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Analysis of the Plantain Supply System of Markets in the City of Douala

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Abstract

In Cameroon, the city of Douala constitutes one of the major urban centers for the consumption of plantain. Due to changes in eating habits, the consumption of plantain is in net increase. This study aims to gain a better understanding of the functioning of the plantain supply system in the city of Douala, as well as its current performance. Surveys were carried out among 125 actors (transporters, wholesalers, retailers, collectors) in order to study its efficiency. The results of the study reveal that the activity is clearly dominated by women. The actors are very little organized, in associations or groups. The markets are mainly supplied with plantain from the production basins of the Littoral, South-West and West regions. There is strong seasonality in the supply of plantain in the markets. This results in a permanent fluctuation in the price of plantain which at times attains up to 33%. Thus, plantain remains expensive in the markets of Douala and the selling price is influenced by the purchase price, the cost of transport and the profit margins imposed by the stakeholders. Financial analysis of the activity shows that it is very profitable, with gross monthly profit margins evaluated at CFAF 183 417 for retailers, CFAF 229 756 for wholesalers and CFAF 397 612 for collectors. The profit margin of the collector is higher than those of the other actors. Actors face severe constraints such as: the poor state of rural roads; costs of informal road tolls; absence of market structures; theft and insecurity, etc. In view of the results obtained, the supply system is not performing well to satisfy the high demand for plantain in the city of Douala.
Key words: Plantain, Performance, Supply system, Markets, Douala, Cameroon.

1. Introduction

The need to ensure food security in urban areas reveals the important role of agricultural production but also that of commercialization. The marketing activity allows a channel of agricultural surplus to the urban areas for consumption (or redistribution), generally considered to be deficient in foodstuff. Also, it leads to agricultural performance without which production would be stagnant (Mahyao *et al.*, 2003, *Doumbia et al.*, 2006, Demont *et al.*, 2003 cited by Mahyoa, 2008).

Plantain plays an important role in the diet of the population of several countries of the Economic and Monetary Community of Central Africa (CEMAC) such as Cameroon, Congo, Gabon, Equatorial Guinea and the Central African Republic. In Cameroon, it contributes 4.5% to agricultural GDP and mobilizes about 650 000 producers and just over 50 000 other intermediaries such as traders, transporters and processors (LVDP, 2013). In view of all these contributions, plantain is an indispensable resource on food security and economic components. Demand for plantain in Cameroon is growing in relation to demographic pressure, urban population growth and various forms of consumption (Nkendah and Temple, 2003, Nkendah and Akyeampong, 2003, Nkendah *et al*., 2007, Wandji, 2015). Cameroon has experienced a high increase in its urban population for more than a decade, including that of the city of Douala, which has one of the highest growth rates in Central Africa. Its average annual growth rate is estimated at 5% over the last 30 years. This is well above the national rate of 2.8%. The population of Douala would triple by 2035.

A town situated in the equatorial subtropical zone and currently populated by more than 2 million people, Douala therefor constitutes a large plantain market. This is particularly due to the eating habits of this cosmopolitan city and its location in an area conducive to plantain production (Fongang *et al.*, 2016). This situation shows that it is a zone of increasing food demand and almost all the means are good to feed the population. This is where food products come into play; this is typical of subtropical cities such as Douala. Among these food crops, plantain is one of the most important. Despite the specialization and specification of markets in Douala, traders and users undergo promiscuity, insalubrity (unhealthiness) and insecurity (Hatcheu, 2003; Temple and Kamajou, 2009).

However, it should be noted that several factors limit the consumption of this commodity in major Cameroonian cities, they include: high plantain prices, unstable supply in markets (unstable market supply), poor organization of markets and marketing channels, etc. Indeed, food supply and distribution systems in developing countries are inefficient given their informal nature. Indeed, supplying urban markets with food is sometimes insufficient (quantity and quality) and very often subject to strong seasonal variations.

Faced with an increasing demand for plantain and strong constraints, the challenge faced by the stakeholders in the plantain sector is to ensure a regular supply of markets in the city of Douala. A systematic analysis of the supply system of the city of Douala in plantain can from this point of view provide insights for effective strategies. The objective of the study is to obtain a better understanding of the functioning of the Douala plantain supply system and its current performance in order to provide decision makers and stakeholders with up-to-date information, able to revitalize these markets.

2. Methodology

This study was carried out in Cameroon, mainly in the city of Douala and its supply areas. A city located in the South-Western part of the country and currently with a population of more than 2 million, Douala is the most important plantain market. This is because of the eating habits of this cosmopolitan city and also because of its situation in a zone favorable to the production of plantain. In addition, Douala is the economic capital of Cameroon and economic activities there are very favorable. It is here that one meets the major markets for the commercialization of agricultural products and finds the largest markets for plantain.

For data collection, (a mission was first carried out for market prospection) we first carried out a mission for market prospecting, with the aim of identifying markets and grouping them by category (wholesale and retail markets). Random sampling was adopted after the preliminary market survey and a total of 125 actors (including 6 transporters, 28 wholesalers, 56 retailers and 35 collectors) were surveyed by means of questionnaires addressed to each category of the actors. The data collected included: the identity of the actors, their role in the market circuits, the quantity of plantain that is transported to the target markets, the quantity sold, the quantity lost during transport, other major constraints, costs and additional sums imputed or charged for transiting plantain from the producer to the final consumer. The data obtained through the interview guides were subject to thematic analysis. For the individual data collected by questionnaire, descriptive statistics (frequency, mean, standard deviation) were mainly used. The operating or exploitation account was used to analyze the profitability of the processing and marketing of plantain fries (chips).

3. Results and discussions

3.1. Identification of stakeholders

Both men and women carry out the activity of supplying the city of Douala with plantain in Cameroon. However, apart from transporters that are exclusively men, women are most interested in the activity. Indeed, the study shows that they represent 86% of retailers, 74% of collectors and 64% of wholesalers. It should be noted that there is a greater proportion of retailers. This result is in line with the results of the study carried out by Ngoma in 2003, which shows that in the plantation supply chain of the city of Douala, women represent 72% of the workforce of traders. Over the years, the proportion of women has remained very strong in the activity. Women are more active in marketing activities while men are more involved in production and transport.

Young people do not seem to be very interested in this activity. Apart from the younger transporters with an average age of 32 years, the oldest category is the collectors with an average of 47.59 years, followed by retailers and wholesalers with 46.26 and 45.52 years as average ages respectively.

The study shows that those who attained primary and secondary education are the most represented. Of those who completed primary education, we have 50% of transporters, 44.6% of retailers and 40% of collectors and wholesalers. Secondary education is mostly represented by the wholesalers at 46.6% and less than 40% for retailers. Similarly, the category of actors with the lowest enrollment rate is that of transporters (33% did not attend school). The most educated are wholesalers with only 10% who did not attend school; It is also the category of actors most present at the higher level of education (university) with more than 7% followed by retailers.

