



Research Paper

Commercial dynamics and actors involved in the plantain trade between Alibuku and Kisangani (DRC).

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Abstract

Plantain plays a crucial role in food security and the local economy of Kisangani, as a staple food and source of income for many stakeholders, including vendors and transporters. However, the plantain value chain, from production to marketing, remains poorly structured and lacks reliable data. This study analyzes the mechanism of plantain trade between Alibuku and Kisangani, identifying the actors in the sector, the marketing channels, the logistical means used, the economic profitability as well as the constraints encountered and the possible solutions.

A mixed qualitative and quantitative survey was conducted among 75 plantain traders in Kisangani, selected using purposive sampling.

The results reveal that 94.7% of the traders are women, the majority of whom are married, with 78% having a secondary education. Their ages range from 25 to 58 years, with an average of 37.1 years, and an average experience of 7.49 years.

Three marketing channels were identified: the long channel (producers, wholesalers, retailers, consumers), the short channel (producers-consumers), and self-consumption.

Transportation, previously handled by trucks, is now carried out by motorcycles and bicycles due to poor road conditions. The net marketing margin is 1,220 CFA francs for wholesalers and 2,534 CFA francs for retailers per 13.5 kg bunch. Major constraints include plantain rot, road conditions, multiple taxes, high transportation costs, and a scarcity of buyers.

Keywords: Plantain, trade, stakeholders, Alibuku and Kisangani.

Received 08 Oct., 2025; Revised 17 Oct., 2025; Accepted 19 Oct., 2025 © The author(s) 2025.

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I. INTRODUCTION

Plantain is a staple food in the diets of urban and rural populations in the Democratic Republic of Congo (DRC). In Kisangani, the capital of Tshopo Province, it constitutes an essential source of carbohydrates and an important base for many culinary preparations. This growing demand for plantain is largely met by production from the Alibuku region, located about fifty kilometers from the city of Kisangani. This area is recognized as a veritable agricultural production basin thanks to the availability of arable land and the commitment of local communities to food crops, particularly plantain (Ngoma, 2021).

Plantain plays a central role in food security and the local economy in Kisangani. It is not only a staple food for many families, but also an important source of income for producers, traders, and transporters in the region (Muliwambene et al., 2020).

Despite its importance in the local economy, studies on plantain marketing remain limited. The plantain value chain, from production to marketing, remains poorly structured and suffers from a lack of reliable data on distribution channels, profit margins, and the obstacles encountered by traders (Tshibanda, 2020). This lack of scientific attention hinders the optimization of the economic potential of this agricultural product in the Kisangani region.

The overall objective of this study is to analyze the mechanisms of plantain trade between the Alibuku region and the city of Kisangani, with a view to proposing strategies to optimize the value chain and strengthen the sustainability of this activity. More specifically, it will involve identifying the different actors involved in the plantain marketing sector, studying the marketing channels, as well as the logistical means used, evaluating the economic profitability of the activity for producers and traders, analyzing post-harvest losses, the major obstacles encountered in this sector and the possible solutions.

II. SETTING AND METHODS

2.1. STUDY SETTING

This study was conducted in the city of Kisangani, located in the northeast of the Democratic Republic of Congo (DRC) in the heart of Tshopo province. Its geographic coordinates are: Latitude approximately 0° 31' N, Longitude approximately 25° 12' E, and Altitude 400 m. The city of Kisangani is located approximately 320 km from Isiro to the northeast, approximately 300 km from Buta to the north, approximately 400 km from Bumba to the west along the river, approximately 600 km from Goma to the east, and approximately 1000 km from Mbandaka. Currently, the city of Kisangani comprises six communes (Makiso, Tshopo, Mangobo, Kabondo, Kisangani, and Lubunga) and a peri-urban entity called "Lubuya-bera."

Although the city of Kisangani comprises six communes, our study only focused on the communes of Makiso and Tshopo, where the central market and the 11th Avenue Tshopo market, respectively, are located, where plantain traders from the Alibuku region are located. Figure 1 below shows a map of the city of Kisangani and its surrounding areas.

