services such as transport or cooling, and ultimately response to consumer demand (Kaplinsky and Morris, 2001). In this light, the value chain activities comprises of all the activities from production to consumption, as well as waste utilization of a certain product. Value chain actors are individual or organization, enterprises and public agencies related to a value chain and performance of the value chain. There are often but not necessary associated with a particular value chain. Value chain actors are those directly related to value chain activities while the supportive actors include NGOs and other agencies that comes in to play an important role in production.

According to Dunn (2014), the value chain linkages are the channels or relationships that connect the different value chain activities and through which a product passes from the design to the consumption stage. He went further to differentiate between the horizontal and vertical linkages in the value chain. Vertical linkages connect actors involved in different activities of value chain from input suppliers to producers, processors, wholesalers, distributor, and export and so on to consumers. While horizontal linkage are the commercial relationship involved in bringing the product up to the value chain.

The study on the 'oil palm production: actors, roles and activities' in the value chain aimed at describing the actors, roles and their activities in the oil palm value chain.

2. Literature Review and conceptual framework

In this study literature was reviewed in areas of value chain, oil palm smallholder in Africa, oil palm production structure, oil palm products and by-products benefits and the constraint faced by the smallholders. Meanwhile the on the conceptual framework, this study examines the Michael Porter's value chain model. The term 'Value Chain' was used by Michael Porter in his book "Competitive Advantage: Creating and Sustaining superior Performance" (1985). The value chain analysis describes the activities the organization performs and links them to the organizations competitive position. And the smallholder models in oil palm sector which was loosely grouped into three general categories, including: supported smallholders' model, independent smallholders' model and cooperative and collective smallholders' scheme. The most common used model which is that used in this study area is the independent smallholder mode

3. Methodology and data collection

The study was conducted in two divisions (Moungo and Sanaga- Maritime) of the Littoral region and data was collected in ten subdivisions which were; Bonalea, Ebone, Edea 1, Edea 2, Dibamba, Dizangue, Manjo, Mbanga, Melong, and Pouma. Consequently, forty villages were selected for the study namely; Kombe, Kominpa, Malike, Souza Nlonako, Manegole, Ndungue, Ntolo, Bakwat, Lala-kola, Nlohe, Mantem, Bayon, Kidong, Muyuka, Yoke, Isoko, Nkongson, Mbouroukou, Mouanguel Missole, Sikoum, Logbagex, Kopongo, Kongue, Mbanda, Mbongo, Songue- land, Apoh-Anjong, Bisseke, Kakanzock, Koukoue, Ekite, Ekite 1, Ekite 2, Malimba, Hebah-Pouma, Ngwie, Sosimod and Syba-bassa.

The target population for this study were smallholder growers/processors and marketers involved in the oil palm value chain. The sample size for the study was four hundred (400)

assuming that the growers/processors and marketers in the Littoral region are more than 100000 distributed within two divisions