The dominant (matrimonial) status is that of married couples who account for nearly 60% in wholesalers and retailers and a little less than 70% in collectors. The highest rate is that of transporters with more than 80%. Singles and widowers come next with fairly equal rates (± 15%). Finally, the divorced are the least represented.

Finally, the various actors have a fairly important experience in their field of activity. The number of years of experience varies between 10 and 11 years for wholesalers, retailers and collectors. The fairly large number of years in the exercise of this activity would reflect the fact that the actors are stable in this activity. When they start, they do not leave easily, because of the certainty of profitability.

3.2. The different stakeholders and functions

The different types of actors identified and involved in the supply system of Douala in plantain are: producers, wholesalers, collectors and loaders. Transporters are also involved in the supply chain.

• **Producers:** Producers are the most important actors in the supply chain. They are the first link in the chain. They are small producers who do not have plots of more than one hectare as plantain plantation. They produce plantain bunches and ensure their first sale in rural markets and sometimes by the side of their farms. They sell their production for most of the time in bunches or clusters (association of two or three bunches).

• **Retailers:** In the city of Douala, they are many in the markets and ensure the final distribution of the product. They are found in large urban markets, neighborhood markets and public road-sides. Generally, retailers sometimes associate plantain with other products. The retail of plantain is an activity of both sexes. But it must be emphasized that the majority are women. From their modest assets, retailers market relatively large quantities, either in bunches, piles or hands. They are scattered in different parts of the city. Their offer varies according to the seasons and depends on the supply by wholesalers. Moreover, due to the non-specialization of the market by product type, there are also some mobile street vendors selling in the markets and streets of Douala. Retailers are also found in streets and neighborhoods and offer small quantities of the product for households in the neighborhood.

• **Wholesalers:** Wholesalers provide wholesale functions to retailers and consumers in the markets of Douala. Wholesalers play the most important role in supplying the city of Douala with plantain. Indeed, they sales very large quantities of plantain and contribute to the regulation of supply in the markets. They supply themselves either directly from the fields and take care of primary collection, or from producers in local markets and sometimes collectors. Since the supply of plantain is dispersed in the production area, wholesalers organize primary collection in close collaboration with producers in rural markets or with large farmers who offer large quantities of plantain. Finally, they operate informally and do not have equipment for product storage or accounting or stock management documents.

• **Collectors:** As with wholesalers, collectors are important players who are very active in the different rural markets. They buy relatively large quantities in these markets and they re-sell either wholesale or in retail. Some collectors are retailers who, due to the high price of plantain from wholesalers, go directly to the rural markets to supply themselves.

• **Transporters:** They are essential players in the supply chain. They are rarely sellers of plantains, except for a few isolated cases. In this activity, there are permanent transporters who have trucks or vans for the transportation of products. Others are occasional, truck drivers often empty and returning from a trip, either from the West or Northwest Regions and carry goods stocked by the roadside or in rural markets. Other actors use their small vans to supply themselves from the large producers and sell to the markets of the city and in front of their vehicles (which at the same time serve as a warehouse). Wholesalers and collectors are not obliged to travel with the vehicle that carries the plantains, they can arrive at the market place several hours after unloading and find their goods stored.

• **Loaders:** Besides the usual sellers and transporters, we find other categories of actors that are an integral part of the system, loaders. The loading of vehicles so as to stockpile a maximum of plantain (practically no empty space) is not improvised, it requires a certain technicality. In villages or the provision areas, the "loaders", arrange the bunches in the trucks. When the load reaches its destination in the city, other loaders handle the unloading. Once the bunch is placed on the ground at the bottom of the truck, "arrangers" classify the bunches according to the initials marked on the stem of the bunches by the wholesalers or collectors to identify the product (after buying from the producer).

3.3. Relationship between the stakeholders

The study shows that the organization of actors in formal associations is rather weak and there is no inter-professional organization of actors in the plantain sector to defend their interests and people are constantly engaged for publicity, edification and attraction of potential clients. We observe that the actors are a little more organized at the level of wholesalers with only 17.9% who are members of a group. Indeed, there are some formal groups or associations of wholesalers in the wholesale markets of the city of Douala. The other actors remain reluctant to regroup by evoking bad memories of previous groupings, where governance problems led to disruption of the groups. Thus, we have a very small proportion of collectors and retailers who are members of a group, with 6.1% and 5.5%, respectively.

Despite this situation, the various categories of actors enter into various relationships ranging from cooperation to active competition, depending on their position in the sector. Between producers and buyers, there is a relationship of trust based on proximity. The exchanges are mainly based on relationships of trust. In addition, it creates a commercial relationship of clientele and in this context; the buyer has priority over other competitors and benefits from better prices in transactions.

3.4. Supplying the city of Douala with plantain

3.4.1. Supply points of actors

The markets in the city of Douala are mainly supplied with plantain from the production basins of the Littoral, South-West and West Regions. However, it should be noted that the localities of supply vary according to the type of actor.

3.4.1.1. Retailers supply locations

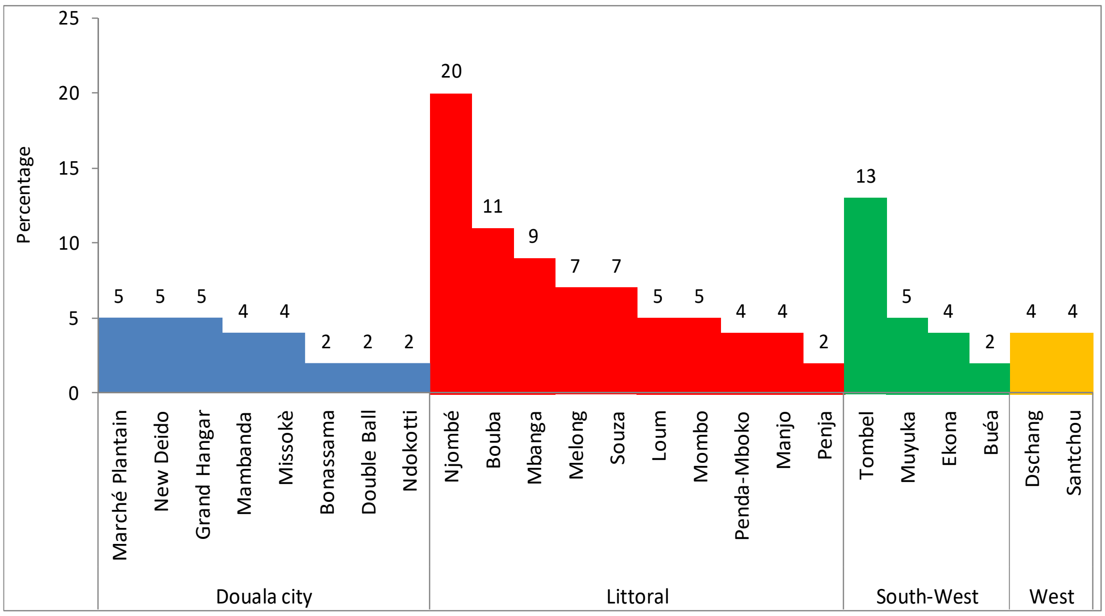

Figure 2 : Supply location of plantain retailers in Douala

This figure above shows the main supply areas of Douala plantain retailers. The study shows that retailers obtain significant supplies from production areas in the coastal region. However, it should be noted that a significant proportion (29%) obtain their supplies in the urban markets of the city of Douala from wholesalers and collectors. Almost all markets where wholesalers are found are potential supply areas for the retailers.