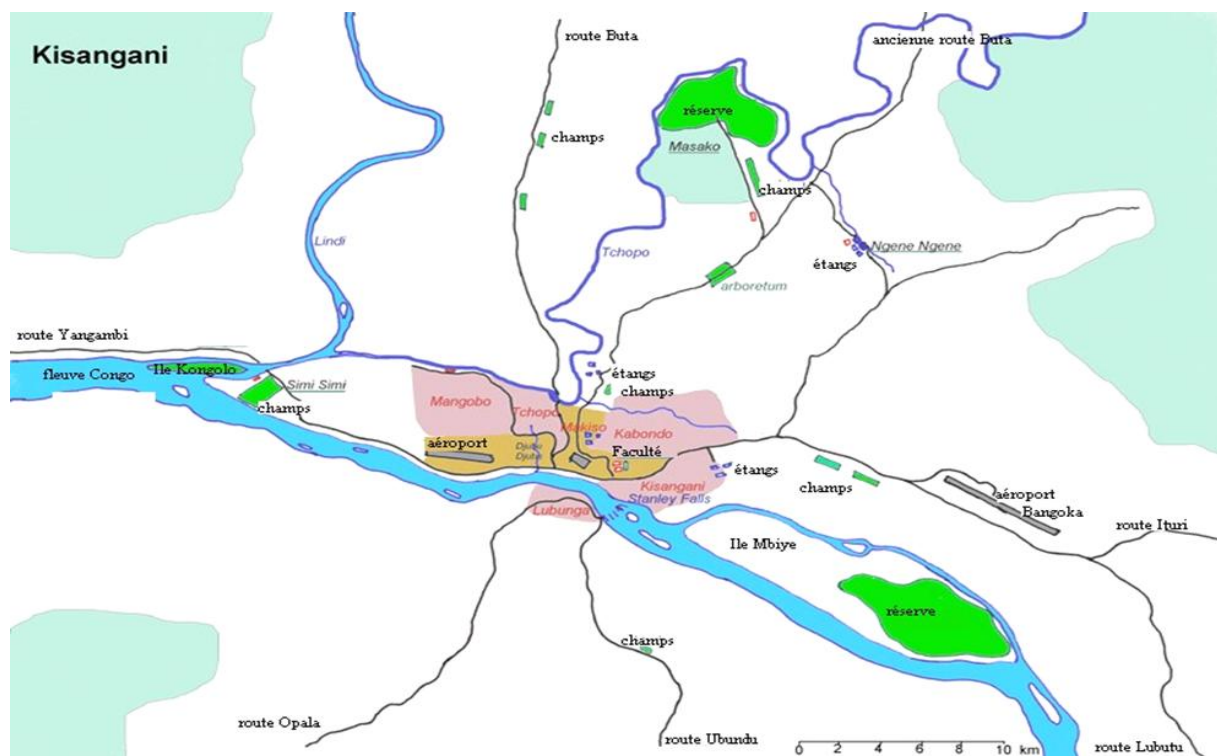


Figure 1 : Map of the city of Kisangani and its surroundings (N'shimba, 2008).

Kisangani is generally flat with some slight undulations. The city lies on an alluvial plain formed by the Congo River and its tributaries. There are marshy lowlands and areas prone to flooding during periods of high water. A few hills border the plain towards the outskirts of the city. This configuration favors urbanization but exposes certain areas to flooding.

The city of Kisangani has a hot and humid equatorial climate year-round. Average temperatures range between 24°C and 27°C, and rainfall is abundant, exceeding 1,800 mm per year. There is no marked dry season, but there is a slight decrease in rainfall between December and February. Relative humidity is generally high, often above 80%, and the lush vegetation reflects a climate favorable to forests. (Van Wambeke et al., 1956).

The soils of the city of Kisangani belong mainly to the Ferralsols (FAO classification) or Oxisols (USDA), characteristic of the central Congolese basin, they come from intense alterations of rock of the upper Proterozoic, with clayey-sandstone covers and sandy-clayey texture, poor in humus, powdery structure on the surface, finely then frankly granular in depth, red to yellow ochre in color linked to the abundance of iron and

aluminum sesquioxides. These soils are acidic ($\text{pH} < 6$), the low cation exchange capacity often $< 16 \text{ meq}/100\text{g}$, a mineralogy with a dominance of kaolinite. The soils of the city of Kisangani are deep, very permeable favoring infiltration but sensitive to leaching and susceptible to water erosion during intense rains. (Kombele, 2004).