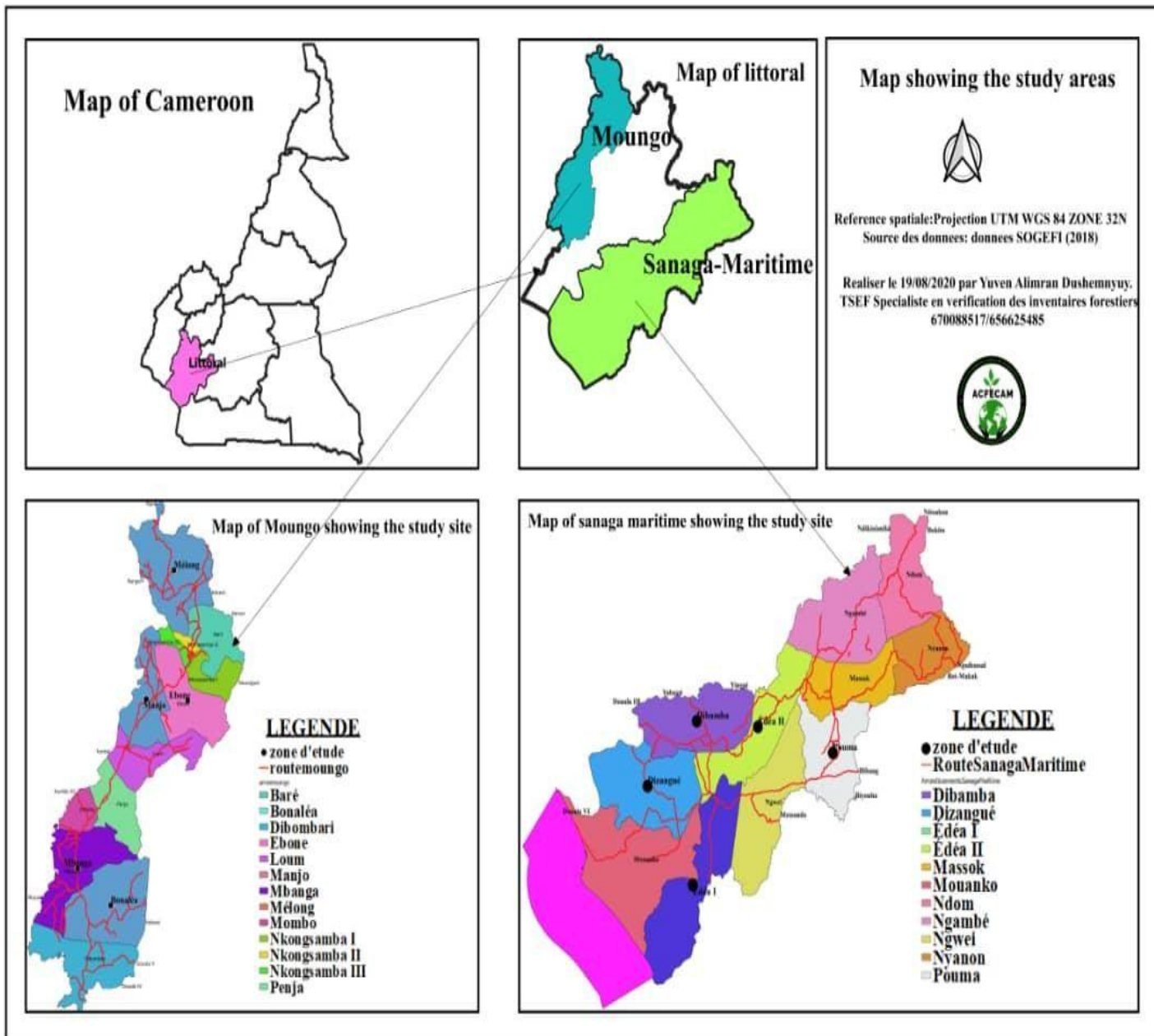
Table 1: Distribution of sample size per division

Divisions	Distribution size
Moungo	200
Sanaga-Maritime	200
Total	400

Source: Field survey 2020

Both primary and secondary data were used for this study. The primary data were collected from all key actors with the use of interview guides, focus group discussions, and participatory observation to collect qualitative data concerning oil palm production. Meanwhile secondary sources of information were gotten from journals, internet articles, newspapers, documented materials, textbooks past thesis and dissertations related to various oil palm projects, further information was obtained from IRAD and SOCAPALM located in the study area. This information was used to elaborate the context of study and the problems. It also helps to unite the literature review.

A multi-stage sampling survey method was used for the study. A purposive sampling technique was used to select two divisions known for its oil palm production (Mungo, and Sanaga-Maritime). From these two divisions, five subdivisions were purposively selected from each division. 10 Input Suppliers, 10 Nursery Farmers, 220 Growers/Processors and 160Marketers were randomly selected from each subdivision using a snow balls sampling technique, making a total number of 400 respondents



Map: The Localization of the study area on the national territory.