Due to the scarcity of plantain in certain markets in Douala and the high cost of purchasing from wholesalers and collectors, some retailers, who can be described as collecting retailers, go directly into the rural markets of production basins, provision themselves and return to retail in the city of Douala. Thus, a large proportion (73%) of retailers obtains their supplies from rural markets in the Littoral region. The most frequently mentioned localities are Njombé (20%), Bouba (11%) and Mbanga (9%). It should be noted that the locality of Njombé is located in the Moungo production area and the plantain market is located near the national highway road n° 5. This geographical situation eases access and one can easily find trucks coming from the West and North-West Regions for transportation of these products to the various markets in Douala.

In addition, the rural markets of the South-West Region contribute to the supply of markets in Douala. Approximately 18% of retailers are sourced from markets in this region, with Tombel being the most cited locality at 12.5%. Mile 20 market in the Tombel area is one of the largest plantain markets in Cameroon, attracting many actors of the supply chain. Because of important very fertile soils, the population abundantly cultivates plantain. Finally, with the large number of buyers and plantain insufficiency in the urban markets, some collecting retailers go further (up to 200 km), into the West-Region in particular to the localities of Dschang and Santchou, they represent a cumulative proportion of 7.2%.

3.4.1.2. Supply locations of the wholesalers

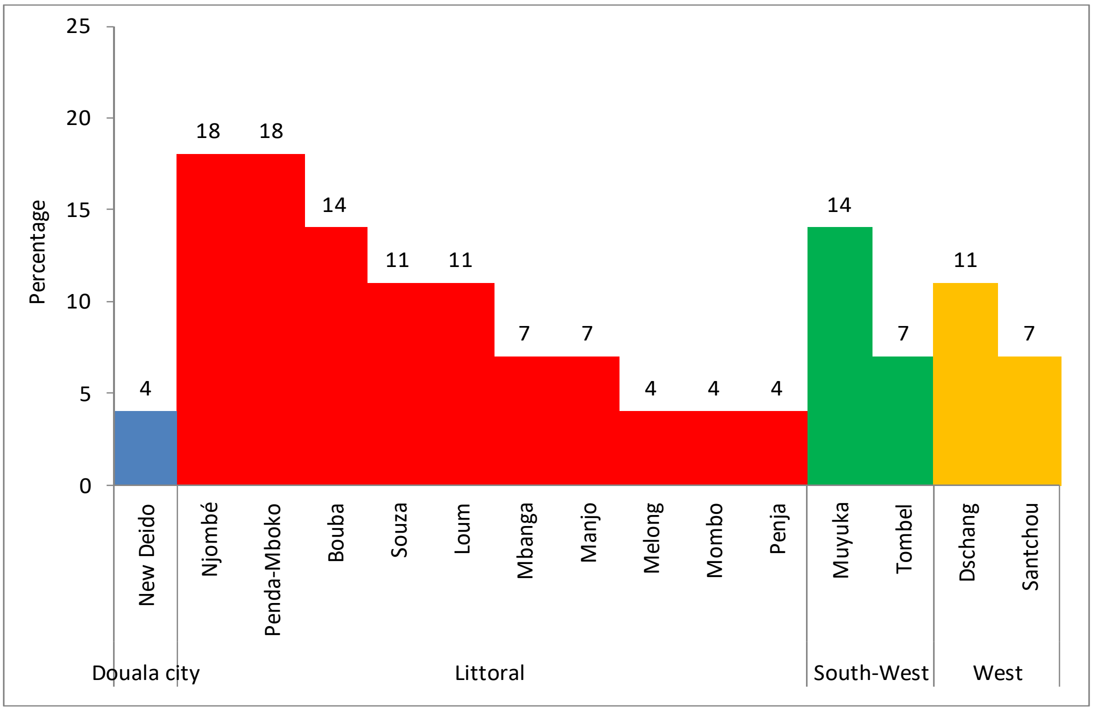

Figure 3: Supply points of Douala plantain wholesalers

It is clear from Figure 2 that a small proportion of wholesalers obtain their supplies from a wholesale market in the city of Douala, that of New Deido (4%). These wholesalers buy and also sell wholesale in other markets. It should be noted that most wholesalers obtain their supplies from rural markets in the Littoral Region, particularly in the Moungo Division, whose cumulative percentage is 96.5%. The markets of the most important localities are those of Penda-Mboko and Njombé, each with 18%, then Bouba with 14%. As noted above, some of these markets are located on the National Highway N^{o} 5 and are easily accessible. We then have the Southwest Region with a cumulative percentage of 21.4% of which Muyuka is the most quoted at 14% and Tombel 7%. Still as retailer collectors and wholesalers supply themselves in other rural markets, the Western Region records 17.8%

with Dschang (11%) and Santchou (7%). According to wholesalers, with the abundance of food products in the markets, plantain is cheaper in markets of the Western Region than in markets closer to Douala.

3.4.1.3. Supply points of collectors

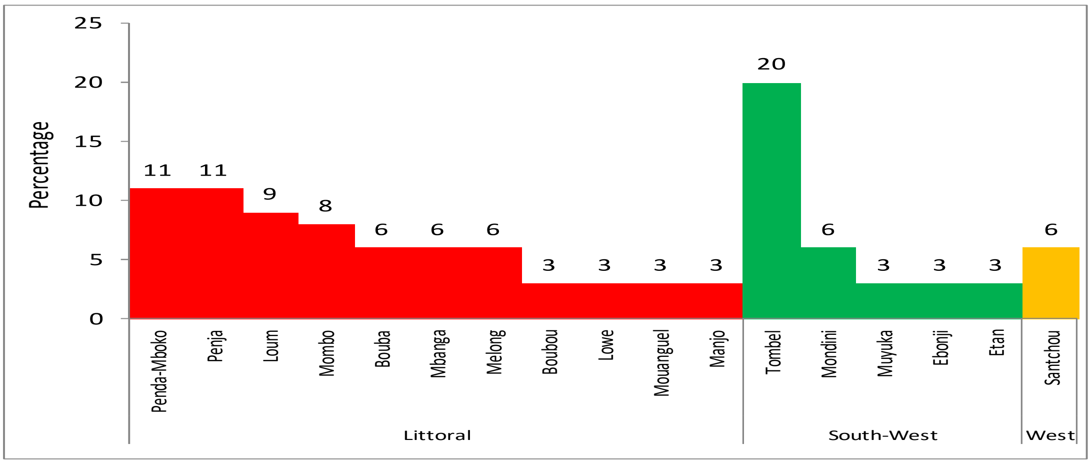

Figure 4 : Supply points of Douala plantain collectors

The figures 3 shows supply points of Douala plantain collectors. Concerning the supply points of the collectors, we note an absence of the markets in the city of Douala in the places mentioned. Also we note localities that were absent in retailers and wholesalers. If we group these localities according to the regions we will have the Littoral, the Southwest and the West Regions. The Littoral has a cumulative percentage of 69% and is the most represented with the localities of Penja and Penda-Mboko at 11% each, followed by Loum and Mombo with 9%, and then Bouba, Mombo, Mbanga and Melong all at 6%.