From a socioeconomic perspective, Kisangani is an important economic and commercial center of the country thanks to its strategic position on the Congo River. It acts as a crossroads between the east and west of the country, thus facilitating the exchange of goods and services (Mwilambwe, 2018). However, the city faces major socioeconomic challenges, including high unemployment, a dominant informal economy, and insufficient modern infrastructure (UN-Habitat, 2021). The agricultural sector remains vital, but underexploited due to a lack of investment and appropriate technologies. Despite these constraints, Kisangani remains a major academic and cultural center, with strong potential for future development (Mukuna, 2020).

2.2. MATERIALS

To properly conduct this research, the following materials were used :

- ☐ Android telephone with GPS ;
- ☐ A balance
- ☐ Investigation questionnaire ;
- ☐ A note note ;
- ☐ a pen and
- ☐ A computer

2.3. METHOD

2.3.1. Sample size determination

The selection of plantain traders (wholesalers and retailers) in the city of Kisangani was made using non - probabilistic sampling, more precisely according to the reasoned choice sampling method. The traders included in the sample were retained on the basis of five essential criteria :

- Only merchants selling at least 20 plantain diets per week ;
- the geographic location of traders ;
- seniority in the activity : only traders justifying a minimum experience 1 year in the sale of plantains ;
- the frequency of supply, selected merchants had to obtain supplies at least once a week and ;
- the origin of plantain ; Only merchants distributing plantain from the Alibuku region ;

Thus, 50 wholesalers were selected, including 30 at the central market in Kisangani and 20 at the 11th Avenue Tshopo market. As for retailers, their workforce was 25 people, including 15 people at the central market and 10 people at the 11th Avenue Tshopo market.

2.3.2. Data collection on the marketing of plantains

The first phase of data collection was to do a pre-investigation in order to identify traders who will meet the sampling criteria. Still in this phase, all accessible media or means have been used as part of documentary research. The second phase is that of collecting information itself. This information was collected by the surveys. She consisted in questioning the respondents by semi-direct interview, without any time influenced their choice in the responses. To facilitate the collection of information two types of survey questionnaire, one of which is intended for wholesalers and the other for plantain trading retailers were used. These two types of questionnaire were printed on the papers.

The data was collected in two markets in the city of Kisangani : central market (March 15 market) and market for the 11th Avenue Tshopo, during a period from March to May 2025.

2.3.3. Data analysis

The analysis of the data of this study was articulated around two additional aspects : a statistical analysis and an economic analysis.

a) Economic analysis

From an economic point of view, the analysis carried out is that of the margin of marketing.

- ☐ The calculation of the margin of marketing was carried out using the following formula :

$$1^{\circ} \text{ MB} = \text{PVM} - \text{PAM}$$

Or :

- MB means gross margin
- PVM represents average selling price,
- PAM is the average purchase price.

$$2^{\circ} \text{ MN} = \text{MB} - \text{CI}$$

Or :

- MN it's the clear margin,
- CL represents the logistical cost.

b) Statistical analysis

The information collected by survey was entered and analyzed in Microsoft Excel and SPSS 20.

Statistical data analysis was carried out according to the nature of the variables. The qualitative variables were analyzed using frequency tables, percentage and histograms. These tools have made it possible to describe the distribution of the modalities of the categorical variables.

With regard to quantitative variables, a descriptive analysis has been carried out. The indicators used included the minimum, the maximum, the average, the median and the statistical tables. These methods made it possible to summarize the central trends and the dispersion of digital data.

III. RESULTS AND DISCUSSIONS

3.1. RESULTS

3.1.1. Soci-demographic characteristics of plantain sellers

Table 1 presents the distribution of plantain's sellers, supplied to Alibuku and reselling to Kisangani, according to their sex, their level of education and their civil status.

Table 1 : Distribution of sellers according to sex, civil status and the level of study

variables	Terms and Conditions	Staff	Percentage
Sexe	Féminin	71	94,7
	Masculin	4	5,3
Etat civil	Marié (e)	65	86,7
	Célibataire	10	13,3
Niveau d'étude	Sans étude	4	5,3
	Primaire	12	16
	Secondaire	59	78,7

The results obtained reveal a strong female predominance among Kisangani plantain sellers supplier in Alibuku, with 94.7% of women against only 5.3% of men. This situation reflects the central place occupied by women in small food business activities, often considered an extension of their traditional household food management role.

In addition, the high proportion of married people (86%) compared to singles (13.4%) suggests that this activity constitutes a family economic strategy, aimed at supporting the home and diversifying sources of income.