Source: Administrative Units of Cameroon NIC 2016, Realized by Yuven Alimran Dushenyuy, 2020.

Descriptive statistical methods of data analyses were employed with the use of Statistical Package for Social Science (SPSS), and Microsoft Excel, and the analysed results were presented using descriptive methods and a flow chart.

4. Results and discussions

From the study conducted, five main actors were identified in the field with financial and products flow and each actor carried its own value chain activities. Main actors identified were; Input suppliers (such as seeds from IRAD and SOCAPALM), Nurseries establisher, Growers/ Processors, Marketers (wholesalers and retailers), and Consumers. In this study, the actors identified were similar to those of Bamidele *et al.*, (2011), whose study was based on palm oil value chain analysis in the Niger Delta State. The actors' linkages were summarized as shown figure 1.

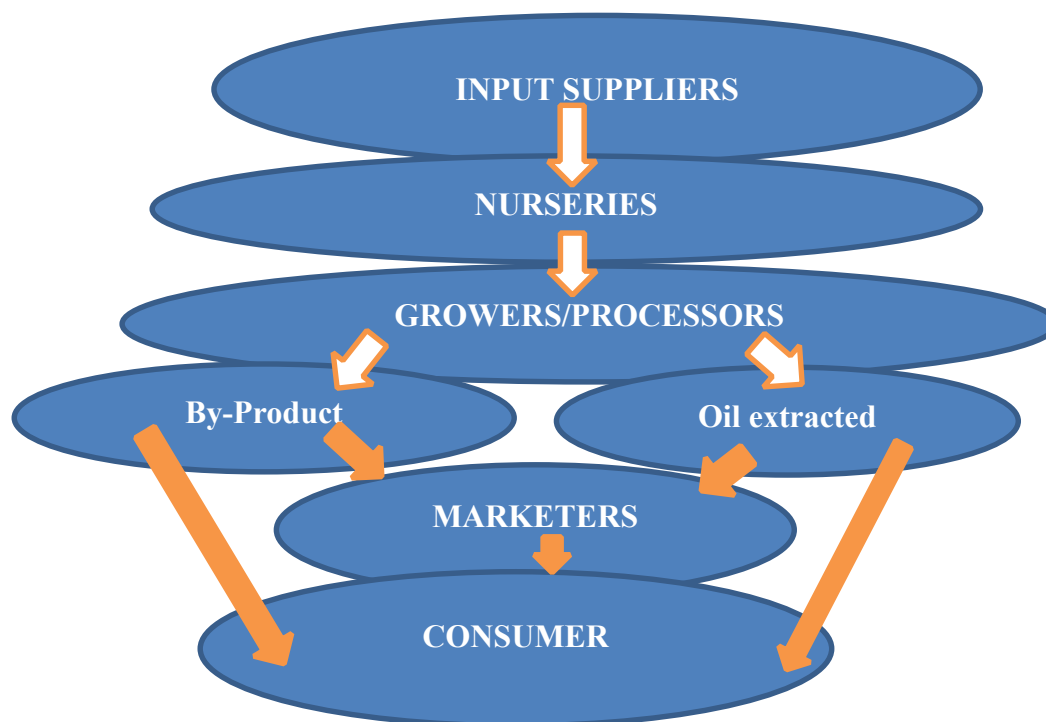


Figure 1: Actors' linkages

Input Suppliers.

Respondents in the study area indicated that nursery farmers got their inputs such as oil palm seeds from IRAD and SOCAPALM. The seed selection and germination was done following a procedure. Thick shelled *dura* with shell-less *pisifera* were crossed and prepared for germination. After harvesting, the fruits were removed manually from bunch and the mesocarp was extracted in a centrifugal electric pump. Subsequently the seeds were dried in the shade and the ones that were damaged by the processing were discarded. Then they were treated with systemic and contact fungicide with carboxin@ +thiram@ 200sc at 0.2% for 5 minutes. After that the seeds were removed and dried in a shade until reaching a moisture content of 18%. The moisture content of the seeds was determined using the oven method of $105^{\circ}\text{C} \pm 3$ for 24 hours.