In the South-West Region, we note that collectors go to several rural markets to buy plantain, with a proportion of 35%. The markets of the following localities are the most representative: Tombel (20%) followed by Mondoni (6%), the other localities are Ebonji, Etam and Muyuka having percentages of 3% each. Finally, collectors and other actors also go to the Western Region, notably Santchou (6%).

Thus plantain flux is from production basins to markets in the city of Douala. This flow is schematized through figure 4 which follows.

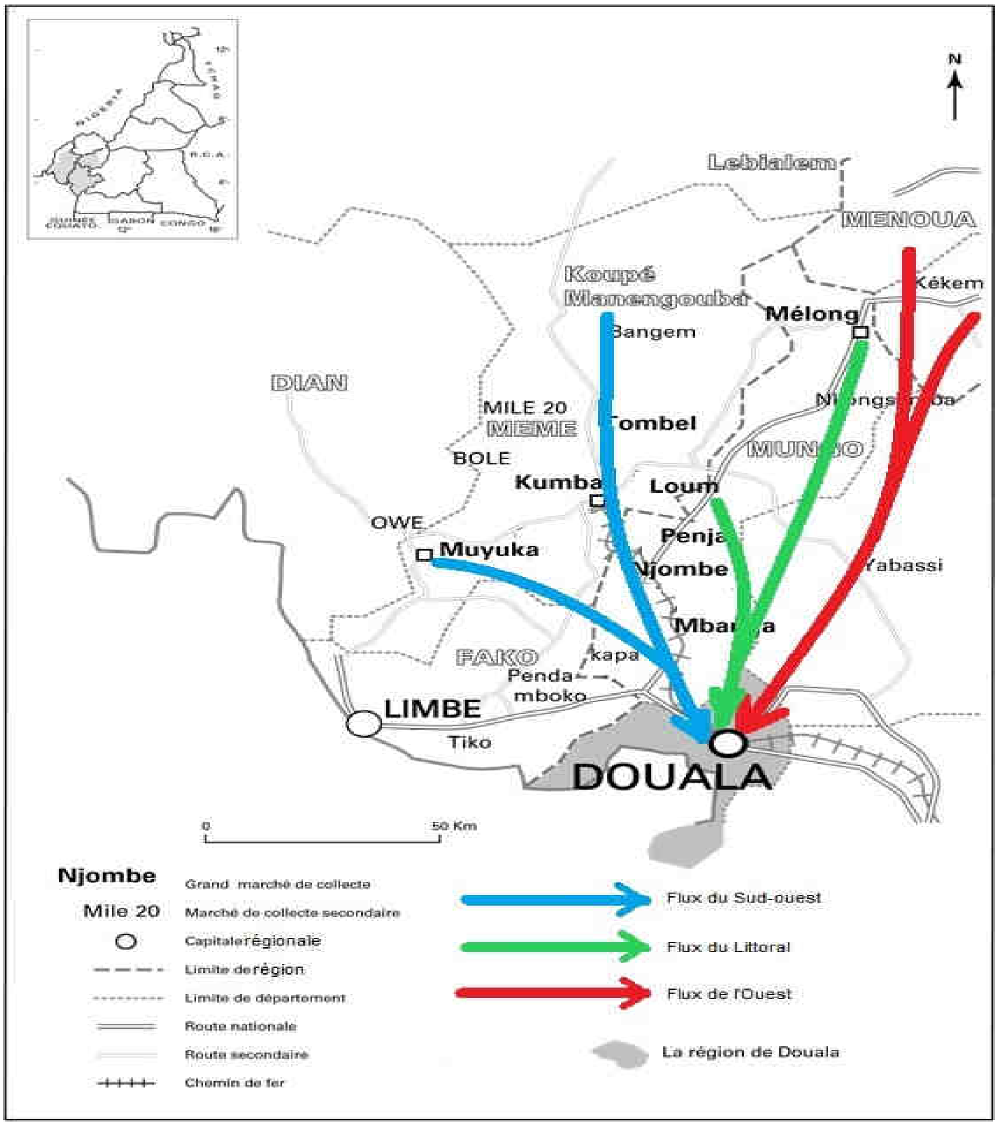

Figure 5 : Supply circuits of plantain in Douala

3.4.2. Determinants of choice of supply locations

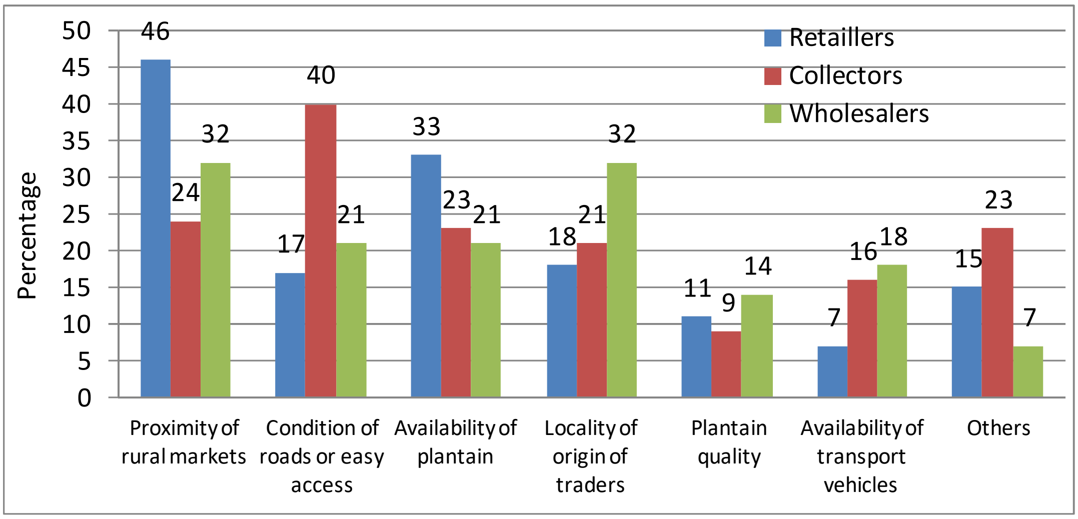

Figure 6: Reasons for the choice of supply locations

The choice of localities for supply is influenced by several factors. Figure 5 identifies the main factors by type of actors. The analysis allowed us to identify the main reasons for the choice of localities of supply. Thus, the proximity of rural markets is a major determinant, irrespective of the type of actor. The collectors evoked the condition of roads or easy access, as the most important factor with a percentage of 40. This explains well the idea that it is this category of actors who cover the most important distance in kilometers in the supply circuit of plantain in the city of Douala. Then we have wholesalers (21.4%) and retailers (16.7%) who care about the state of the roads when buying plantain. The other reason mentioned is the locality of origin of traders or the habit of getting provisions in certain localities. There are 32.1% of wholesalers, 18.5% of retailers and 20.7% of collectors who think so.