In terms of educational terms, the majority of sellers (78.7%) have a secondary level, compared to 16% with a primary level and only 5.3% without studies. This profile testifies to a significant participation of people relatively educated in this business, which could influence the way in which they manage transactions and relations with customers and suppliers.

These results thus show that plantain's trade in Kisangani, although anchored in traditional practices, mobilizes a mainly married female workforce with a minimum of secondary education.

Table 2: distribution of the age of sellers and their experience in the activity

Settings	Age	Experience in the activity
Minimum	25	1
Average	37,1	7,49
Maximum	58	35

The results show that the age of traders who source plantain from Alibuku to sell in Kisangani ranges from 25 to 58 years, with an average of 37.1 years. This average places the majority of traders in the active adult age group, generally considered the most economically productive. The minimum age of 25 suggests that the activity also attracts young adults who likely enter the trade after acquiring a certain autonomy or starting capital. The maximum age of 58, for its part, reflects the presence of older traders, indicating that this activity can be carried out over a long period and does not necessarily require intense physical strength, but rather experience and a network of contacts. This wide dispersion of ages could also reflect relatively open access to commercial activity, without major restrictions related to age.

Traders' experience ranges from 1 year to 35 years, with an average of 7.49 years. This relatively modest average indicates that many traders have less than ten years of experience, which could be linked to a recent expansion of the plantain trade or the growing appeal of this sector in the region. The presence of a minimum of one year suggests that the activity is accessible to beginners, while the maximum of 35 years shows that there are very experienced actors, probably key figures in this trade. This heterogeneity in terms of

experience may encourage a transfer of know-how between old and new traders, and reflect a new generational dynamic in the activity.

By crossing the two parameters, it appears that the plantain trade in this circuit (Alibuku-Kisangani) mainly attracts middle-aged adults with varying experience, ranging from beginners to seasoned traders. This combination may indicate a growing sector where newcomers see an economic opportunity, while coexisting with older traders who probably have better access to supply networks and customers. On the socio-economic level, these results highlight that the activity is not reserved for a specific age group and can constitute a sustainable source of income for different profiles.

3.1.2 Plantain Marketing Channel

Figure 2 shows the diagram of the plantain marketing channel between the Alibuku region and Kisangani.

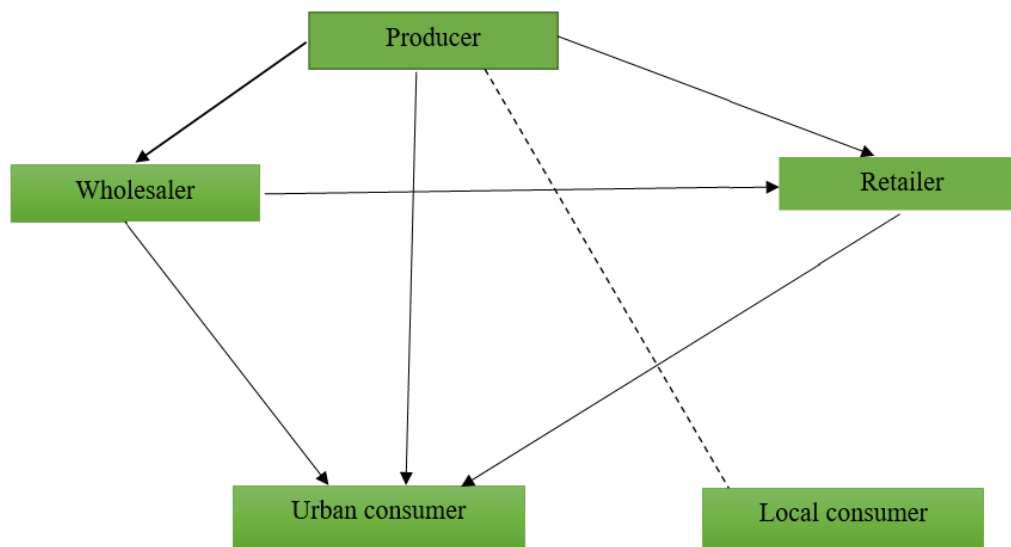


Figure 2. Plantain marketing circuit between the Alibuku region and Kisangani.