After that the seed were placed in thick sealed polyethylene bags, with the volume of air at least equal to the volume seeds and place in a generator at a temperature of $39^{\circ}\text{C} \pm 1$ and relative air

humidity of approximately 80% for a period of 80days. The seeds were inspected after every two weeks and in case of any fungal contamination, the infected ones are treated.

After each heat treatment, the seeds were hydrated for 7days by putting the bags which were previously perforated in tanks with water replace twice daily. To remove excess water after hydration, seed were dried in shade over a wire screen at room temperature of 30⁰c. Seed germination was noticed by the appearance of radicles.

The procedure for the germination of seeds by IRAD and SOCAPALM in the study area was in line with the study conducted by Beugre (2009) on the effect of heart treatment duration on the germination of oil palm seeds. The germinated seeds were then sold to the nursery farmers. Plate 1 shows already germinated tenera-type oil palm seeds whose dormancy was broken between 38⁰c and 40⁰c and place in the germinator for 80days.



Plate 1: Germinated seeds Nurseries

In the region, nurseries were mostly limited due to fact that it requires lots of attention and treatments. Field report (2020) indicated that after buying already germinated seeds from IRAD and SOCAPALM, a land was cleared and prepared for the establishment of a one stage nursery. Nursery farmers were involved in a one stage nursery in order to avoid transfer shocks if it was a double nursery and plants not improperly managed. Before the arrival of the seeds in the nursery, soils were thoroughly mixed with phosphorus (P) fertilizers and filled to within 2cm of the rim in a polybags in order to avoid seedlings roots system. The seed polybags were prepared 4 weeks before the seeds arrived and watering was done daily until planting was done to ensure adequate P available.

Polyethylene bags of 30x15cm were used and grand cover of 30cm-100cm before placing seed 2cm below the top soil of the bag with radicles pointing downwards to ease fast growth. After the application of fertilizers to the nursed palm, watering was done regularly in order to prevent the leaves from burning. Pre-germinated seeds received by the grower were kept under shade and cool. Once seed bags were opened, distilled water were sprinkled to maintain moist seed

The duration of palm plant in the nursery was determined by the number of leaves it produced. After 4 months, the plants were transferred to another area with enough space to enabled them acquired effective growth. Palm plant stayed in the nursery for 12months before transferred to the field for proper planting. This planting procedure was in line with the study conducted by Rankine and Fairhurst (1998) on Nurseries. Nurseries in the study area had lockable stores for parts, tools and equipment and for chemicals and fertilizers (near a water supply). Herbicides

were clearly marked and kept separately from insecticides, fungicides, and foliar fertilizers to prevent contamination and incorrect handling. Farmer's nursery site can be seen in plate 2 within a time interval of 1 year.



Early stage nursery within 1-4 months.



Nursery within 6months to 1year

Plate 2: Nursery establishment within 1 year Growers/Processors

This main group of actors grows palm nuts and processes them to different oil palm products and by-products. The palms are grown at an interval of 8-10m away from each palm tree. Approximately 57.10% of growers in this area have palms which are crossed breed from thick shelled *dura* with shell-less *pisifera*. A *dura* palm tree takes seven years to mature and on average produces 2-3cones of palm nuts each times it bears, while a *pisifera* palm tree takes 3-4years to mature and produces 5-8cones of palm nuts. Although palm nuts are harvested throughout the year in the Littoral region, there is a peak season (March-June) and off season (July-February) for harvest. Palm bunches are harvested from the palm trees which are then detached and the nuts selected as shown in plate 3. Growers (67%) harvest palm nuts monthly. According to available data, in the peak season the monthly minimum and maximum quantities

harvested from mixed *dura* and *pesifera* palm trees per hectare was 15 and 4 drums respectively (45,000kg and 12,000kg).