Another criterion of choice of the markets is the quality of plantain sought, though the percentages are rather modest. However, it is 14.3% for wholesalers, 11.1% for retailers and 9.1% for collectors who care about quality when buying plantain. Another issue of concern during supply is the availability of transport vehicles in certain areas that could influence either negatively or positively the purchase of plantain by traders in the city of Douala. This concerns 17.9% of wholesalers, followed by 16.1% of collectors and 7.4% of retailers. Finally, the last major reason is the search for lesser charges such as transport costs, purchase price, harassment, etc. Those involved are 23.3% of collectors, 14.8% of retailers and 7.1% of wholesalers. Indeed, they think that these charges would seriously impact on their profits. That is why they are looking for localities where they would spend less, where plantain is cheaper, as well as transport cost.

3.5. Seasonality of plantain in markets

Plantain can be grown all year round, but yields vary with rainfall, which affects planting and harvest schedules. This results in a seasonal supply that causes price fluctuations. This instability constitutes a major disadvantage for producers in the context of climate change. Figure 6 shows the availability of products.

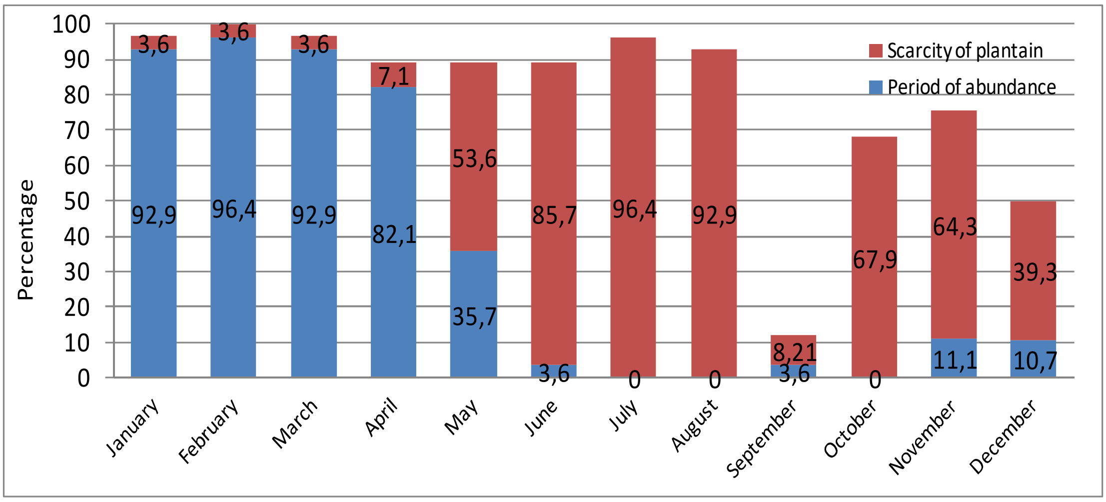

Figure 7: Periods of plantain availability

The study shows that there are three major periods for the availability of plantain in the city of Douala. The first from January to April, according to the opinion of the traders (up to 96.4% of wholesalers, 89.3% of retailers and finally 90% of collectors) is a period of abundance. Indeed, this period of the year corresponds to the dry season which runs from November to March. Between June and September, we notice that it is a period of real shortage. This can be justified by the rainy season which is experiencing its highest rainfall between July and August. The other months (April-May and October-December) can be termed buffer or intermediate months between rarity and abundance. According to Meuriot et al. (2011) the months of December and January are the least rainy of the seasons thus, average availability during these months. Judging from this figure, we can say that plantain abundance has an inverse relationship with rainfall. In this context of strong seasonal supply, actors develop adaptation strategies that are summarized as follows. To cope with the scarcity of plantain insufficiency or total absence, most traders buy other products with plantain funds. These are products like banana, tubers (taro, cassava, cocoyam, sweet and Irish potato ...), vegetables and other consumer products. This is more the case for retailers who very often, also sell other products alongside plantain. Approximately 57% of retailers do this. Also, 39% of wholesalers blend plantain with other products and finally we have 26% of collectors who very often mix with banana. Other traders, on the other hand, think it is more appropriate for them to buy the little plantain found at the collection site and avoid 'wandering' or buying other products instead. This is because they believe that total lack is not possible, there is always at least a very small amount. And it is this quantity that must be grasped. They are 42% of collectors, 32% of wholesalers and finally 29% of retailers who think so.

We have those who react to the lack in certain areas by fetching the product in other areas likely to have it. This of course involves more costs but traders believe that this is a necessary risk to take. This is the case for 24% of collectors, 11% of wholesalers and 9% of retailers.

Finally, we have a share of traders who have rather a passive reaction because they say they remain 'unemployed' during periods of severe shortage or they are ironic about the situation and consider that there is nothing they can do about it. Others take advantage of it to rest even though it is not always for pleasure. These are 27% of wholesalers, 18% of retailers and collectors.

3.6. Processing of products and means of transportation

Plantain once bought in the markets does not undergo any special conditioning prior to transport to the markets in the city of Douala. In some markets such as the local markets of Tombel, where, plantains are sold with very long stems, buyers cut-off these long stems so as not to use up much of the space in the trucks. Every buyer just takes the trouble to put his or her initials or marks on the stems of plantains to facilitate the identification of their bunches at destination because the products of several buyers are transported on the same truck to the city of Douala. The plantain is transported for the most part in whole bunches and never in hand or in cardboard (method of conditioning not yet popularized and used in Cameroon). The transport cost varies between 250 to 300 CFAF per bunch depending on the period. Once the plantain is bought, buyers make stacks at the places reserved for loading.

In connection with the means of transport of plantain used by the traders of the city of Douala, several means are used to transport products from rural markets to urban markets or from markets in Douala to places of sale or retail.