Figure 2 shows that plantain production in Alibuku is heavily oriented toward the urban market, particularly the city of Kisangani. Plantain sales are organized around three main circuits :

- The long circuit : Producer → Wholesaler → Retailer → Urban consumer. This circuit involves several intermediaries. It is primarily intended to supply urban markets, particularly that of Kisangani. This circuit allows for better distribution in the city, but likely reduces the producer's direct income due to the presence of several links.

- Short circuit : Producer → Urban consumer (in Kisangani). In this case, the producer sells directly to the consumer, often via transportation to the city. This means of transportation can be either a motorcycle or a bicycle, and it is often done by the producer who owns the means of transportation. This circuit can be more profitable for the producer because it eliminates intermediaries.

- Self-consumption : Production → Producer's Household

Some plantain is consumed directly by the producer and their family. This shows that in this region, despite its commercial orientation, plantain remains an important household staple.

Furthermore, it should be noted that sales to local consumers are almost nonexistent. This indicates that plantain is primarily grown as a cash crop, intended for sale outside the region, particularly to urban areas like Kisangani. It is understandable that plantain is seen by producers as a source of income and not as a staple food to be traded locally. Producers are closely tied to urban demand. Any variation in this demand (price, market access, logistics) could affect their income. Wholesalers and retailers play a central role in distribution, but they can also capture a significant share of the added value. The absence of a local market could be seen as an opportunity to develop markets or local processing channels.

3.1.3 Logistics and Dynamics of Plantain Transportation in the Alibuku Region

To transport these products from the village to the city of Kisangani, traders use bicycles and motorcycles, considered faster and more reliable alternatives.

It should be noted that about ten years ago, trucks were the main means of transportation connecting producing villages to urban markets. However, this mode of transportation has gradually been abandoned by traders.

Indeed, recurring truck breakdowns, combined with the poor condition of the roads, led to long interruptions in the journey, causing the deterioration of the agricultural products being transported, particularly plantain. This situation has prompted a shift to more flexible means of transportation, capable of traveling even on roads in poor condition, thus ensuring better preservation of product quality and reducing post-harvest losses.

This observation highlights the importance of adapting transport systems to local realities to ensure the viability of the agricultural sector or value chain in rural Africa.

3.1.4. Types of Marketed Products

Producers in the Alibuku region adopt a marketing strategy focused on the rapid sale of green plantain, without waiting for it to ripen (i.e., without waiting for the bunches to turn yellow). This practice is motivated by a desire to avoid post-harvest losses, particularly due to a lack of appropriate preservation methods.

This early sales system results in direct sales to wholesalers, who in turn supply retailers with the same plantain while it is still green. This rapid distribution chain limits storage time for each stakeholder, thus minimizing the risk of product spoilage.

The lack of adequate preservation infrastructure pushes stakeholders to quickly sell the product as soon as it is harvested, even if it has not reached its optimal consumption stage (yellow plantain is generally more sought-after for certain culinary preparations). This method helps reduce losses but can also influence the perceived quality and selling price of the plantain.

3.1.5 Plantain Prices

The pricing system in the Alibuku and Kisangani regions is based on bunch size. The practice of setting prices based on bunch size indicates a qualitative valuation system. This means that the value of an agricultural product (plantain) is not simply determined by quantity, but by observable qualitative criteria, namely size. This type of system is common in poorly structured or local markets, where visual or empirical criteria dominate valuation.

This system reflects limited information asymmetry, where buyers and sellers have a common perception of what constitutes a "large" or "small" bunch, likely in the absence of standardized norms. This can create price variability even for the same number of bunches, depending on their size.

According to surveys in the city of Kisangani, individual price-setting decisions by producers are also observed. The fact that each producer sets their own price individually, without coordination with a group or cooperative, indicates an atomized market structure. This means that agricultural producers act autonomously, without internal regulation of the local market.

The consequences for market dynamics include weak collective bargaining power, high exposure to market fluctuations (intermediaries can impose their prices), and a lack of collective governance that prevents price harmonization, which can disadvantage some isolated producers.

The survey shows that bunches are sold in bulk, 12 bunches for 30,000 CFA francs. This overall price allows for the calculation of an average unit price. This yields a price of 2,500 CFA francs per bunch and provides a basis for analysis to compare average prices elsewhere or by size.

Wholesale indicates a batch distribution system, often intended for resellers or urban transporters. This marketing method suggests a search for rapid liquidity, as wholesale allows for the sale of a large quantity in a single transaction.