Plate 3: palm bunches, detached and selected palm nuts

Some of the harvested palm nuts are sold to companies such as the SOCAPALM while some are processed into different products. Palm nuts are sold at 25FCFA and 35-45FCFA per kilogram in the peak and off season respectively depending on the location. In this study all growers of palm nuts were processors. Palm nuts are boiled in metallic drums of 200litres or, 500litres as shown in plate 4 and milled into crude palm oil (CPO), which is then cooked in to final palm oil.



Plate 4: Metallic drums used in boiling palm nuts

On an average, 300kg of palm nuts make up a drum of palm nuts, which can produce about a tin (22litres) of palm oil. Majority (85.90%) of processors used a modern method of milling. From data collected 65.9% (135) of the processors used automatic machine which uses electricity and petrol to function while 17.10% (35) of the processors used manual machine. Two types of press were identified which are the horizontal and vertical press as shown in plate 5



Plate 5: Horizontal and Vertical Press oil palm machines

Also from data analysis, majority of growers/processors 95.40% (229) carry out activity as individuals, while 4.60% (11) belong to common initiative groups (CIGs). Approximately 56.50% (134) processors carry out their processing activity at river banks due to the availability of water. More so, 67.60% (138) of processors reported that they rent machines which they use for processing and 32.4% (66) were owners. The processed products and byproducts were stored in gallons (60.70%), drums (20.90%) and buckets and bags (3.00%) of different sizes as shown in plate 6





Plate 6: Different storage materials

The growers/processors main sources of labour of their activities were mostly family (85%) labour. Approximately 84.60% (203) of the respondents reported that their main sources of capital were from their personal savings.

Marketers

Marketers also play an important role in the oil palm value chain. In the study area marketers were grouped in to wholesalers and retailers. Wholesalers were important as they commercialize the produced oil palm products and by-products in bulk to other actors. Mostly, wholesalers buy in bulk in gallons, drums and bags and sell in bulk to retailers. Their main role is to go in to villages buy from growers/processors in larger quantities, stock and sell to retailers in the neighboring towns. In the Moungo division, most of the wholesalers go to neighbouring villages such as Mouanguel, Nlohe, Kombe, Logbagex, Koukoue, Ngwie in Melong, Manjo, Mbanga, Dimbabam, Edea 1 and Pouma among others. More so, a majority of the wholesalers in these areas buy and retail to companies in urban towns like Douala and Yaoundé. In the same light, there were still some growers/processors that had a perfect knowledge of the market. These groups of growers/processors take their products directly from the processing site to the market without passing through the wholesalers in order to increase their profit.

The wholesalers buy 22liters of palm oil from the villages at the cost of 5,000 FCFA during the peak season and retail in urban areas at a cost of 7,000FCFA. While in the off season, prices increase due to inadequate production resulting from the scarcity of palm fruits. During this period 22litres of palm oil is sold at 8,000FCFA in the villages meanwhile the wholesalers retails in town at a cost of 13,000FCFA to 14,000FCFA.

Under the marketing sector, the retailers deal directly with the consumers. In the study area, this group of persons played an important role as they trade directly with the consumers. Those who were considered as retailers were those who sell palm oil, palm kernels, palm kernel oil and soap in smaller quantities (less than 22litres) depending on the need of the clients. Their main function in the chain is to facilitate the distribution of the oil palm products and by-products produced by the growers/processors at a cost that is affordable by everyone in the

locality. Retailers after buying from the wholesalers, in return sell palm oil in units of 1 liter at a cost of 550FCFA to 600FCFA in the peak season and at a cost of 700FCFA to 900FCFA in the off season depending on the area. Majority of the retailers who sell palm oil along highways like the case of Melong center are mostly sold in 5liters, 10liters, than those retailers who sell in markets and quarters in 1 liter. Plate 7 shows the various units in which palm oil which is the main products is sold in the study area.