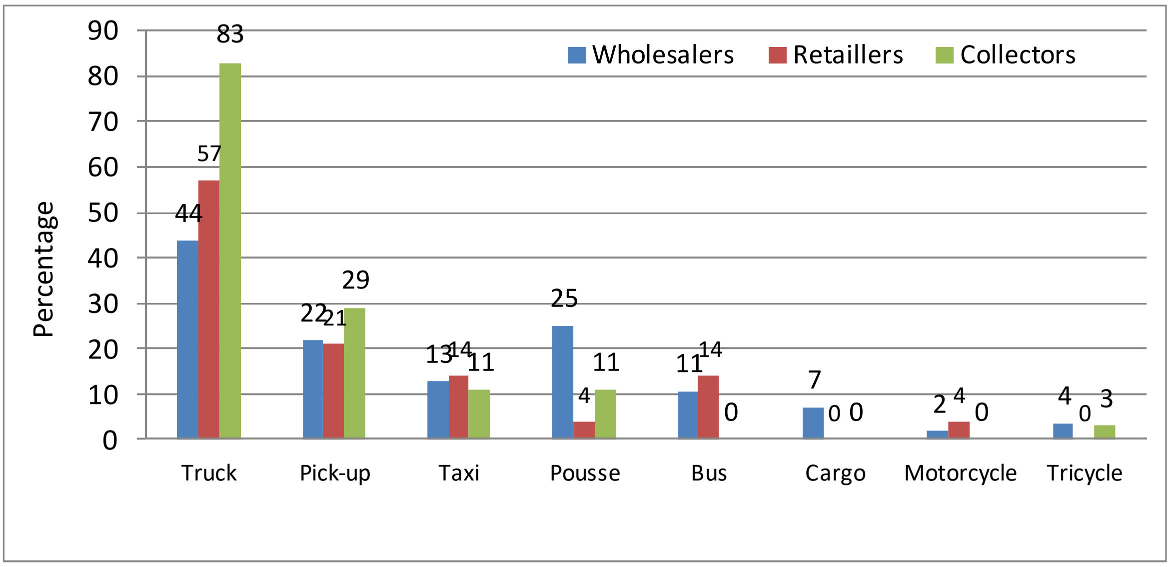

Figure 8: Means of transport used for the transport of plantain

Figure 7 provides information on the main modes of transport. According to the actors in the supply chain, the truck is the most used means of transporting plantain from local markets to the city of Douala, this for nearly 83% of the collectors, 57% of the retailers (here, it is more of the collectors and retailers, who will make purchases in rural markets to come and retail in Douala), 44% of wholesalers. Trucks are mostly used because they have more space and can transport large quantities of agricultural products purchased in markets including plantain for several buyers at a time. Informal contracts are established between buyers and permanent transporters.

There is a fairly large use of pickups by 29% of collectors, 22% of wholesalers and 21% of retailers. Due to difficult access to some rural markets during the rainy season, pickups with a reducer (rear-wheel drive) are more convenient to access these markets and transport agricultural products.

Photo 1: Some modes of plantain transport

Moreover, the use of transport buses is noted especially when they could not buy large quantities of products in a market. Thus, the transport bus is also used by 14% of retailers and 11% of wholesalers. We must also mention the use of rickshaws, city taxis and triple cycles, especially in the city of Douala for the transport of products to the place of sale after off-loading by trucks or after purchases. Finally, we have motorcycles and trucks that are quite timidly used by traders in the city of Douala, but the motorcycle and the transportation of plantain by head and back are very much used by the producers to convey their product from the farms to local markets.

3.7. Integration and structure of markets

Markets are a privileged meeting place between actors. While in large and even smaller cities, sales take place every day, the quantities of plantain that arrive on the shelves vary according to the fairly regular movement of buyers. In rural markets, markets usually take place once a week.

In the course of this study, market prospection and exchange with stakeholders enabled the markets in the city of Douala to be classified into major wholesale and retail markets. The main retail markets for plantain are: Sacker Market, Bépanda-Cité SIC Market, wholesale and retail markets: Grand Hangar, Mambanda, Bonassama, Plantain market of Nkoulouloun (Ngoh Soa), New-Deido, Missoké, Dakar.

To supply urban markets in the city of Douala with plantain, the actors go into rural markets. Most of the rural markets supplying the city of Douala are located within a radius of about 100 km in the production areas of the Moungo Division (Littoral), Koupé-Manengouba (South-West) and about 200 km in the basins of the Menoua Division (West). This would therefore be an advantageous point in view of the fact that losses due to transport would be decreased as well as costs. To get there, some roads are tarred and others are not. It should be noted that the state of advanced degradation of the national road n°5 (Douala-Bafoussam high way) is a handicap for the transport of products, as well as the significant number of roadside check points in addition to the formal toll gates.

Photo 2: Overview of an open air plantain market in Douala

In addition, it should be pointed out that in rural markets, such as those in the city of Douala, there are often no hangars in the plantain markets, and when they exist, they are insufficient. In addition, outside the wholesale markets, plantain is sold throughout the markets in the areas reserved for the sale of other fresh produce. We note that markets are very disorganized. According to the traders, they prefer to sell on the streets (sidewalk or even on the roads) than in counters because they deemed it is too expensive and far from potential customers. As a result, sedentary traders are very often forced to use their pseudo-counters as places of storage.

In rural markets, we note an insufficiency of reception facilities for actors such as hangars and shops. In addition, it should be noted that access to these markets from the National Road n° 5 is very difficult because of the poor condition of rural roads, especially during the rainy season. Also, because some markets start very early in the morning, sellers and buyers are sometimes forced to spend nights on the spot under the stars with all the associated risks. In Penda-Mboko on the other hand there are some reception facilities as well as a large access road and in Mbanga for example we note road accessibility but a lack of hangars on the spot.

Surveys show that there is no formal market information system (MIS) in the Littoral Region. According to the actors, several initiatives were made in the past, but did not last long, because they were carried out on project budgets. Although there is no MIS, with the development of mobile telephones, buyers get information through phone calls from their knowledge in the markets. In addition, others have information by exchanging with other buyers about the market situation.

3.8. Purchase and sale price of plantain by buyers

3.8.1. Purchase prices practiced by traders in rural markets

Table 2: Purchase prices charged by traders

Type of actors	Small bunch	Average bunch	Big bunch	Mean
(in CFAF)				
Wholesalers	1 413	3 295	6 250	3 653
Retailers	1 633	2 949	5 910	3 497
Collectors	1 548	3 069	5 856	3 491
Mean	1 531	3 104	6 005	

*Weight of small bunch:(4 to 12 kg); Weight of average bunch:(12 to 17 kg); Weight of big bunch:(17 to more than 20kg.

Purchase prices of plantain in rural markets vary according to bunch types, sale periods and markets. The study shows that the overall average purchase price for the various actors are CFAF 3 491 for collectors, CFAF 3 497 for retailers and CFAF 3 653 for wholesalers. We do not observe a large price difference according to the actors. This shows that the actors because of their experience in the markets probably have the same purchase prices or agree amongst themselves not to buy plantain too expensive and reduce their profit margins.

On the other hand, taking into account the type of bunch, we observe a variation. Thus, we have an average of 1531 FCFA for the small bunch, 3,104 FCFA for the average bunch and finally 6,005 FCFA for the big bunch. It is reported that there is an important fluctuation of prices in rural markets during the same season and periods. We observe right to a 36% rise in plantain prices.