The average quantity purchased by wholesalers is 594 kg, representing 44 bunches. This indicates a semi-bulky sourcing strategy, typical of an intermediary trade between rural producers and urban markets. The average volume of 594 kg shows that these wholesalers are neither very small players (local resellers) nor very large industrial distributors, but rather often mobile intermediaries. The unit resale price per bunch ranges from 4,000 to 6,500 FCFA.

This survey further shows that plantain retailers operating between Alibuku and Kisangani engage in a structured business activity around the purchase of plantain bunches, their processing into smaller sales units (piles), and their resale on the urban market.

On average, a retailer purchases 26 bunches, each weighing approximately 13.5 kg, for a total of 351 kg of plantain per transaction. The purchase price of a bunch is 6500 FC, while the sale of the same bunch, once cut into small piles, brings in 10900 FC. Thus, this commercial practice illustrates an informal but effective distribution strategy, which is based on adapting volumes to local demand and on the ability to create added value without industrial processing, only through packaging and targeted resale.

3.1.6. Annual change in the price per kilogram of plantain in Kisangani.

Figure 3 illustrates the annual change in the price per kilogram of plantain in Kisangani between 2021 and 2024.



Figure 3 : Change in plantain prices per kilogram in Kisangani.

Source : INS/TSHOPO

The change in the price of plantain per kilogram in the city of Kisangani over the period from 2021 to 2024 reveals a general upward trend. This price increase can be interpreted in light of several economic and economic factors that influence supply and demand in the local market. A scientific analysis of these data highlights the inflationary dynamics affecting the agrifood sector in this region.

From a quantitative perspective, the average price increased from 604 FCFA/kg in 2021 to 1120 FCFA/kg in 2024, representing a total increase of 85.4% over a three-year period. This progression is not, however, linear: between 2021 and 2022, the increase was particularly marked (+34.77%), possibly reflecting a significant external shock, such as a sudden drop in production, a disruption in the supply chain, or an increase in transport costs. In 2023, price growth slowed (+7.49%), which could indicate a period of adjustment or a temporary improvement in market conditions. On the other hand, in 2024, the increase picks up significantly (+28%), which could reflect a return of tensions on the market, perhaps linked to widespread inflation, a depreciation of the local currency, or even the effects of climate change on harvests.

3.1.7. Marketing Margin

1°) Gross Marketing Margin

Table 3 presents the gross margins earned by the main plantain sector players in the city of Kisangani, namely wholesalers and retailers.

Table 3 : Presentation of Gross Margins by Player (FC/Regime)			
ACTOR	PAM	PVM	MB
Wholesaler	2500	6500	4000
Retailer	6500	10900	4400

With PAM : Average Purchase Price – PVM : Average Selling Price – MB : Gross Margin

The analysis of Table 3 indicates that in Kisangani, retailers in the plantain sector generate a higher gross marketing margin (4,400 FCFA) than wholesalers (4,000 FCFA). This suggests a market structure where retailers exercise greater pricing power, likely due to their proximity to the end consumer. The small margin difference could also indicate limited competition or higher operating costs for retailers. This situation may reflect an imbalance in the value chain.

2°) Net Marketing Margin

Table 4 presents a summary of logistics costs and net margins associated with each retailer in the chain, allowing for an assessment of economic performance.

Table 4 : Presentation of Net Margins by Operator (FC/13.5 kg Package)

Actor	Gross margin	Transportation	storage	Tax	other costs	total logistics cost	Net margins
Wholesaler	4000	830	1000	650	300	4646	1220
Retailer	4400	0	706	660	500	1866	2534

The result in Table 4 shows the analysis of marketing margins in the city of Kisangani. It reveals a significant disparity between the two main actors in the distribution chain: wholesalers and retailers. The data shows that retailers obtain a net margin of 2534 FC, which is double that of wholesalers, which is 1220 FC. This difference reflects a better economic profitability for retailers in this commercial activity.

This situation can be explained by the very nature of the operations carried out at each level of the chain. Wholesalers are mainly involved in the bulk purchase and transport of plantain from production areas to urban markets. These operations require greater investment in logistics, storage, and handling, while maintaining relatively low resale prices to ensure the rapid flow of large quantities. Consequently, even if wholesalers process high volumes, their net unit margins remain low.