Plate 7: Palm oil on sale in various units.

Oil palm value chain in the littoral region has three main marketing channels. The marketing channels identified were short, medium and long marketing channels. These marketing channels identified in the study area were similar to that identified by Fon *et al* (2017) on mushroom production in the western highlands of Cameroon. In the short marketing channel, growers/processors sell their products directly to the final consumers. In the medium marketing channel, growers/processors sell their products to either retailers or wholesalers who then sell to the final consumers and the long marketing channel growers/processors sell to wholesalers in bulk who buys and sell to the retailers who then later distributes to final consumers in smaller quantities.

Results showed that 83.10% of surveyed marketers carried out their activities in both seasons (rainy and dry season) to meet up with their family needs such as education, health care and household needs. Approximately 71% of the marketers claimed to have had their products directly from the producers without passing through the middlemen. Majority (68.80%) of the marketers sold their products at the local and regional markets like in Melong, Manjo, Loum Penja, Nkongsamba, Souza, Missole, Logbagex, Edea, Pouma among others. While 31.20% of marketers sold their products to companies around Douala, Yaounde, and Buea. Wholesalers and retailers (64.40%) claimed that their sources of finance for their activity were from their personal savings, and 85.00% reported that their sources of labour were from family and hired labour.

Consumers play an important role in the oil palm production because they increase the economic capital system. Without the consumers, producers would have no reasons to produce. In the littoral region their production was mostly motivated by the total number of wholesalers

who visited the neighbouring villages on daily basis to buy palm nuts, palm kernels, palm oil, among others.

5. Conclusion

Oil palm production requires much attention as it involves many actors who carried out different activities at different stage of production. This value chain therefore faced lots of challenges as sometimes actors at different stages of production do not meet up with their objectives. In the Littoral region, the main activities carried out by various actors in the value chain were the acquisition of germinated seeds from IRAD and SOCAPALM, an establishment of nurseries within a year and transferring to the field for proper planting, maintenance and harvesting of FFB by the growers and processing them in to various products and by-products, marketing to wholesalers and retailer at different location and with different prices, hence reaching the final consumers who are the motivational population who causes production to take place. Value chain actors needs to be encourage in order for them to be able to improve on their productivity and outputs.

6. Recommendations.

Smallholders in the study area had limited influence on the prices of oil palm by-products which were largely controlled by the market forces of demand and supply in peak and off season. In regards to this price fluctuation, the state through the local authorities such as the council could set up fixed prices for their products in order to encourage production and continues marketing.

More so, smallholders in the Littoral region complaint of poor roads network which made accessibility in to areas where oil palm by-products are found more difficult for them to operate. The state should therefore ensure the improvement and maintenance of these roads most especially in the rainy season where roads are obstructed in order to ease movements.

Furthermore, smallholders with low yields resulted from old palms and with dura palm species made mentioned of the fact that they had difficulties in acquiring improved seedlings due to high prices. The state through agricultural programs like IRAD could provide them with improved seedlings and fertilizers at a cheaper rate and also educate them on the growing technique so as to improve on their productivity and maintain good yield.

Growers should increase the use of organic manure in order to improve on their soil fertility. These interventions are likely to reduce the use of external inputs such as, pesticides and other agrochemicals and sustain the use of the land and to protect it

Growers/processors should also constitute themselves into cooperative groups so that their products could be bought at a fixed price determined by the cooperative society in order to avoid constant fluctuation of prices caused as a result of middlemen intervention. Such cooperatives would also keep its members up to date on modern agricultural techniques and the cost of acquiring such technologies.

Growers/producers should full utilised all the by-products oil palm production, as most of these by-products such as palm kernels were being wasted which could still serve as a source of income for the families involves.

Marketers should also constitute themselves in the groups so as to decide on a fixed price for buying and selling of their by-products in order to solve the constraint of price fluctuation.

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