3.8.2. Average selling prices of traders

Table 3: Average selling prices of traders

Type of actors	Small bunch	Average bunch	Big bunch	Mean
(in CFAF)				
Wholesalers	2 262	4 229	8 021	4 837
Retailers	2 326	3 973	7 679	4 659
Collectors	2 380	4 270	7 942	4 864
Mean	2 323	4 157	7 881	

*Weight of small bunch:(4 to 12 kg); Weight of average bunch:(12 to 17 kg); Weight of big bunch:(17 to more than 20kg

Table 2 above shows that the overall average sale price of the actors is CFAF 4,837 for wholesalers, CFAF 4,659 for retailers and CFAF 4,864 for collectors. Overall, there is no significant difference between the selling prices of actors.

An analysis by type of bunch shows a clear difference in price. Average selling prices are CFAF 2,323 for small bunches, CFAF 4,157 for medium-sized bunches and CFAF 7,881 for large bunches. It is reported that there is an important price fluctuation in the markets of Douala. There is an increase in selling prices for plantain, up to 33% in times of scarcity. An analysis of the price structure makes it possible to assess the proportion of the various components.

Table 4: Structure of plantain prices

	Retailers		Wholesalers		Collectors	
	Mean (CFAF)	Percentage of sale price	Mean (CFAF)	Percentage of sale price	Mean (CFAF)	Percentage of sale price
Buying cost	3 497	75	3 653	76	3 491	72
Transport cost	222	5	330	7	300	6
Profit margin	940	20	855	18	1 073	22
Selling price	4 659	100	4 837	100	4 864	100

An analysis of the structure of the price of plantain shows that in the selling prices of plantain in the markets of Douala, the purchase price of producers or other actors in the chain is between 70 and 75%. The cost of transport varies between 5 and 7%. The profit margins are around 20%. In this structure, it is observed that profit margins are large and depending on the number of intermediaries, this will influence the selling price to the final consumers in the markets.

In addition, whether in the buying or selling of plantain, prices are high and unstable. The seasonality of plantain production to some extent partly contributes to this instability. According to the actors in the sector, other factors explain the phenomenon observed in the markets. Indeed, the problem of the current cost comes from the state of the roads, the strong presence of foreigners (Equatorial Guineans, Gabonese) in the sector, but also violent rains which threaten crops, and climatic changes. According to some actors, since the Equatorial Guineans and the Gabonese have discovered the production basins, they buy directly in the farms, in large quantities and at very high prices. "When we arrive the farmers want to practice the same prices and we are in turn, are obliged to increase the selling price in order to earn something". This combination of factors does not only affect the price of plantain, though of course, it registers the highest price increase. Yam, cocoyam, sweet potato etc. are not left out of this price increase.

This phenomenon of high prices and price instability has been observed for several years in the urban markets of Cameroon in general and those of Douala in particular. Thus, according to Nzié *et al.* (2010), who examined the determinants of price volatility in agricultural products show there are several explanatory factors. In the first place, prices of perishable food products are subject to high volatility, which is higher than that of their potential stockable substitutes (imported products). Seasonality for some of these products to some extent may also contribute to this instability. Second, the expectations of producers and traders (suppliers) on the state of the market based on prices from previous periods, and the price of gasoline, have a significant effect in explaining the prices of food products in towns. The reduction in the stability of the prices of local foodstuffs compared to imported products appears to be an axis of improvement for food security in the cities but also of strengthening the competitiveness of the sectors concerned.

3.9. Profit margin of traders in the city of Douala

The monthly operating account is based on the 'current period' data or surveys.

Table 4: Plantain traders' monthly exploitation account in Douala

Actors		Retailers			Wholesalers			Collectors		
			CFAF			CFAF			CFAF	
Category	Units	Quantity	Unitary cost	Total cost	Quantity	Unitary cost	Total cost	Quantity	Unitary cost	Total cost
Expenses										
Plantain bought	Bunch	423	3 497	1 478 868	400	3 653	1 460 125	500	3 491	1 744 262
Bunch transport	Flat rate	1	94 140	94 140	1	44 134	44 134	1	49 805	49 805
Transport in the city	Flat rate	1	15 918	15 918	1	12 000	12 000	1	14 663	14 663
Travel cost	Ticket	6	5 000	30 000	6	5 000	30 000	5	5 000	25 000
Market ticket	Flat rate	1	2 000	2 000	1	2 683	2 683	1	4 377	4 377
Security	Month	1	1 000	1 000	1	1 571	1 571	1	1 078	1 078
Temporary cost for occupancy of public roads	Month	1	2 500	2 500	1	2 727	2 727	1	2 625	2 625
Handling	H/J	6	1 295	7 768	6	2 175	13 050	5	2 412	12 060
Location Magasin	Month	1	2 452	2 452	1	4 250	4 250	1	1 854	1 854
Sweeping(hygien)	Flat rate	1	1 333	1 333			-	1	1 500	1 500
Other costs	Flat rate	1	3 250	3 250			-	1	3 500	3 500
Communal rights	Flat rate			-			-	5	1 857	9 286
Passage rights	Flat rate			-			-	5	1 000	5 000
Contingencies (5%)	Month	1	81 962	81 962	1	78 527	78 527	1	93 750	93 750
Total expenses				1 721 192			1 649 067			1 968 760
Recipes										
Plantain sales	Bunches	409	4 659	1 904 608	388	4 837	1 878 823	486	4 864	2 366 372
Total income				1 904 608			1 878 823			2 366 372
Gross profit				183 417			229 756			397 612
NB: Percentage of loss during transport of products: 3%										

From Table 4, the figures can be summarized as follows. The quantity of bunches handled by wholesalers and retailers are almost identical during the investigation period (about 400) and 500 for collectors. The estimated monthly expenses for traders from the disaggregation of prices (product purchase, transport, handling, storage, market place, etc.) are: CFAF 1,721,192 for retailers; CFAF 1,649,067 for wholesalers and CFAF 1,968,760 for collectors. The estimated gains are: CFAF 1,904,608 for retailers, CFAF 1,878,823 for wholesalers and CFAF 2,366,372 for collectors. This makes it possible to estimate the gross profits such as: 183 417 FCFA (retailers); CFAF 229,756 (wholesalers) and CFAF 397,612 (collectors).

The collectors register the highest profits in part because of lower costs in the market (space, storage) and the virtual absence of intermediaries between collectors and producers. These estimated profits would justify the longevity of actors in this activity which would allow them to provide for the needs of their modest families. We note a fairly large gap between the profits of retailers and that of wholesalers, which could be explained by the fact that retailers do not only sell plantain during the period of shortage; They can sell in addition to plantain, other consumer products. But for the second hypothesis, it would be a question of the profit margin being favorable to actors, and even though the circuits are not performing well. We accept this hypothesis in the light of the profit margin calculations which show that the gross profits of the traders are all positive and with an average of CFAF 270,262 per month

3.10. Actors constraints

This section focuses on the difficulties encountered by the actors surveyed from different angles of supply, transport and marketing.