In contrast, retailers sell plantain in small quantities directly to end consumers, often at much higher prices. Their proximity to end demand allows them not only to charge higher unit prices, but also to adapt the presentation and services (cutting, sorting, accessibility), which increases the perceived value of the product. Thus, although they operate on lower volumes, retailers realize higher net profits per unit sold.

3.1.8. Access to Credit

Table 5 presents the main stakeholders involved in the plantain sector in the Alibuku region, namely wholesalers and retailers, as well as the proportion of each with access to credit.

Table 5 : Presentation of stakeholders' credit access rates

Actor	Access to credit			
	Yes	No	Total	Rate (%)
Wholesaler	16	41	57	28
Retailer	3	22	25	12
Total	19	157	176	10,8

Analysis of the data in Table 5 reveals significant inequality in access to financial credit among plantain sector stakeholders. 28% of wholesalers access credit, but only through an informal system ("Lambert Bank"), reflecting a lack of formal financial inclusion and reliance on unregulated credit mechanisms, often under unfavorable conditions.

12% of retailers have access to credit through formal financial institutions (FINCA, SMICO), although this proportion remains low. This suggests a slow pace of financial integration in the downstream sector, likely linked to better structuring or the perceived solvency of retailers by the institutions.

Regarding the characteristics of retailer loans (FINCA, SMICO), the principal amount is \$1,000 with a repayment term of 9 months and an interest rate of 44%. This credit is provided by microfinance institutions. The effective annual interest rate, if linear, is approximately 58.7% per annum, which is relatively high but remains within the range of microfinance in Africa. This rate can be explained by the perceived risk, the high management costs, and the lack of formal guarantees. The term (9 months) is relatively compatible with plantain marketing cycles.

For wholesalers, the principal amount of the loan ranges from 100,000 FC to 200,000 FC with a repayment term of 1 month and an interest rate of 25%. This informal loan is characterized by a very high monthly interest rate, equivalent to an annual interest rate exceeding 300%. A relatively small amount and very short term, suitable for immediate cash flow needs, but extremely costly. This type of financing is typical of informal credit systems, which are often exploitative, exposing beneficiaries to the risk of over-indebtedness.

3.1.9. Marketing Constraints

Survey results show that wholesalers and retailers transporting plantain from Alibuku to Kisangani face several challenges that hamper the profitability of their business. These constraints include :

- Plantain rotting during sale: Plantain is a perishable product. If traders don't sell it quickly, it begins to rot, leading to losses. This puts pressure on sellers to sell the goods quickly, often at any price.
- Poor road conditions: The roads between Alibuku and Kisangani are in poor condition, making transportation difficult, long, and risky. This delay in transportation makes journeys more expensive.
- Too many road taxes: Along the way, traders must pay numerous taxes or fees imposed by various checkpoints. These additional costs reduce their profits and make the trade less attractive.
- High transportation costs: Due to the distance, poor road conditions, and multiple taxes, transportation costs become very high. This is reflected in the selling price, making plantain more expensive for consumers and more difficult to sell.
- Scarcity of buyers in Kisangani: Once they arrive in Kisangani, traders find few buyers. This low demand forces them to lower prices to sell more quickly, often below the purchase and transportation costs, which causes losses.
- Combination with cassava to speed up sales: Faced with the slow sales of plantain alone, some retailers combine it with cassava to attract customers and sell more quickly. This strategy aims to reduce losses due to rotting.

3.1.10 Strategies for Improving the Plantain Marketing System

To address the constraints listed above, the following solutions are proposed :

- It would be useful for stakeholders to be made aware of plantain preservation and processing techniques;
- For stakeholders to be able to advocate with local authorities for regular maintenance work on strategic roads;
- To ease the burden of road taxes, traders can form cooperatives to negotiate with local authorities for a reduction or harmonization of taxes imposed on the route;
- Regarding the high cost of transportation, sharing transportation between several traders can significantly reduce logistics costs;
- Given the scarcity of buyers in Kisangani, it would be useful to develop local and regional marketing strategies, such as agricultural fairs or the use of digital platforms to reach more potential buyers.