3.10.1. Constraints of transporters

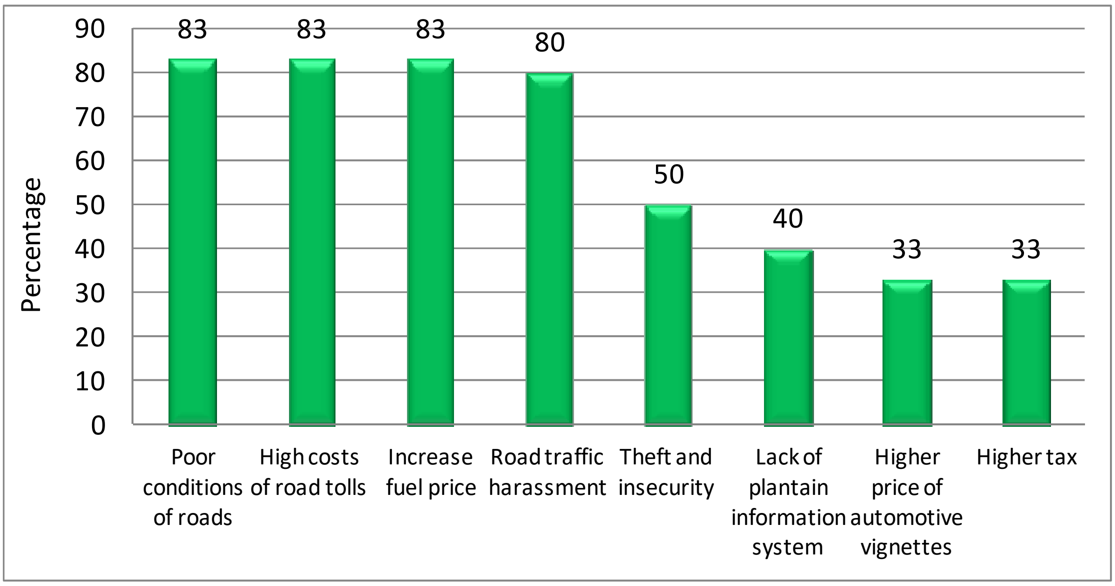

Figure 9: Constraints of transporters

Figure 8 presents the main constraints faced by transporters in the supply of plantain to the city of Douala The study found that the main difficulties faced by transporters were the quality of the roads (poor condition of rural roads and the National Road No. 5), the high costs of road tolls and fuel. Road traffic harassment is not the least because about 80% say they are very annoyed by the many roadside checkpoints carried out by gendarmes and police officers. It should be noted that in these road checks, transporters are obliged to pay informal taxes at each checkpoint, varying from 2,000 to 10,000 FCFA depending on the type of vehicle and the load. There is also, a considerable loss of time, up to 1 hour in case the transporter refuses to pay the informal tax. All these corruptions happen in the sight of all and some administrative authorities are often complicit, because, when denounced, nothing is done.

Finally, we note difficulties such as theft and insecurity (50%) of products in the markets, due to the fact that in the markets, there is a lack of reception and storage facilities for products and plantain, a Formal Information System on prices (as mentioned above, there is no market information system). Lastly, the tax burden, particularly the communal rights, which are quite expensive and the automotive vignettes, in the markets regardless of the quantity of products brought, must be paid.

3.10.2. Constraints of traders

The traders in the city of Douala face several difficulties, the main ones being summarized in figure 9.

Figure 10: Traders constraints

The study shows that theft of plantains and market insecurity are likely to be one of the main constraints to the commercialization of plantain in the city of Douala. These cases of theft are reported both in the markets of Douala and in the rural markets; cases of aggression are also reported. All this is related to the fact that there are no or insufficient market structures.

Secondly, the high cost of transport is not conducive to the development of this activity. This seem to be due to the fact that transporters face numerous harassments when moving products to the various markets. In addition, is also reported the difficulty of having vehicles capable of transporting the products after purchase in rural and other markets.

The lack of information on prices is also very constraining according to the traders, it refers to the difficulty to identify the best areas of supply according to space and time. This situation according to them often leads to breaks in the circuit with moments of severe lack. They are up to 69% of wholesalers in particular to denounce this difficulty. The bargaining power of producers and consumers is impaired if they are not informed on prices in other markets and the level of harvests (PAM, 2013).

Another notorious difficulty is materialized through road traffic and police harassment. These are the thoughts of at least 50% of traders surveyed with up to 61% of wholesalers. This set of harassments is made up of the poor state of roads (rural, urban and even urban), the plethoric number of roadside checkpoints and the loss of time (often hours of immobility) and financial resources, damage to perishable products such as plantain.

The lack of infrastructure in the markets leads to difficulties in storing the products mentioned by about 75% of retailers, most of whom do not use stores (which are quite expensive for some) and use their counters (which are often temporary) as places of storage. Other difficulties are the tax burden imposed by taxes (levies, market place, temporary right of occupation of the road, hygiene and sanitation) which are deemed too high and constitute a rather important constraint. In fact, conflicting relations also arise between tax agents and traders, a situation that the latter finds stressful.

We also note complaints related to the high price of plantain that makes the desired supply quite difficult. This difficulty is often linked to the competition that binds merchants in the city of Douala to foreign buyers, notably the Gabonese who would ‘raise the auction in the collection areas’. This makes situations very difficult for merchants with modest means. If the level of competition is low, traders can easily agree on both producer purchase prices and consumer prices according to PAM (2013); so the increase in competition for traders is quite serious. Finally, we note bad weather (rain, sun, dust ...) that these traders brave in the exercise of their activity, this accounts for 20% of the collectors complains.

4. Conclusion

This work permitted an evaluation of the efficiency of the circuit of supply of plantain in the markets of the city of Douala. The results of the study show that the supply chain is clearly dominated by women with about 75% of actors. On the other hand, transport is exclusively male at 100%. Despite the importance of this activity, the actors prove to be very unorganized.

Moreover, the actors are mainly supplied in the neighboring production areas (Littoral, South-West and West Regions) as well as some markets of the city for others. The plantains purchased do not undergo any particular conditioning, they are transported in bunches in trucks, transit buses, motorcycles, taxis, rickshaws. There is a strong seasonality of supply of plantain in the markets and this leads to a strong price fluctuation in the markets. There are sometimes significant increases in purchase prices of up to 36%. The activity is very profitable for the actors, because, the study allowed an observation of gross profits of: 183, 417 FCFA (retailers); CFAF 229,756 (wholesalers) and CFAF 397,612 (collectors).

Finally, transporters encounter the following constraints: the quality of roads; the cost of road tolls and fuel; police harassment; theft and insecurity in markets; lack of information; the tax burden in particular the communal rights. Constraints include: theft and insecurity; high cost of transport; lack of information; road and police harassment; difficulties related to storage; the tax burden and the high price of plantain.

But given the results, notably through poor coordination of the actors in the markets; high seasonality of prices; strong seasonality of supply and demand; difficult access to information; the almost arbitrary fixing of prices, the supply routes of the city of Douala are not effective.

Improved transport conditions, with the adoption of cardboard transport of plantain, better organization of actors, a reduction in roadside checkpoints, road and police harassment and the construction of infrastructure in markets are needed and would significantly improve the performance of the supply system of Douala in plantain.

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