IV. DISCUSSIONS

Three marketing channels dominate the plantain distribution chain in the region:

- The long channel: involves several intermediaries, namely: producer, wholesaler, retailer, and consumer. This type of channel is common in areas with surplus production, where producers do not always have direct access to urban markets or logistical means. This channel allows for the sale of large quantities, but results in a lower profit margin for the producer due to the multiple transaction levels (Kibungu, 2019). Furthermore, it makes the final price of the product higher for the urban consumer.
- The short channel: the producer sells directly to the consumer, either at the farm or at the local market. This channel is more advantageous for the producer in terms of profitability, as it eliminates the costs associated with intermediaries (Beldegué et al., 2008). However, it remains limited in volume and geographic reach.
- Self-consumption: part of the production is intended for family consumption. This mode of product destination reveals the crucial role of plantain in the food security of producer households (FAO, 2019). It also reflects a mixed agricultural system, both in substance and in terms of market.

The coexistence of these three channels reveals a relatively diverse marketing system, also marked by certain vulnerabilities: weak producer organization, lack of means of transportation, and poor access to price information (IFAD, 2018).

Surveys show that plantain pricing is based on an informal system structured around three main elements: bunch size, individual decision-making by the producer, and wholesale sales primarily to traders or intermediary buyers. This system is consistent with the logic observed in rural areas of Central Africa, where market regulation is based on empirical, often community-based, standards rather than formal or institutionalized mechanisms.

Bunch size is one of the determining criteria in determining plantain prices. It is perceived as a visual and tangible indicator of product quality and profitability. This observation is consistent with the results of Temple and Kwatche (2005), who show that in plantain-producing areas of Central Africa, traders and producers assess quality primarily by eye, based on the size, number of fingers, and apparent weight of the bunch. This subjective assessment allows for the categorization of bunches (small, medium, large), which is then used to pragmatically set prices.

Plantain is a highly perishable product, particularly sensitive to heat and humidity. The lack of storage facilities (cold storage, processing techniques) accelerates rotting, especially when there are delays in transport to market. This perishability reduces the commercial shelf life of plantain, leading to significant post-harvest losses, which can reach up to 30-40% according to some studies (Adegbola and Gardebroek, 2007). The condition of rural roads in agricultural areas such as Alibuku poses a major obstacle to the smooth flow of trade. During the rainy season, the roads become impassable, increasing transport times and costs. This phenomenon has been widely documented in sub-Saharan Africa, where inadequate transport infrastructure compromises the integration of rural areas into urban markets (Minten et al., 2012).

The direct consequence of road deterioration is increased logistics costs. Transporters charge high fares to cover the risks and increased wear and tear on their vehicles. This situation is exacerbated by the lack of competition on some rural transport routes, giving rise to a form of local monopoly (Barrett, 2008). Small traders, particularly women, are the most affected.

Legal and illegal taxes imposed at various points in the chain squeeze profit margins. This phenomenon of "informal taxation" is common in several rural African regions where the State has little presence and where various local authorities impose their own tax system (Collier & Gunning, 1999).

V. CONCLUSION

The objective of this study was to analyze the mechanisms of plantain trade between the Alibuku region and the city of Kisangani, with a view to proposing strategies to optimize the value chain and strengthen the sustainability of this activity.

A qualitative and quantitative survey was conducted in the city of Kisangani among 75 plantain traders, selected using a purposive sampling method.

The survey results reveal that the plantain trade is predominantly carried out by women, representing 94.7% of traders. The vast majority of traders are married. Furthermore, 78% of those involved in this trade have a secondary education.

The traders who source plantain from Alibuku to sell in Kisangani range in age from 25 to 58, with an average of 37.1 years. This average places the majority of traders in the active adult age group. Traders' experience ranges from one to 35 years, with an average of 7.49 years. This relatively modest average indicates that many traders have less than ten years of experience. The results reveal three modes of plantain distribution. The long supply chain involves producers, wholesalers, retailers, and consumers. The short supply chain directly connects producers and consumers. Finally, a portion of the production is intended for self-consumption.

This same result further shows that ten years ago, plantain transport from Alibuku to Kisangani was primarily done by truck, but this method was abandoned due to road conditions. Today, traders instead use motorcycles and bicycles, which are better suited to current conditions.

The net marketing margin per 13.5 kg bunch is 1,220 FCFA for wholesalers sourcing from Alibuku and selling in Kisangani. For retailers, this net margin amounts to 2,534 FCFA per bunch. Surveys conducted among plantain traders reveal several marketing constraints. These include plantain rot, poor road conditions, multiple taxes, high transportation costs, and a scarcity of buyers.

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